

Doctor of Philosophy

Thesis

School of Educational Studies and Leadership

The impact of social influences on the financial knowledge, attitudes and behavior of teenagers and young adults

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Academic papers

This doctoral thesis has been completed by preparing a series of eight academic papers which have been either published or accepted for publication. Consequently, there may be a small amount of repetition between the introductions and references in some chapters. Table 1 below outlines the eight papers and provides details on the authors, the contribution of the candidate to the papers, journals for publication, and current status at the time of printing of this thesis. Permission has been granted by journal publishers to include these papers in this thesis.

Table 1.1 Thesis chapters, paper titles, authorship and candidate contribution, journal and current publication status for each of the four journal articles produced for this thesis.

| Chp | Paper title | Authors | Contribution of candidate | Journal | Status |
|-----|---|-----------|---------------------------|---|---------------------|
| 2 | What is Happening to Girls Studying Economics in Low Decile Schools? | Agnew, S. | Sole Authorship | <i>New Zealand Journal of Applied Business Research</i> | 2010: 8(2) 43-57. |
| 3 | Accounting for Differences: What Impact do Decile and Gender Have on NCEA Level Three Accounting Results? | Agnew, S. | Sole Authorship | <i>Journal of Modern Accounting and Auditing,</i> | 2011: 7(6) 634-644 |
| 4 | Has the Academic Performance of Low Socioeconomic Students and Students from Ethnic Minorities Improved in the Subject of Economics over the First Five Years of a Standards-Based Assessment Regime? | Agnew, S. | Sole Authorship | <i>Citizenship, Social and Economics Education</i> | 2011: 10(1) 3-13 |
| 5 | Accounting for the NCEA: Has the Transition to Standards-based Assessment Achieved its Objectives? | Agnew, S. | Sole Authorship | <i>Australasian Accounting Business and Finance Journal</i> | 2010: 4(4) 87-102 |
| 6 | The Financial Literacy of Maori Relative to Europeans in N.Z. | Agnew, S. | Sole Authorship | <i>Journal of Business Leadership,</i> | 2013: 19(1) 102-116 |

| | | | | | |
|---|--|------------------------------|--|---|-----------------------|
| 7 | The influence of consumer socialisation in the home on gender differences in financial literacy | Agnew, S & Cameron-Agnew, T. | Sole responsibility for literature review, methods, and analysis sections, as well as all data collection and survey design. Introduction and findings/discussions written in conjunction with co-author | <i>International Journal of Consumer Studies</i> | 2015: <i>In Press</i> |
| 8 | The Influence of Gender and Household Culture on Financial Literacy Knowledge; Attitudes and Behaviour | Agnew, S & Cameron-Agnew, T. | Sole responsibility for literature review, methods, and analysis sections, as well as all data collection and survey design. Introduction and findings/discussions written in conjunction with co-author | <i>Journal of Financial Management, Markets and Institution</i> | 2015: <i>In Press</i> |
| 9 | Financial Literacy and Student Attitudes to Debt: A cross national study examining the influence of gender and ethnicity | Agnew, S & Harrison, N. | Candidate wrote paper, then provided with feedback from co-author. Candidate collected all data in New Zealand. Survey design was shared between candidate and co-author. | <i>Journal of Retailing and Consumer Services</i> | 2015: 25 122-129 |

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Chapter Nine

Agnew, S. and Harrison, N. (2015). Financial Literacy and Student Attitudes to Debt: A cross national study examining the influence of gender and ethnicity. *Journal of Retailing and Consumer Services*, (25): 122-129.

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Agnew 67%

Harrison 33%

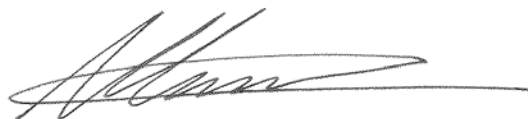
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Appendix E

Harrison, N., Agnew, S. and Serido, J. (2015). Attitudes to debt among indebted undergraduates: A cross-national exploratory factor analysis. *Journal of Economic Psychology* (46) p. 62-73.

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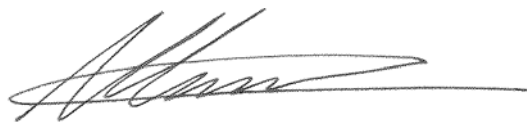
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Appendix B

Agnew, S. and Hickson, S. (2012). Using online assessment to replace invigilated assessment in times of a natural disaster: Are some online assessment conditions better than others? *Journal of Open, Flexible and Distance Learning* 16(1) p. 1-13.

Please detail the nature and extent (%) of contribution by the candidate:

Agnew 60%

Hickson 40%

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Appendix C

Hickson, S. and Agnew, S. (2013). Assigning grades during an earthquake - shaken or stirred? *New Zealand Economic Papers* 47(3) p. 288-303.

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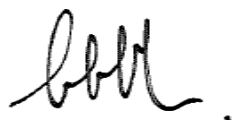
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Chapter Eight

Agnew, S. and Cameron-Agnew, T. (2015), The Influence of Gender and Household Culture on Financial Literacy Knowledge; Attitudes and Behaviour. *Journal of Financial Management, Markets and Institution*, Forthcoming.

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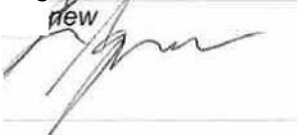
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Copyright Policies

Introduction

What is Financial Literacy?

Over recent decades, the importance of having financially literate or capable citizens has been given increasing importance by countries around the world. For example, New Zealand was one of the first countries in the Organisation for Economic Cooperation and Development (OECD) to adopt a national strategy for financial literacy. Launched in 2008 the *National Strategy for Financial Literacy* had a vision to equip everyone to “get ahead financially” (Commission for Financial Capability, 2014, p. 1), with progress reports given to the Minister of Finance, stakeholders and the public twice a year. The strategy defined ‘getting ahead’ as how one successfully navigates through products, choices, demands and needs across a lifetime (Commission for Financial Capability, 2014, p. 1), identifying five distinct activity streams to aid people getting ahead financially:

1. *Talk*: A cultural shift where it’s easy to talk about money.
2. *Learn*: Effective financial learning throughout life.
3. *Plan*: Everyone has a current financial plan and is prepared for the unexpected.
4. *Debt-smart*: People make smart use of debt.
5. *Save/Invest*: Everyone saving and investing (Commission for Financial Capability, 2014, p. 3).

In terms of the formal education system, the ‘learn’ activity stream has outcomes of all learners achieving financial literacy outcomes as part of their educational pathways, and that financial literacy is part of lifelong learning for all. The ‘talk’ activity stream focusses more on informal learning, with an outcome that people can talk with their partner, family and friends about money (Commission for Financial Capability, 2014).

Since the launch in 2008 of the *National Strategy for Financial Literacy*, the 2012 *National Strategy for Financial Literacy* defined financial literacy as “the ability to make informed judgements and make effective decisions regarding the use and management of money” (Commission for Financial Capability, 2012). The 2012 strategy also gives the OECD’s definition of financial education:

“Financial education is the process by which financial consumers/investors improve their understanding of financial products and concepts and, through information, instruction and/or objective advice, develop the skills and confidence to become more aware of financial risks and opportunities, to make informed choices, to know where to go for help, and to take other effective actions to improve their financial well-being” (Commission for Financial Capability, 2012, p. 3).

The New Zealand Curriculum (NZC), as published by the Ministry of Education also mentions the idea of financial capability, encouraging links between learning areas through broad programmes or units of work designed to, among other things, “develop students’ financial capability, positioning them to make well-informed financial decisions throughout their lives” (Ministry of Education, 2007, p. 39). The NZC also states that “learning is inseparable from its social and cultural context” (Ministry of Education, 2007, p. 34). The Ministry of Education’s NZC resources website defines that a financially capable person is able to “make informed judgements and effective decisions regarding the personal use and management of money. To do this they need: An understanding of their own and others’ values, and Knowledge and skills in managing money and income, setting goals, and planning ahead” (Ministry of Education, 2015).

The website also states that:

- “In becoming financially capable, students will develop:
- a) Knowledge and understanding of financial information and processes that have an impact on daily living

- b) Personal financial management competencies that enable sound decision making about financial activities
- c) Recognition and development of their personal values, which make it possible for them to achieve their personal goals
- d) An awareness of others' values and priorities, which will enable them to participate meaningfully in the community" (Ministry of Education, 2015).

The Ministry's justification for teaching financial capability is that "young people increasingly have to make decisions that involve finances earlier in life than previous generations had to" (Ministry of Education, 2015). This is a sentiment echoing that of the PISA 2012 Financial Literacy Assessment Framework which hypothesised that, "developing the skills associated with financial literacy has thus become essential for young people on the brink of adulthood and poised to make complex financial decisions that could have an impact on the rest of their lives" (OECD 2012, p. 118). The PISA 2012 Financial Literacy Assessment Framework defines financial literacy as "knowledge and understanding of financial concepts and risks, and the skills, motivation and confidence to apply such knowledge and understanding in order to make effective decisions across a range of financial contexts, to improve the financial well-being of individuals and society, and to enable participation in economic life" (OECD 2012, p. 13).

The idea of improved well-being of individuals is touched on by the NZC when describing key competencies that young people need to be successful in the 21st century, competencies that all people need to live, learn, work and contribute as active members of their communities (Ministry of Education, 2007). The document espouses the benefits of authentic learning contexts which involve student interaction to build students' financial capability, enabling the development of the key competencies in relevant and meaningful ways for all students from all cultures, particularly Maori and Pasifika students (Ministry of Education 2007, p. 12). Further, the Ministry of Education website on financial capability makes the statement that "if young people come out of school with a better understanding of how money works, how to interact with it, how to use it, and how to work with it, they will have a better chance of setting themselves up for life" (Ministry of Education, 2015).

In June 2012, the Commission for Financial Literacy and Retirement Income released *Charting a Course: A review of financial education in New Zealand*. Based on an online survey and personal interviews with key players in the sector, this document identified the factors contributing to the need for financial education and financial literacy as including:

- a) "Pressure on people to consume more, despite static or slowly growing incomes;
- b) The complexity and proliferation of financial products;
- c) Low overall literacy and numeracy levels for many people;
- d) An erosion of trust/confidence in the financial services industry;
- e) Continuing high levels of consumer debt;
- f) An ageing population, which threatens the viability of New Zealand's public pay-as-you-go superannuation scheme; and
- g) An increase in life expectancy, with people's savings having to support them for longer than ever before Commission for Financial Capability" 2012, p. 5).

The focus of the document was not on the compulsory (schools) education sector and instead focused on representatives from the hairdressing, motor industry and retail industry sectors, along with national and local organisations involved in delivering financial literacy education to the community, such as the Salvation Army and Citizens Advice Bureau. A key finding was that, "tutors providing financial education tended to be adult educators without specific expertise in either the content or processes of financial literacy. Often they relied on their own personal experience of financial matters. Only 47 percent had received any training or professional development, and what they had received was not exclusively linked to financial literacy" (p. 14). An additional theme was that "cultural differences were

important, both in a direct sense (such as when there was an expectation of tithing a proportion of income) and indirectly through different views of what constituted ‘financial wellbeing’” (p. 16). This led to the conclusion that “these differences in perspective emphasise the importance of educators knowing learners’ values and learning needs and matching delivery to those needs” (p. 16).

Table 1: Personal Financial Management Standards

| ID | Title | Level | Credit |
|-----------|--|--------------|---------------|
| 24695 | Explain taxation and other deductions relating to personal income | 2 | 2 |
| 24697 | Perform income-related calculations for personal financial management | 1 | 1 |
| 24699 | Make an informed decision relating to personal income and explain its consequences | 2 | 2 |
| 24705 | Interpret financial documents and verify accuracy of financial documents for personal financial management | 1 | 2 |
| 24709 | Produce a balanced budget to manage personal finances | 1 | 3 |
| 28087 | Demonstrate understanding of the effect of life stage factors on personal income sources | 1 | 3 |
| 28088 | Demonstrate understanding of manageable and unmanageable credit and debt | 1 | 3 |
| 28089 | Demonstrate understanding of personal financial goal setting | 1 | 3 |
| 28090 | Demonstrate knowledge of personal financial saving and investment options | 1 | 4 |
| 28091 | Describe risks and basic risk management strategies for personal finances | 1 | 3 |
| 28092 | Analyse the effect of significant life events at different life stages on personal financial income | 2 | 3 |
| 28093 | Describe the future financial responsibilities of utilising tertiary study funding options | 2 | 3 |
| 28094 | Produce a balanced budget and adjust the budget to reflect changing financial circumstances | 2 | 3 |
| 28095 | Analyse personal financial investment opportunities | 2 | 3 |
| 28096 | Evaluate and select insurance product types in relation to events for personal finances | 2 | 3 |
| 28097 | Evaluate and select personal banking products and services in relation to personal financial needs | 2 | 3 |
| 28098 | Evaluate options to increase personal income | 3 | 3 |
| 28099 | Analyse and compare credit options and recommend strategies to manage personal finances | | |
| 28100 | Develop a plan to achieve a long-term personal financial goal(s) | 3 | 4 |
| 28101 | Plan a long-term personal financial investment portfolio | 3 | 4 |
| 28102 | Demonstrate understanding of risk and return for a personal financial investment portfolio | 3 | 4 |
| 28103 | Analyse and select personal house financing and purchase options | 3 | 3 |
| 28104 | Analyse the impact(s) of external factors on personal finances | 3 | 3 |

Although *Charting a Course: A review of financial education in New Zealand* did not focus on the schools education sector, the document does mention Personal Financial Management standards used by both the tertiary and secondary sectors, along with workplace contexts, as part of either vocational or traditional schools based qualifications. These standards were reviewed in 2013, with some standards deleted, others retained, along with the addition of new standards. As a result, there are now 23 standards, which guide students in the school or tertiary sector along with those in the workplace. These standards are shown in Table 1 above.

While the definitions of financial literacy from the *2012 National Strategy for Financial Literacy*, the OECD, the Ministry of Education and PISA 2012 Financial Literacy Assessment Framework focus on the financial knowledge and the importance of building financial capability, there is also the recognition that social influences and context are important influences on building financial capability. There has also been a general recognition in the financial literacy literature that females have lower levels of financial capability than males, leading two of the more prominent researchers in the field, Lusardi and Mitchell, to recently state that “this debate is far from closed, and additional research will be required to better understand these observed gender differences in financial literacy” (Lusardi and Mitchell, 2014, p. 20).

The Role of Gender in Developing Financial Attitudes, Knowledge and Behaviours.

Social Cognitive Theory of Gender.

In their 1999 paper, Bussey and Bandura specifically examine the application of social cognitive theory of gender development and differentiation. They believe that gender development has three major influences:

1. Modelling. Models in the immediate environment such as parents, peers, significant people in social, educational and occupational contexts as well as the mass media all play a role in the way gender-linked conduct is acquired.
2. Enactive experience. Discerning ‘appropriate’ behaviour from how current behaviour is received is an influential component in forming gender-linked conduct, with Bussey and Bandura (1999) believing that “gender-linked behaviour is heavily socially sanctioned in most societies. Therefore, evaluative social reactions are important sources of information for constructing gender conceptions” (p. 15).
3. Direct tuition. This could take place in an educational setting or in the home, and is what Bussey and Bandura (1999) describe as “a convenient way of informing people about different styles of conduct and their linkage to gender” (p. 15).

It can easily be seen how these three influences could relate to financial learning in the home by children. In a home where the father is seen as the breadwinner who makes the financial decisions on behalf of the household, both male and female children according to social learning theory could be socialized into portraying those roles based on their observations growing up. Female children could also themselves be subject to negative feedback from parents if they strayed from this ‘traditional’ model of the household, as outlined by the enactive experience influence above. Equally, male children could well be conditioned into seeing the taking of proactive, leadership roles in terms of financial matters as being appropriate behavior. Lastly, if a home environment places a greater importance on the financial knowledge of male children relative to female children due to a perceived future need as the breadwinner, it is more likely that parents will spend more time teaching male children financial concepts in the home, as outlined in the direct tuition influence above.

As part of their paper, Bussey and Bandura (1999) present a thorough summary of the relevant literature. In terms of the relevant effectiveness of each influence, it is claimed that modelling is generally superior to enactive experience (Bandura, 1986; Debowski, Wood, & Bandura, 1999) and direct tuition, depending on the developmental status of individuals. Many researchers have discussed the significant role modelling plays in gender-role learning (Bandura, 1969; Kohlberg, 1966; Mischel, 1970) with others showing that learning from same-sex role models can be particularly powerful (Bussey & Perry,

1982; Perry & Bussey, 1979). Enactive experience is also subject to same-sex influences, with fathers reacting more negatively than mothers to feminine play by their sons (Idle, Wood & Desmarais, 1993). As children develop parents also broaden the approaches used in reinforcing gender-linked conduct. As an example, girls are encouraged to be nurturing and polite while boys are encouraged to be adventuresome and independent (Huston, 1983; Zahn-Waxler, Cole, & Barrett, 1991). Bussey and Bandura (1999) claim that “parents promote sharper differentiation of gendered conduct with boys than for girls” (p. 33), while others suggest gender differential is stronger for fathers who continue the gender differential throughout childhood (Bradley & Gobbart, 1989; Fagot & Hagen, 1991; Langlois & Downs, 1980; Maccoby, 1998; Siegel, 1987).

This idea of same sex role models possibly exerting a stronger influence over same-sex children is an intriguing one. It is plausible that children give same-sex parents admired status as mentioned above due to an increased ability for males to relate to their fathers and for females to relate to their mothers. A son seeing his father take a more dominant role in financial matters in the household, while at the same time a daughter seeing her mother take a lesser role in financial matters may be especially pertinent to each respective child in terms of role modelling and enactive experience.

The educational setting can also reinforce gender differences, with Bussey and Bandura (1999) stating that “despite the lack of gender differences in intelligence, there are differences in the courses boys and girls select and how they judge their capabilities in these varied academic domains (Benbow & Stanley, 1980; Eccles, 1987; Halpern, 1992; Hogebe, Nest, & Newman, 1985; Hyde, Fennema, & Lamon, 1990; Hyde & Linn, 1988; Raymond & Benbow, 1989; Steinkamp & Maehr, 1983; Walkerdine, 1989). Females enroll in significantly fewer higher-level mathematics, science and computer courses, have less interest in these subjects, and view them as less useful to their lives than do their male counterparts” (p. 39). The home and schools are of course not two distinct settings, with the influence of parents in the home being influential in a student’s activities at school (Steinberg, 1996), influencing their aspirations and perceived ability in certain curriculum areas among other things, with Bussey and Bandura (1999) citing Eccles (1989), stating that “parents generally subscribe to the cultural stereotype that boys are more naturally endowed than girls for quantitative activities, despite equivalent achievement in mathematics. The more parents stereotype mathematics as a naturally male domain, the more they underestimate their daughters’ math ability, and overestimate the difficulty of the subject for them” (p. 39). This extended to the tertiary setting, where Ancis and Phillips (1996) described how college women were considered to be less serious and capable than their male counterparts in an academic environment, especially female students from ethnic minorities.

Although similar conclusions have been drawn by other researchers such as McHale et al. (2003) who believed that family experiences may have a more important impact on gender development than has previously been believed (p. 125), there does appear to be less research into the gender bias in direct instruction by parents in the home, with (Parke & Buriel, 1998) discussing parents roles as opportunity providers and concluding “we know little about parents’ influences in their role as instructors for their children” (p. 469). An important finding by McHale et al (1999) was that patterns of differential treatment of male and female children vary across context. “For example, when fathers hold more traditional gender role attitudes, greater differential treatment of sisters and brothers is evident, but when fathers’ attitudes are less traditional, sisters’ and brothers’ experiences with parents are more similar” (p. 130).

The allocation of a parent’s time between offspring has also been found to be subject to the influence of gender, with researchers finding that parents tended to spend more time with same sex offspring, because they believe they are better able to offer guidance and advice to their same-sex children (Harris & Morgan, 1991; Huston, 1983; Jacklin, DiPietro, & Maccoby, 1984, McHale *et*

al., 1999, 2000). McHale et al (2003) also references Crouter *et al.*, (1999) describing the gender patterns of parental knowledge of their children's daily activities, finding that "parents know relatively more about the everyday experiences of offspring of their own sex" (p. 132) and goes on to say that "there is much more evidence that children have different experiences with their mothers versus their fathers (Collins & Russell, 1991; Leaper *et al.*, 1998; Russell & Saebel, 1997; Siegal, 1987)" (p. 134). These findings coupled with the findings from a limited body of research into a gender bias in parent-child discussions are suggestive of a possible gender bias in the delivery of direct tuition with respect to financial matters. If children are in a home where fathers are seen as being the financial experts and fathers are likely to spend more time with their sons than their daughters, it would seem logical that there would be a greater opportunity to give direct financial tuition to sons than daughters, especially if there is a perceived greater need.

The relative strength of the influence of the father and the mother in the gender development of children in the home is also touched on in the literature by McHale et al (2003) who suggest that the influence of fathers is stronger possibly due to fathers having a higher level of concern about ensuring their children are displaying behavior that is gender appropriate, or that fathers may have a greater influence in determining how household duties and roles are allocated between parents. Another point mentioned by McHale et al (2003) which may be pertinent to this study is that given "the extent to which opportunities and personal choices are relatively constrained during childhood and adolescence, the implications of family gender socialization may be most apparent later, for instance, in the kinds of education and career decisions individuals make and in the family roles they assume in their adult lives" (p. 134). So while the socialization of children in the home with regard to financial roles, and the need for financial knowledge may occur through childhood, the full effects may not be felt until adulthood. There is some evidence to support this hypothesis from the PISA (Programme for International Student Assessment) 2012 Results: Students and Money report (OECD, 2014) which suggested that lower scores on financial literacy quiz scores by females relative to males may be less prevalent in younger citizens than in adults. The report showed that studies conducted in one third of the countries which took part in the PISA reported that adult men perform better than adult women on surveys measuring financial knowledge. However when using 15-year-old high school students as the subjects for the PISA study, only one of the 18 participating countries (Italy) showed a statistically significant difference between the performance of girls and boys on a financial literacy test.

McHale et al (2003) also reference Martin & Halverson, (1987) making the connection between parental socialization of their children and subsequent behaviours of those children in later years by stating "the idea that children observe and compare the roles and activities of their mothers and fathers and use these experiences to construct their own schemas about gender roles is consistent with cognitive theories of gender development" (p. 135). They go on to describe the roles and activities observed by the children including providing evidence "that parents distinguish between girls and boys in how they organize, manage, and provide resources to support their children's development" (p. 132). Examples can include the way bedrooms are styled and decorated (Rheingold & Cook, 1975), the toys children received (Fisher-Thompson, 1993), the allocation of household chores (White & Brinkerhoff, 1981), and parents being more likely to arrange for their sons to be involved in extension classes for gifted children (Eccles & Harold, 1992). The gender differential investment in activities which enhance their children's development was found to be more common when the family had fewer economic resources (Eccles & Hoffman, 1984; Romich, 2001; see also Ferree, 1990). This differential allocation of resources was found by Updegraff, McHale and Crouter (1996) to be linked to gender based differences in outcomes and behaviours for children in subsequent years, with girls who spent more time with their fathers relative to their mothers maintaining school grades in masculine subjects by comparison to girls who did not spend the same ratio of time with their fathers relative to their mothers more likely to suffer declining grades in masculine subjects as their schooling advanced. Thompson & Walker (1999) also found that the idea of gender based responsibility for certain chores around the home could extend to gender based ideas on who is responsible for domestic chores per se and who is responsible for being the primary breadwinner.

Leavell et al (2012) support the notion that fathers are a major influence of socialization in the home, finding fathers direct their children toward activities which are gender specific well before the children themselves have a clear knowledge of gender roles. They also found that ethnicity, fathers' education and family circumstances all impacted on fathers' activities with their children, leading them to state that "fathers are key socializers of gender in cultures both within and outside the United States (p. 53). While confirming the findings of McHale et al (1999) that of families with both sons and daughters aged 9 to 10 years old, in those families where the father held more traditional attitudes, "children were more likely to be involved in activities with their same gender parent" (p. 55), Leavell et al (2012) describe that the majority of gender socialization research focuses on mothers' attitudes and beliefs rather than fathers' attitudes and beliefs. This led them to conclude that "the limited research on fathers is problematic as fathers have been found to have stronger gender stereotyped attitudes and behaviors (e.g., Lamb 1977; Siegal 1987) and to be more likely to encourage gender-typed play than mothers (Leaper and Friedman 2007). Fathers may be particularly important to the gender development of boys. Boys may be more sensitive to, and adhere more strongly to their fathers' gender attitudes than girls (Leaper 2002)" (p. 55). Despite this lack of research into fathers' beliefs and attitudes, Leavell et al (2012) do describe some literature supporting the notion that "fathers provide unique and potentially very different messages and contexts for gender socialization" (p. 55). This includes the findings of Tamis-LeMonda et al. (2004) that "fathers with more education (even within low-income, ethnically diverse samples) provide more cognitive stimulation to their young child" (p. 56). This led Leavell et al (2012) to conclude that "fathers may channel their children toward gender-typed activities from an early age" (p. 61), and that "fathers provide a unique gendered context for children's developing understanding of gender that may be quite different from that provided by mothers" (p. 63).

While the literature makes minimal mention of same-sex parents exerting a greater influence in terms of direct instruction, there is however a body of literature in this field which looks specifically at conversations between parents and children.

The Influence of Gender on Parental Conversations with Children.

As mentioned earlier in the introduction, creating a cultural shift where it was easy to talk about money was one of five distinct activity streams to aid people getting ahead financially according to the 2008 the *National Strategy for Financial Literacy*. It has however been found that parental conversations are differentiated by gender (Dunn, Bretherton, & Munn, 1987). Mothers tend to talk more to daughters than sons, and encourage more autonomy and independence in sons (Pomerantz & Ruble, 1998). Leavell et al (2012) also examined the importance of conversations in the socializing of children, finding that "fathers also talk about different things with their sons than daughters" (p. 55). This focus specifically on conversations with fathers was also touched on by McHale et al (2003) when they referenced Collins & Russell, 1991; and Maccoby, 1998, stating that children were "focusing their conversations with fathers on more instrumental issues and concerns, and that children tend to have more conflicts and disagreements with their mothers and treat their fathers with more deference" (p. 134). Merrill, Gallo & Fivush show the importance of discussions in the family when describing how family dinnertime conversations can provide a key setting for children to learn behavior regulation and knowledge, while parents may also socialize gender differences in language, while others have also noted the importance of family conversations at mealtimes for teaching children or socializing behavioural norms (Callanan & Oakes, 1992; Callanan & Jipson, 2001; Fiese, B. H., Foley, K. P., & Spagnola, M. 2006).

When analysing conversations in general, rather than focusing on mealtime conversations, Leaper, C., Anderson, K. J., & Sanders, P (1998) found that mothers talked differently to their daughters compared to their sons, while fathers' talk used more assertive, directive speech and made more informative statements than did mothers. Researchers such as Newman, M. L., Groom, C. J., Handelman, L. D., & Pennebaker, J. W. (2008) found that men were more likely to discuss money than were women, while Crowley, K., Callanan, M. A., Tenenbaum, H. R., & Allen, E. (2001) found that parents were more

likely to explain scientific thinking to boys than to girls. A similar result of fathers using more cognitively demanding talk when discussing physics with sons than with daughters was found by Tenenbaum, H. R., & Leaper, C. (2003).

These findings touch on other important dimensions such as the level of education of the father possibly influencing the types of discussions fathers have with their children. The level of parental education could therefore have intriguing influences on children's socialization in the home with regard to financial matters. An intuitive reasoning might be that parents with higher levels of education may be less likely to hold traditional stereotypical views on the gender division of tasks and responsibilities in the home. Equally, more educated parents may contribute to better financial discussions in the home. Given the gender patterns described earlier, one may expect a more educated father to have better financial discussions with their sons, and for educated mothers to have better financial discussions with their daughters than uneducated parents.

The Influence of the Social Environment on Cognitive Development

While social learning theory can be used to explain the socialisation of children in their home with respect to their financial knowledge, attitudes and behaviours, theorists such as Vygotsky (1931) have endeavoured to understand the role of the social environment when describing the cognitive development of children, with respect to the role of experts such as parents. Vygotsky's notion of a zone of proximal development (ZPD) explored the important relationship between social interaction and cognitive development, hypothesizing that the level of cognitive development is dependent on the level of social interaction a child has, with full development of the ZPD contingent on full social interaction. With guidance from peers and adults, the skills that can be developed are greater than those obtainable without this social interaction. It is important there are sources of stimulation in the environment to help in the development of a child's thinking, especially during adolescence, which Vygotsky (1998) described as an essential period, describing the social environment as the source of characteristics acquired by a child, and that a child learns to master their behaviour "from the example of how an adult masters it" (Vygotsky 1997 p. 248). He gives an example of a child in a home where the parents read a lot of books learning to read without direct instruction, but rather by observing others reading the books (Vygotsky 1956). Vygotsky identified ages 7 to 12 as the period when the ZPD becomes an aspect of the child's cognitive development. Gredler (2009) outlines Vygotsky's emphasis of the role of the adult in the development of the ZPD when describing the teaching process as "always in the form of the child's cooperation with adults" (Vygotsky 1998, p. 204), and that a child learns mastery of their behavior "from the example of how an adult masters it" (Vygotsky 1997, p. 248), concluding that a child's interactions with adults are essential in the development of higher mental functions. Lave (1988) argues that learning is a function of the activity, context and culture in which it occurs. Lave (1988) also describes how important social interaction is in terms of situated learning, and references other researchers who have further developed the theory of situated learning such as Brown, Collins & Duguid (1989) who emphasised that learning, both outside and inside school, advances through collaborative social interaction and the social construction of knowledge. Given the gender differences in the home identified by experts in the field of social learning theory, one could surmise that the same gender differences may play an influence in the actual financial cognitive development of boys and girls in the home. These influences on financial cognitive development could include the gender of the child, along with the gender and educational qualifications of the child's parents.

Research Questions

The above body of literature gave rise to the construction of two research questions.

1. What are the influences of variables such as ethnicity, socioeconomic status and gender on academic achievement in the subjects of economics and accounting in New Zealand secondary schools?

Due to the fragmented nature of financial literacy education in New Zealand schools, the subjects of economics and accounting were chosen as proxies where there is readily available data on student achievement. This research question is addressed in chapter two to chapter five.

2. How are influences consistent with social learning and social cognitive theory such as ethnicity, gender, socioeconomic status, parental education and parental discussions in the home correlated with financial literacy knowledge, attitudes and behaviours?

This research question is addressed in chapters six to nine. As this is a thesis by publication, not every chapter addresses all components of the research question. Each chapter will also have its own methodology and literature review. However, when taken as a complete body of work, chapters one to five address the first research question, with chapters six to nine addressing the second.

Chapter Summaries

As a precursor to analysing the attainment of students in the subjects of economics and accounting, chapter one outlines the results of a nationwide survey conducted in 2010, examining the current state of financial education in New Zealand secondary schools. The disparate nature of financial literacy education provision provides justification for concentrating on the more structured subjects of economics and accounting in chapters two to five.

Due to the commonality between business and financial concepts as well as business and economics courses being identified as areas where financial education tends to be taught, the next four chapters of this thesis focus on the achievement or otherwise of students in the subjects of economics and accounting. Specifically, the interaction of demographic variables to examine the impact of ethnicity, gender and socioeconomic status on achievement levels in two subjects where financial concepts are often taught.

As chapter two outlines, there is a considerable body of literature on the correlation between attainment and socioeconomic status of students, with the general consensus being that students from higher socioeconomic backgrounds have higher levels of attainment than those from lower socioeconomic backgrounds. Ethnicity is also seen to be correlated with attainment, with students from many ethnic minorities on average having lower attainment levels than students from the ethnic majority. However, this correlation is muddled somewhat by the interaction between the socioeconomic and ethnicity variables, with many ethnic minorities disproportionately represented in the lower socioeconomic status category. Gender is also seen to play a part in educational attainment, with on average, girls achieving to a higher level than boys when using success rates in the National Certificate of Education Achievement in New Zealand. Chapter two goes on to examine interaction effects between gender and school decile (a proxy for school socioeconomic status) using data from students studying economics at secondary schools in New Zealand.

Chapter three expands on this by analysing the interaction between socioeconomic status and gender across different ethnic groupings for students taking accounting at secondary school in New Zealand. Chapters four and five examine whether a change in the assessment regime to a standards based assessment from a norm-referenced assessment regime has improved participation rates and attainment levels among low socioeconomic students and ethnic minority groupings taking the subjects of economics and accounting. The subjects of economics and accounting were the focus of this analysis, as they were the traditional commerce subjects offered in most schools which were the closest comparable subjects to financial literacy. Due to the lack of a formalised subject called 'financial literacy' and with low rates of participation in the previously mentioned Personal Financial Management standards in the secondary sector, these first four chapters coupled with the survey results outlined in this introduction describe the 'state of play' in the secondary sector, in terms of the level of achievement of students in the

traditional subjects of economics and accounting, which hold the most similarities with the area of financial literacy, and for which there is a sufficiently large body of student assessment results that the effect of ethnicity, gender and school decile can be examined.

Chapter six to chapter nine focus specifically on financial literacy, and the effect of gender, school decile and ethnicity, with the latter chapters exploring the impact of financial socialisation in the home. The notion of the home environment impacting differentially on the financial literacy levels of females and males draws from social learning theory, which emphasizes the importance of observing and modeling the behaviors, attitudes, and emotional reactions of others. Bandura (1977) states: "Learning would be exceedingly laborious, not to mention hazardous, if people had to rely solely on the effects of their own actions to inform them what to do. Fortunately, most human behavior is learned observationally through modeling: from observing others one forms an idea of how new behaviors are performed, and on later occasions this coded information serves as a guide for action." (p. 22). Bandura's work is related to the theories of Vygotsky and Lave which also emphasize the central role of social learning. Two of the basic principles of social learning theory are that individuals are more likely to adopt a modeled behavior if it results in outcomes they value, and individuals are more likely to adopt a modeled behavior if the model is similar to the observer. Other influential factors include whether the person being modelled has 'admired status' and whether the behavior has functional value.

While chapter six focuses on the correlation between ethnicity and financial literacy quiz scores chapters seven to nine while still examining the correlations between socioeconomic status, ethnicity and gender, focus more on gender, as the body of literature discussed in these chapters has identified the underperformance of adult females relative to males on financial literacy quizzes as being a problematic, and not yet understood area. Two of the higher profile researchers in the area of financial literacy, Lusardi and Mitchell recently stated that "this debate is far from closed, and additional research will be required to better understand these observed gender differences in financial literacy" (Lusardi and Mitchell, 2014, p. 20). When discussing factors contributing to subsequent financial literacy knowledge, researchers have briefly mentioned the influence of the home as the place where children first learn about money with what is learned being filtered through their parents (Danes and Haberman, 2007; Lusardi et al., 2010). Applying the principals of social learning theory mentioned above to the area of financial socialization in the home, younger children are likely to be readily influenced by parents, as they will hold an 'admired status', with children being likely to value and model the financial messages being displayed by parents as it results in positive feedback from the parents.

This series of papers thus attempts to outline the correlations between key variables of ethnicity, socioeconomic status and gender with financial literacy knowledge, attitudes and behavior. The chapters progress from initially investigating correlations between these key variables and academic achievement in the traditional 'business' subjects of economics and accounting at secondary school, where there is a sufficient quantity of formal assessment results to conduct reliable analysis; to the later chapters which focus on the correlations between key variables and proxies for financial socialization in the home. Included are variables such as financial literacy quiz scores, the age of a child when they have their first financial discussion with a parent in the home, and the education level of parents. Finally, financial attitudes and behaviours are scrutinized for evidence of patterns of correlation with key demographic variables.

Chapter One – Financial Literacy Education in New Zealand

The PISA 2012 New Zealand Financial Literacy Report (Ministry of Education, 2014) outlines the results of a survey where school principals were asked questions about the provision of financial education within their schools. Financial literacy education was specifically defined as “relating to topics such as money and income; budgeting and long term planning; saving and spending; credit and debt; investment and insurance; the potential risks and benefits of financial products; and the financial landscape (including consumer rights and responsibilities and understanding of the wider financial, economic and social system)” (p. 28). The results showed that New Zealand had more widespread coverage of financial literacy courses than the OECD average, with 30% of students being in schools where financial education was not available compared to the OECD average of 48%. Financial education in New Zealand was also more established, with 59% of students in schools where financial education had been available for two years or more, compared to the OECD average of 36%. However, only 8% of New Zealand students were in schools where financial education was compulsory, lower than the OECD average of 28%. When focussing specifically on year 11 students, the majority (55%) of New Zealand students are in schools where financial education is not taught as a separate subject, or as a cross-curricular subject (80%). Principals reported that for year 11 students, “financial education tends to be taught as part of business or economics courses, social science courses, and maths” (Ministry of Education 2014, p. 29).

In an attempt to gain an understanding of the delivery of financial literacy courses in the secondary sector, in 2010 a survey was distributed to all 475 public secondary and composite schools in New Zealand (See Appendix 1). The response rate was 192, or 40% (a copy of the survey is in Appendix 1). Due to the varying definitions of what financial literacy covers, and how it can be delivered, a deliberately open ended question was initially asked, which simply stated: ‘Do you offer a financial literacy programme?’

Questions on the number of hours in the financial literacy programme and where it fitted into the school timetable, along with the frequency of sessions and length of time the programme has been running were asked. Questions asked also included how the programme was chosen or devised, and if there was any testing of the effectiveness of the programme, including student evaluations. These questions were designed to extract information about the financial literacy programmes offered, allowing for a more accurate picture of the programmes. Further questions on the main subject area of the teacher delivering the programme, whether the same teacher took all the sessions, the year level the programme was delivered and whether the programme was compulsory for all students were designed to establish whether school decile impacted on the background of the teacher teaching the programme, whether or not it was compulsory, and whether the programme was aimed at the senior level. School decile is calculated by the Ministry of Education, and indicates the extent to which the school draws its students from low socio-economic communities. Decile 1 schools are the 10% of schools with the highest proportion of students from low socio-economic communities, whereas decile 10 schools are the 10% of schools with the lowest proportion of these students.

In terms of decile, the breakdowns of the population and sample are shown in Table 2. The sample was representative of the population, with slightly fewer decile 1 and 2 schools than the population.

Table 2: Population and sample school decile distributions.

| Decile | Population n | Population % | Sample n | Sample % |
|---------------|---------------------|---------------------|-----------------|-----------------|
| 1 | 48 | 10 | 14 | 7 |
| 2 | 51 | 11 | 11 | 6 |
| 3 | 46 | 10 | 19 | 10 |
| 4 | 47 | 10 | 20 | 10 |
| 5 | 45 | 9 | 17 | 9 |
| 6 | 54 | 11 | 22 | 11 |
| 7 | 46 | 10 | 20 | 10 |
| 8 | 47 | 10 | 21 | 11 |
| 9 | 40 | 8 | 27 | 14 |
| 10 | 51 | 11 | 21 | 11 |
| TOTAL | 475 | 100 | 193 | 100 |

The sample was then split into two categories, low decile schools (deciles 1-5) and high decile schools (deciles 6-10). Table 3 shows the percentage of schools in each of the two decile groupings that offered a financial literacy course, how many offered a senior financial literacy course (years 11 and above), and how many made their financial literacy course compulsory for students.

Table 3: Proportion of schools offering financial literacy courses, and whether or not they are compulsory by decile group.

| | Low Decile | High Decile |
|---|-------------------|--------------------|
| Yes Financial Literacy Course | 32 (40%) | 54 (49%) |
| No Financial Literacy Course | 49 (60%) | 57 (51%) |
| Yes Senior Financial Literacy Course | 18 (22%) | 19 (17%) |
| No Senior Financial Literacy Course | 63 (78%) | 92 (83%) |
| Compulsory | 14 (17%) | 19 (17%) |
| Not Compulsory | 67 (83%) | 90 (83%) |

High decile schools were more likely to offer financial literacy than low decile schools, but low decile schools were slightly more likely to offer financial literacy in the senior (Years 11 – 13) school. There was no difference between the two groups in terms of the percentage of schools who made financial literacy compulsory. Odds ratios were calculated, and chi square analysis (confirmed with a logit regression) carried to see if any of these comparisons were significantly different. Table 4 shows there was no significant difference between low and high decile schools in terms of the percentage of schools offering financial literacy, offering senior financial literacy, or making financial literacy compulsory.

Table 4: Chi square and regression analysis results comparing low and high decile schools in terms of financial literacy course provision by decile group.

| 2 Groups (High, Low) | χ^2 | Logit Regression (Z) | Odds Ratios |
|---|----------------------------|-----------------------------|--------------------|
| Does Financial Literacy (N=192) | (1.583) (p = 0.21) | (1.26) | 1.45 |
| Does Senior Financial Literacy (N=192) | (0.784) (p = 0.38) | (-0.88) | 0.72 |
| Has Compulsory Financial Literacy (N=192) | (0.001) (p = 0.97) | (0.03) | 1.01 |

The sample was then split into those schools that offered a financial literacy course, and those that did not to ascertain if schools that did offer financial literacy were different on any demographic metric. As Table 5 shows, schools that offered financial literacy were more likely to be larger (above the median roll) and be a secondary school (Years 9 – 13) rather than a composite school (Years 1-13), when compared to schools that do not offer financial literacy. These differences were significant at the 90% confidence level. There was no significant difference between schools that do offer financial literacy and those that don't on the decile, ethnicity, urban or gender (based on a comparison of single sex schools) variables.

Table 5: Chi square and regression analysis results comparing whether or not financial literacy programs run in a school by decile group.

| Does Financial Literacy (Yes=1) | χ^2 | Logit Regression (Z) | Odds Ratios |
|---|----------------------------|-----------------------------|--------------------|
| Decile (High=1) (N= 192) | (1.583) | (1.26) | 1.45 |
| Size (Above Median Roll=1) (N= 192) | (2.971)* | (1.72)* | 1.68 |
| European % (Above Median=1) (N= 192) | (0.651) | (0.81) | 1.27 |
| Location (Main Urban Area=1) (N= 192) | (1.497) | (1.22) | 1.43 |
| School Type (Secondary=1) (N=192) | (2.831)* | (1.67)* | 1.90 |
| Gender (Girls=1) (N=55) | (0.025) | (0.16) | 1.09 |

The above approach was repeated with the sample split into those schools that offered a financial senior literacy course, and those that did not. As the results in Table 6 show none of the variables showed a significant difference between schools that offered senior financial literacy and those that did not. Note

that the gender variable was not included in this analysis, as the sample size of those offering senior financial literacy in single sex schools was insufficient.

Table 6: Chi square and regression analysis results comparing whether or not senior financial literacy programs run in a school by decile group.

| Does Senior Financial Literacy (Yes=1) | χ^2 | Logit Regression (Z) | Odds Ratios |
|---|----------------------------|-----------------------------|--------------------|
| Decile (High=1) (N= 192) | (0.784) | (-0.88) | 0.72 |
| Size (Above Median Roll=1) (N= 192) | (2.431) | (1.55) | 1.77 |
| European % (Above Median=1) (N= 192) | (0.162) | (0.40) | 1.17 |
| Location (Main Urban Area=1) (N= 192) | (0.543) | (0.74) | 1.32 |
| School Type (Secondary=1) (N=192) | (0.275) | (0.52) | 1.29 |

Using the sub-sample of schools that offered financial literacy, additional regressions were run on the sample comparing high decile to low decile schools, to ascertain if decile grouping impacted whether or not a school had the same teacher delivering their financial literacy offerings, if the commerce teacher delivered their financial literacy offerings, and whether the financial literacy offerings were compulsory or not. There was no significant difference for any of the above three measures between the low and high decile samples, as shown in table 7. The average percentage of schools that had the same teacher delivering all of their financial literacy offerings across both decile groupings combined was 66%, with 70% of schools who offered financial literacy having the offerings delivered by commerce teachers. However of the schools who offered financial literacy, in only 39% of schools was it compulsory, which equates to 17% of the 192 schools who replied to the survey.

Table 7: Chi square and regression analysis results comparing whether financial literacy courses were compulsory, were taught by the same teacher, and were taught by the commerce teacher by decile group.

| 2 Groups (High, Low) | χ^2 | Logit Regression | Odds Ratios |
|---|----------------------------|-------------------------|--------------------|
| Has Compulsory Financial Literacy (N=84) | (0.432) | (-0.66) | 0.74 |
| Same Teacher (N=80) | (0.773) | (-0.88) | 0.64 |
| Commerce Teacher (N=80) | (2.286) | (1.50) | 2.11 |

In Table 8 the two decile groupings of low (1-5) and high (6-10) are reclassified to three groupings of low (1-3), medium (4-7) and high (8-10). This was not possible for some of the earlier comparisons, as using three groupings resulted in insufficient responses in some categories to conduct any meaningful

statistical analysis. To determine whether there was a significant difference between schools offering financial literacy or not using the three decile group classification chi square analysis, along with odds ratios and logistic regressions were once again carried out. When comparing low to medium decile schools, there was a significant difference at the 90% confidence level for the chi-square analysis. However, the logit regression reporting odds ratios did not return a significant difference. Both statistical approaches did report a significant difference at the 95% confidence level between medium and high decile school. According to the odds ratios, the odds of a high decile school offering financial literacy are 2.11 times the odds of a medium decile school offering financial literacy.

Table 8: Chi square and regression analysis results comparing whether schools offer a financial literacy course by three decile groupings.

| 3 Groups (High, Medium, Low) | χ^2 | Logit Regression | Odds Ratios |
|-------------------------------------|----------------------------|-------------------------|--------------------|
| Low v Medium (N= 123) | (0.498)* | (-0.70) | 0.76 |
| Medium v High (N= 148) | (5.013)** | (2.23)** | 2.11 |
| Low v High (N= 113) | (1.52) | (1.23) | 1.61 |

Table 9 shows the same analysis, with the dependant variable being whether or not a school runs a senior financial literacy programme.

Table 9: Chi square and regression analysis results comparing whether schools offer a senior financial literacy course by three decile groupings.

| 3 Groups (High, Medium, Low) | χ^2 | Logit Regression | Odds Ratios |
|-------------------------------------|----------------------------|-------------------------|--------------------|
| Low v Medium (N= 123) | (4.687)** | (-2.13)** | 0.38 |
| Medium v High (N= 148) | (0.016) | (0.13) | 1.06 |
| Low v High (N= 113) | (3.931)** | (-1.95)* | 0.41 |

Both statistical approaches found there to be a significant difference at the 95% confidence level between medium and low decile schools. The odds ratios show that the odds of a medium decile school offering a senior financial literacy programme are 0.38 the odds of a low decile school offering a senior financial literacy programme. There was also a significant difference noted between low and high decile schools, although the chi-square analysis found the difference to be significant at the 95% confidence level, where the logit regression found the difference to be significant at the 90% confidence level. The odds ratios show that the odds of a high decile school offering a senior financial literacy programme are 0.41 the odds of a low decile school offering a senior financial literacy programme.

So overall, there does not appear to be a significant difference across deciles in the provision of financial literacy courses in NZ secondary schools. For those schools that do provide financial literacy courses, 66% have the same teacher delivering all of the courses within that school, with 70% of the teachers delivering the courses commerce teachers. These are promising results, as it appears schools are not just ‘filling holes’ in their timetables by allocating staff who are available to teach financial literacy. There seems to be an attempt made to consider consistency and qualification. For the provision of financial literacy courses at the senior school level, where curriculum crowding leaves less room, course provision is comparable between high and low decile schools, with medium decile schools being less likely to

provide a senior financial literacy course. An intuitive explanation for this is that low decile schools with a greater concentration of students from lower socioeconomic backgrounds provide financial literacy courses due to a greater need from their student body, while schools in high decile schools provide financial literacy courses due to increased interest from their school community, which has a greater concentration of people from higher socioeconomic backgrounds who are statistically more likely to be involved in running their own businesses, working in the financial sector and so on.

Appendix 1

Questions

1. Do you offer a financial literacy programme? Yes ☐ No ☐
2. What is the structure of the programme?
 - i. Hours in the programme?
 - ii. Frequency of sessions? _____
 - iii. Does the same teacher take all sessions? Yes ☐ No ☐
 - iv. What is the main subject area of the teacher(s) delivering the programme?

 - v. At what year level(s) is the programme delivered?

 - vi. Is the programme compulsory for students? Yes ☐ No ☐
 - vii. Where does the programme fit in the timetable?

 - viii. Is there any testing of the effectiveness of the programme such as student evaluations? Yes ☐ No ☐
If yes, please describe the measures taken.

 - ix. How was the programme chosen/devised?

 - x. How long has it been running?

Thank you for taking the time to complete these questions.

Chapter Two Outline

This chapter examines the interaction between gender and the decile of a secondary school a student attends (a proxy for socioeconomic status), and how it affects academic performance of students on economics external assessments. Economics was chosen as it is one of the two traditional ‘commerce’ subjects offered in schools, and would be subject to similar socialization effects in the home as financial literacy. It was also a subject identified by school principals where financial education was delivered. The purpose of this chapter in terms of the overall body of work is twofold. Firstly, to establish whether there is any evidence of a gender bias in economics in terms of the academic achievement of females relative to males similar to that found on financial literacy quizzes, and secondly to ascertain how the gender and socioeconomic status variables interact with each other across different ethnic groupings.

The existing body of literature shows there is a positive correlation between socioeconomic status and educational achievement. While the correlation between gender and academic achievement at first glance seems obvious – girls outperform boys, that may not be the case across all deciles, as the possible interacting effect of gender and socioeconomic status has not been the subject of as much research. Whilst not conducting any tests of statistical significance on the gender-decile interaction, a 1999 Education Review Office (ERO) publication did state that “the gender gap is not strongly correlated to SES decile, although it does appear to increase with higher deciles” (p. 21). The same document also went on to say that the “gap was negative in decile 1” (p. 21). These findings however were for all subjects rather than just economics. Given Whitehead (1996) found “differences in the perception of subjects and achievement appear to be linked to sex-stereotyped attitudes within a particular society rather than to innate sex differences in ability” (p. 149), and her classification of economics as a ‘masculine’ subject, which some students perceive as being a subject boys would be better at than girls; it is possible economics data may yield different results when examining the interaction of decile and gender. Using data collected from the New Zealand Qualifications Authority (NZQA) website in 2010, ordinary least squares (OLS) and logit regressions were used to ascertain correlations between rates of non-achievement in externally assessed National Certificate of Educational Achievement (NCEA) achievement standards with decile, gender, and decile-gender interaction variables. These results were also broken down by ethnic grouping, namely Maori, European, Pacific Islander and Asian.

Male rates of non-achievement are higher for males than females using data aggregated across all subjects, however when examining only aggregated economics data across the three levels on NCEA, females have higher rates of non-achievement than males. Rates of non-achievement are higher for lower decile students for both economics and all subjects aggregated. A significant gender-decile interaction was found when comparing students from low decile and high decile schools, with females from low deciles schools having higher rates of non-achievement relative to males from low decile schools, when compared to high decile schools. A similar result was found in the low decile to medium decile comparison, however not in the medium decile to high decile comparison. When using the same analysis examining rates of excellence rather than non-achievement, similar underperformance of low decile females was found. When broken down by ethnicity, the interaction effect is the strongest and most consistent for Europeans.

These findings could be indicative of some degree of socialization of female students from low decile schools, as per the social learning theory outlined in the introduction. However, with only aggregated examination result data available, it is not possible to tell if this assertion is correct, and if true, what the source of the socialization is. There is certainly evidence from the literature that economics is viewed as a subject males do better at than females, and it is plausible that in low decile schools, where the parents of students are likely to be less educated, and have less involvement in the business or financial worlds, this effect may be felt the strongest.

Abstract:

This research attempts to show that establishing a correlation between gender and socioeconomic group with respect to academic performance across a subject can provide some illuminating data. Ordinary least squares regression is used to show there is an interaction between gender and school decile in NCEA externally assessed economics standards. On average, girls in low decile schools receive higher rates of not achieved grades in economics compared to boys in low decile schools. When this same comparison is done for girls and boys in higher decile schools, there is a statistically significant reduction in the rates of not achieved grades received by girls relative to boys. This difference is the strongest and most consistent for Europeans on average. One key finding of this paper is that girls do not perform as well as boys in low decile schools in the subject of economics, relative to their counterparts in high decile schools.

Introduction

Much research exists in the correlation between socioeconomic status (SES) and attainment in school qualifications. White (1982) found that in research prior to 1980 the relationship between socioeconomic factors and academic achievement depended on the types of socioeconomic status indicators used, and how educational achievement was measured. When Lipsey and Wilson (1993) reviewed the literature, they found a medium positive correlation between socioeconomic status and educational achievement. Sirin (2005) attempted to replicate White's review on literature published between 1990 and 2000. He found that research differed regarding the strength of the relationship between socioeconomic status and academic achievement, but generally there was a medium positive correlation between SES and academic achievement at the student level and a large degree of association at the school level.

Gillborn and Mirza (2000) produced a comprehensive review of data supplied by the Department for Education and Employment (DfEE), and material based on the ongoing Youth Cohort Study of England and Wales (YCS). The report sought to "*place ethnic inequalities within a wider discussion of educational inequality*" (Gillborn and Mirza 2000, p5). Gillborn and Mirza (2000) attempted to map ethnicity, class and gender, using GCSE five or more higher grade passes as the measure of attainment. They found that "*the familiar association between class and attainment can be seen to operate within each of the main ethnic groups*" (Gillborn and Mirza 2000, p5). As an example of this, they found that students from households where the parental occupations were non-manual attained significantly higher as a group than students of the same ethnic origin from households where the parental occupations were manual. Whitehead (1996) puts forward the notion that "*differences in the perception of subjects and achievement appear to be linked to sex-stereotyped attitudes within a particular society rather than to innate sex differences in ability*" (Whitehead (1996, p149). This view is supported by the findings of Klainin, Fensham and West (1989) in the subjects of Chemistry and Physics, and Hanna (1989) in the subject of Mathematics. Whitehead (1996) found in a study of Year 11 and Year 13 students in 14 schools in England and Wales that 55% of students viewed economics and related subjects as being subjects that girls and boys are equally good at, and 39% of students believed economics and related subjects were subjects that boys would do better in than girls. Of the same sample, 17% of girls, and 24% of boys chose to take a course in economics, which resulted in Whitehead categorizing economics as a masculine subject. She found that girls were not avoiding masculine subjects to the degree that boys were avoiding feminine subjects. The possible interacting effect of gender and SES has not been the subject of as much research.

Connolly (2006) attempted to establish if there was any interaction between ethnicity, gender, social class and attainment in GCSE. Several qualitative studies have suggested that the gap between females and males in educational attainment is greater among groups that experience the lowest level of attainment, whether they are socioeconomic groupings or ethnic groupings. Using log-linear analysis, Connolly found that the relatively small gender differences that existed remained relatively stable across all social classes and ethnic groups.

Tinkler (2003) used a logit regression to estimate the probability that high attainment will happen given certain explanatory variables such as social class. It was established that a strong relationship exists between social advantage and high attainment. Dumais (2002) argues that “*traditional gender stereotypes play a role in the lack of cultural participation by male students, and that female students may be more encouraged to make use of their cultural capital to succeed at school*” (Dumais 2002, p44). She used ordinary least squares regression to show that cultural capital had a significant positive effect on the grades of female students. Dumais (2002) also found that if a male student has high occupational aspirations, his GPA increases by .196 points. This led Dumais (2002) to suggest that for boys, a student’s disposition toward obtaining a prestigious career has an effect on grades, where for girls it did not have a significant effect.

The New Zealand Context

The performance in New Zealand schools of girls relative to boys has been well documented in recent times. In the 1999 Education Review Office (ERO) report *The Achievement of Boys*, it was stated “Girls currently outperform boys at school against most measures of achievement. The achievement of boys has therefore become a focus of considerable attention” (ERO 1999, p3). The report then goes on to say that it “provides some examples from New Zealand schools that have set in place initiatives to address issues to do with the teaching and learning of boys” (ERO 1999, p3). The report suggested

Schools need to collect and examine achievement information to assess where boys are not achieving as well as they could and use this information to review their policies and programmes to ensure that the strengths of boys are sufficiently channelled and developed (ERO 1999, p3).

The report included a chapter *Innovations in Schools to Improve Boys’ Achievement*. Clearly, the performance of boys in school was becoming more of a focus, with more resources and initiatives geared toward improving the performance of boys.

The report discussed the gender gap in co-educational schools using school certificate results from 1998. The percentage of school certificate results B or better was graphed by SES decile. The conclusion was then drawn that “*The gender gap is not strongly correlated to SES decile, although it does appear to increase with higher deciles*” (ERO 1999, p21). There was no mention of any statistical techniques used to establish any correlation. It was also acknowledged that the “*gap was negative in decile 1*” (ERO 1999, p21), and that the same effect was noticed in school certificate results for 1997. In summary the data showed that for both 1997 and 1998 in decile one schools, a higher percentage of boys than girls gained a B grade or better in school certificate. From decile two onwards a higher percentage of girls than boys gained a B grade or better, and the gap appeared to be increasing with higher deciles. This data tends to suggest that there is in fact a correlation between gender and decile, which needs to be tested statistically. It is this idea of an interaction between gender and decile that will form the basis of this article.

In 2001, Alton-Lee and Praat were commissioned by the Ministry of Education to complete a literature review. The document was called *Explaining and Addressing Gender Differences in the New Zealand Compulsory School Sector*, and “*stemmed from increasing concern among policy makers and practitioners that the education of boys in Aotearoa New Zealand was at risk*” (Alton-Lee and Praat 2001, p3). The report made several comments about the performance of boys relative to girls, and the performance of students from low decile schools relative to high decile schools, but there was no testing of any interaction between the two.

The Ministry of Education produced a 2007 document *Boys’ Achievement. A Synthesis of the Data*. The report found that:

- From year 11 boys are leaving school at a faster rate than girls
- Males are more likely than females to leave school with little or no formal qualification
- Females tend to stay at school longer and leave school with higher attainment levels; and females are more likely than males to gain a NCEA qualification at all levels

- The higher proportion of females with University Entrance results in higher proportions of females enrolled in degree level courses.

The report then went on to conclude

The literature reports a number of research studies and initiatives that focus on raising achievement and these have built a knowledge base of effective practice and innovation in teaching boys. The challenge now is for schools and their communities to engage with some of the issues faced by boys and to build this knowledge base into school and classroom practice (Ministry of Education 2007, p52). The concerning factor around the push for improvement in boys' academic performance is that not all girls outperform boys. The Achievement of Boys may even have identified a group of low SES girls that are underperforming relative to boys.

The primary academic qualification in New Zealand is the National Certificate of Educational Achievement (NCEA), which can be obtained at three levels. A NCEA can be obtained by a student once they have successfully earned 80 credits towards their certificate, by completing standards in various subjects. Generally, year 11 students attempt a level one certificate, year 12 students attempt a level two certificate, and year thirteen students attempt a level three certificate. According to New Zealand Qualifications Authority (NZQA) data from 2005 to 2007, at levels one, two and three, students at high decile schools acquire NCEA at a much higher rate than students at mid-decile schools, who acquire it at a much higher rate than students at low decile schools. (NZQA, 2009)

A school's decile rating indicates the extent to which the school draws its students from low socio-economic communities. Decile one schools are the 10% of schools with the highest proportion of students from low socio-economic communities, whereas decile 10 schools are the 10% of schools with the lowest proportion of these students (Ministry of Education, 2010).

The five factors that make up decile as a socioeconomic indicator are:

1. Household income
2. Occupation
3. Household crowding
4. Educational qualifications
5. Income support (the percentage of parents who receive a benefit).

The NZQA (2009) published results for the period 2005 to 2007, also showed that there is approximately a 10 percentage point gap in favour of female students with respect to the cumulative percentage of the cohort having achieved NCEA Level 1. The report goes on to say that at years 12 and 13, there is approximately a 12 percentage point gap in favour of female students with respect to the cumulative percentage of the cohort having achieved NCEA Level 2. While girls are doing better than their male counterparts, a closer analysis of the data may reveal a different picture. It may be that there are groups of girls who are doing better than their male counterparts, and there may be other groups of girls who are doing worse than their male counterparts. It is therefore worthwhile to stratify the data on demographics such as socioeconomic status and gender, to establish if any correlations exist.

The intention of this paper is to use ordinary least squares regression analysis to establish the level of interaction between gender and socioeconomic status in Level Three NCEA externally assessed economics standards, that is impacting negatively on girls in low decile schools.

Methodology

Data was collected from the NZQA website (2010) for rates of non-achievement of students sitting level three externally assessed economics standards, broken down by gender and ethnicity. Five years worth of data were used from 2004 to 2008. An Ordinary Least Squares (OLS) linear regression was run on the data to establish if there were any statistically significant interactions between gender and decile from low to medium decile school students, medium to high decile school students, and low to high decile school students. Regressions were also run to establish if ethnic grouping had an influence on

interactions between gender and school decile. The four major ethnic groupings of European, Asian, Maori and Pacific Islanders were used.

The dependent variable in the model is the rate of non-achievement. This data takes a binary form, with a student either achieving a standard or not achieving a standard. The two independent variables of decile and gender were also binary variables, with male being the dummy variable for gender, and the highest decile school grouping being the dummy variable for school decile. A third variable was also introduced, which is an interaction variable of decile multiplied by gender. This variable will show the effect of school decile on males relative to females.

The regression model therefore takes the following form:

$$\text{Not Achieved} = \alpha + \beta_1 \text{ Male} + \beta_2 \text{ High Decile} + \beta_3 \text{ Male} \times \text{High Decile} + \varepsilon$$

Where:

α = intercept

Male = the dummy variable for gender (=1 if male; = 0 if female)

High Decile = the dummy variable for decile grouping (high decile = 8–10, low decile = 1–3)

ε = the error term

Regressions were also run comparing low decile school students to high decile school students using excellence grades as the dependant variable rather than not achieved grades. Due to the binary nature of the variables, a comparable logit regression was also run for every OLS regression. No qualitative differences were found, so OLS was used for ease of reporting.

Results

Table one shows the rates of non-achievement on externally assessed achievement standards for the period from 2004 to 2008, broken down by gender. Table one indicates that at every level and in every year, there are higher rates of non-achievement for males on externally assessed achievement standards than females. As a comparison, table two shows the rates of non-achievement on externally assessed economics achievement standards for the period from 2004 to 2008, broken down by gender. Comparing these results indicates that there is not the same pattern of higher rates of non-achievement by males compared to females.

Table 1: Rates of Non Achievement (%) on Externally Assessed Achievement Standards: All Subjects.

| | 2004 | 2005 | 2006 | 2007 | 2008 |
|--------------------|------|------|------|------|------|
| Level Three | | | | | |
| Male | 43 | 34 | 34 | 34 | 34 |
| Female | 40 | 32 | 30 | 30 | 29 |
| Level Two | | | | | |
| Male | 49 | 40 | 38 | 37 | 37 |
| Female | 42 | 35 | 32 | 31 | 36 |
| Level One | | | | | |
| Male | 41 | 35 | 35 | 33 | 32 |
| Female | 35 | 30 | 30 | 28 | 27 |

Table 2: Rates of Non Achievement (%) on Externally Assessed Achievement Standards: Economics.

| | 2004% | 2005% | 2006% | 2007 % | 2008 % |
|--------------------|-------|-------|-------|--------|--------|
| <i>Level Three</i> | | | | | |
| Male | 56 | 42 | 40 | 35 | 33 |
| Female | 56 | 44 | 42 | 36 | 32 |
| <i>Level Two</i> | | | | | |
| Male | 45 | 37 | 38 | 37 | 33 |
| Female | 48 | 37 | 36 | 36 | 36 |
| <i>Level One</i> | | | | | |
| Male | 31 | 28 | 28 | 25 | 25 |
| Female | 30 | 29 | 27 | 27 | 24 |

Table three shows the percentage of not achieved grades received by students sitting externally assessed standards, broken down by NCEA level, gender and decile grouping for all subjects.

As expected, the rates of non-achievement decrease from low decile school students to high decile school students. It is noteworthy that for every level every year, the male rate of non-achievement is greater than the female rate of non-achievement.

Table 3: Rates of Non Achievement (%) for Externally Assessed Achievement Standards By Decile: All Subjects.

| | Decile | 1-3 | 1-3 | 1-3 | 4-7 | 4-7 | 4-7 | 8-10 | 8-10 | 8-10 |
|-------------|---------------|---------|---------|---------|---------|---------|---------|---------|---------|---------|
| | | Level 3 | Level 2 | Level 1 | Level 3 | Level 2 | Level 1 | Level 3 | Level 2 | Level 1 |
| 2004 | Male | 55 | 63 | 57 | 45 | 52 | 44 | 40 | 44 | 34 |
| | Female | 52 | 59 | 54 | 44 | 47 | 38 | 36 | 36 | 26 |
| 2005 | Male | 50 | 57 | 52 | 36 | 44 | 38 | 31 | 35 | 28 |
| | Female | 47 | 55 | 48 | 35 | 39 | 34 | 28 | 28 | 23 |
| 2006 | Male | 49 | 54 | 52 | 36 | 41 | 38 | 30 | 33 | 29 |
| | Female | 48 | 50 | 48 | 33 | 35 | 34 | 26 | 26 | 22 |
| 2007 | Male | 47 | 53 | 48 | 36 | 40 | 37 | 30 | 33 | 28 |
| | Female | 45 | 47 | 46 | 33 | 35 | 32 | 25 | 25 | 21 |
| 2008 | Male | 47 | 54 | 49 | 36 | 40 | 35 | 30 | 32 | 26 |
| | Female | 46 | 48 | 45 | 32 | 34 | 31 | 24 | 23 | 20 |

Table Four shows the corresponding percentages for economics externally assessed achievement standards.

Table 4: Rates of Non Achievement (%) for Externally Assessed Achievement Standards By Decile: Economics.

| | Decile | 1-3 | 1-3 | 1-3 | 4-7 | 4-7 | 4-7 | 8-10 | 8-10 | 8-10 |
|-------------|---------------|---------|---------|---------|---------|---------|---------|---------|---------|---------|
| | | Level 3 | Level 2 | Level 1 | Level 3 | Level 2 | Level 1 | Level 3 | Level 2 | Level 1 |
| 2004 | Male | 66 | 57 | 46 | 62 | 50 | 34 | 53 | 42 | 27 |
| | Female | 67 | 63 | 51 | 59 | 53 | 35 | 52 | 44 | 23 |
| 2005 | Male | 56 | 57 | 43 | 45 | 41 | 31 | 39 | 33 | 25 |
| | Female | 58 | 61 | 46 | 45 | 42 | 35 | 42 | 30 | 23 |
| 2006 | Male | 60 | 52 | 46 | 45 | 43 | 45 | 36 | 34 | 25 |
| | Female | 62 | 58 | 51 | 46 | 41 | 46 | 36 | 30 | 21 |
| 2007 | Male | 46 | 61 | 41 | 38 | 44 | 28 | 34 | 32 | 22 |
| | Female | 55 | 60 | 49 | 42 | 40 | 31 | 30 | 30 | 20 |
| 2008 | Male | 46 | 54 | 44 | 36 | 36 | 28 | 30 | 29 | 21 |
| | Female | 60 | 68 | 45 | 33 | 41 | 28 | 27 | 29 | 17 |

There is the expected decrease in rates of non-achievement going from low decile school students to high decile school students. The interesting comparison between all externally assessed achievement standards and economics externally assessed achievement standards is the female compared to male rates of non-achievement. Across levels one, two and three of the NCEA, there are 25 occasions where females have higher rates of non-achievement than males, 16 occasions where males have higher rates of non-achievement than females, and 4 occasions where males and females have the same rate of non-achievement. This contrasts with Table Three, where for every level and every year, males have higher rates of non-achievement than females.

Another interesting finding from Table Four is how the performance of girls relative to boys differs across the decile groupings. For low decile school students, on 14 occasions females had higher rates of non-achievement than males. For medium decile school students, there were 9 occasions where females had higher rates of non-achievement than males, and for high decile school students, there were only 2 occasions where females had higher rates of non-achievement than males.

From the raw data, we can make the following three conclusions:

1. The performance of females relative to males on economics externally assessed achievement standards does not follow the same pattern of males receiving higher rates of non-achievement than females exhibited across all externally assessed achievement standards;
2. The expected decrease in rates of non-achievement as school decile increases is exhibited in the results on economics externally assessed achievement standards;
3. There appears to be some interaction between gender and decile with respect to rates of non-achievement on economics externally assessed achievement standards.

To establish if there is a significant difference between the performance of females relative to males across different decile categories, OLS regressions were run for externally assessed economics standards aggregated across the five year period from 2004 to 2008. The coefficients and t-statistics are shown in Table Five.

Table 5: Variables Influencing Non Achievement: OLS Regression Outputs.

| | Level One | Level Two | Level Three |
|-------------------------|---------------------|---------------------|---------------------|
| Gender (Male =1) | -.04*** (-6.54) | -.06*** (-5.25) | -.05*** (-3.73) |
| Decile (High=1) | -.28*** (-53.32) | -.30*** (-36.07) | -.23*** (-23.21) |
| Gender x Decile | 0.08*** (10.40) | 0.08*** (6.40) | 0.06*** (4.04) |
| Intercept | 0.49*** (102.80) | 0.62*** (81.10) | 0.61*** (65.76) |

*** p < 0.01, ** p<0.5, * p<.0.10

At level one, low decile male students had lower rates of non-achievement than female students, as shown by the negative coefficient. This was statistically significant at the 99% confidence level. Students from high decile schools had lower rates of non-achievement than students from low decile schools, with the effect of decile being much stronger than the effect of gender. (Coefficient of -.28 versus-.04). This effect was statistically significant at the 99% confidence level. The interaction term was also statistically significant at the 99% confidence level. The positive coefficient reflects the fact that females in low decile schools have higher rates of non-achievement relative to males than females in high decile schools relative to males in high decile schools. (The coefficients tell us that males in low decile schools receive not achieved rates of 45% (.49 + -.04), where low decile females receive not achieved rates of 49% (.49).

High decile males receive not achieved rates of 25% (.49 + .08 + -.28 + -.04), where high decile females receive not achieved rates of 21% (.49 + -.28)).

At level two, again the independent variables are all statistically significant (at the 99% confidence level). Using the coefficients, low decile girls average a 62% rate of non-achievement, with low decile boys averaging a 56% rate of non-achievement. High decile girls and boys average non achieved rates of 32% and 34% respectively. The 6% higher rates of non-achievement for girls from low decile schools relative to boys from low decile schools is statistically significantly different from the 2% lower rates of non-achievement for girls in high decile schools relative to boys in high decile schools.

At level three, all three independent variables are statistically significant. Females in low decile schools have average non achieved rates of 61%, where boys in low decile schools average 56%. This 5% higher rate of non-achievement for girls is statistically significantly different to the 1% lower rates of non-achievement that girls in high decile schools average (38%) relative to boys in high decile schools (39%).

Regressions were also run comparing students from low and middle decile schools and comparing students from middle and high decile schools for externally assessed economics achievement standards. The coefficients and t-statistics are shown in Table Six.

Table 6: Variables Influencing Non Achievement: OLS Regression Outputs for Different Decile Comparisons.

| | Gender (Male =1) | Decile | Gender x Decile |
|----------------------|--------------------|---------------------|--------------------|
| Low v Medium | | (Medium=1) | |
| Level One | -.04*** (-6.01) | -.17*** (-29.16) | 0.03*** (3.53) |
| Level Two | -.06*** (-5.01) | -.19*** (-21.09) | 0.05*** (4.18) |
| Level Three | -.05*** (-3.66) | -.15*** (-14.64) | 0.05*** (3.08) |
| Medium v High | | (High=1) | |
| Level One | -.02*** (-4.67) | -.11*** (-33.45) | 0.05*** (10.79) |
| Level Two | -.00 (-0.93) | -.11*** (-22.02) | 0.02*** (4.18) |
| Level Three | -.00 (-0.65) | -.08*** (13.86) | 0.01 (1.49) |

*** p < 0.01, ** p<0.5, * p<.0.10

All three independent variables were statistically significant for level one comparing low decile school students to middle decile school students, and comparing middle decile school students to high decile school students. It was the same for level two comparing low decile school students to middle decile school students. However, when comparing middle decile school students to high decile school students, gender was not statistically significant. There was a similar effect at level three. For all comparisons across all levels, the decile coefficient was negative, meaning lower rates of non-achievement for high decile school students. The interaction term coefficient was always positive, meaning high decile girls did better relative to high decile boys, than low decile girls did relative to low decile boys. These regressions were run again using gaining an excellence grade as the dependant variable rather than the rate of non-achievement. This yielded the coefficients and t-statistics in Table Seven.

Table 7: Variables Influencing Economics Externally Assessed Achievement Standards Excellence Grades: OLS Outputs by Decile Grouping.

| | Gender (Male =1) | Decile | Gender x Decile |
|---------------------------|-------------------------|--------------------|------------------------|
| Low v High Deciles | | (High=1) | |
| Level One | -.00 (-0.10) | 0.08*** (24.16) | -.03*** (-6.99) |
| Level Two | 0.00 (0.24) | 0.06*** (14.45) | -.03*** (-4.10) |
| Level Three | 0.01 (1.44) | 0.03*** (7.85) | -.01 (-1.20) |
| Low v Medium | | (Medium=1) | |
| Level One | 0.00 (0.12) | 0.04*** (14.64) | -.02*** (-4.25) |
| Level Two | -.00 (0.40) | 0.03*** (11.34) | -.05*** (-14.51) |
| Level Three | 0.01* (1.68) | 0.02*** (5.23) | -.00 (-0.74) |
| Medium v High | | (High=1) | |
| Level One | -.02*** (-8.20) | 0.04*** (19.16) | -.02*** (-5.78) |
| Level Two | -.06*** (-23.55) | 0.03*** (13.63) | 0.03*** (10.07) |
| Level Three | 0.00* (1.70) | 0.01*** (5.86) | -.00 (-1.02) |

*** p < 0.01, ** p<0.5, * p<.0.10

At levels one and two, gender is not significant when comparing low decile school students to high decile school students, and when comparing low decile school students to medium decile school students. At level three, gender is only significant at the 90% confidence level when comparing low to medium, and medium to high decile school students. Interestingly, the interaction term is not significantly significant for any comparison at level three.

To establish whether or not the same relationships for levels of non-achievement held across all ethnic groups, the same regressions were run on rates of non-achievement, with the students broken down into ethnic groupings. Low decile school students were then compared with high decile school students. The relevant t-statistics and coefficients are shown in Table Eight. For Maori, gender and the interaction term are only significant at level two, with decile being significant at all levels. For Europeans, the decile and the interaction variables are significant at the 95% confidence level. For Asian students, all independent variables are significant to at least the 95% confidence level with the exception of gender and the interaction term at level three, and gender at level two; which were not significant. For Pacific Island students, all independent variables are significant at least at the 90% confidence level with the exception of gender and the interaction term at level one; which were not significant.

Table 8: Variables Influencing Economics Externally Assessed Achievement Standards Non Achievement: OLS Outputs by Ethnicity for Low v High Decile Students.

| | Gender (Male =1) | Decile (High=1) | Gender x Decile |
|-----------------------|-------------------------|------------------------|------------------------|
| European | | | |
| Level One | -.02* (-1.79) | -.16*** (-19.94) | 0.03*** (3.17) |
| Level Two | -.04** (-2.46) | -.21*** (-14.53) | 0.10*** (5.33) |
| Level Three | -.06*** (-2.77) | -.17*** (-9.84) | 0.06*** (2.76) |
| Asian | | | |
| Level One | -.02*** (-1.04) | -.20*** (-14.83) | 0.13*** (6.26) |
| Level Two | 0.02 (0.75) | -.21*** (-11.35) | 0.05** (2.00) |
| Level Three | 0.01 (0.56) | -.17*** (-9.06) | 0.02 (0.73) |
| Maori | | | |
| Level One | -.01 (-.52) | -.19*** (-11.78) | -.02 (-0.96) |
| Level Two | -.06** (-2.29) | -.26*** (-9.76) | 0.08** (2.18) |
| Level Three | 0.01 (0.24) | -.14*** (-4.24) | -.03 (-0.60) |
| Pacific Island | | | |
| Level One | 0.01 (0.56) | -.26*** (-14.46) | -.01 (-.37) |
| Level Two | -.04* (-1.87) | -.24*** (-9.71) | 0.07** (2.01) |
| Level Three | -.07*** (-2.60) | -.22*** (-6.96) | 0.10*** (2.38) |

*** p < 0.01, ** p<0.5, * p<.0.10

Table Nine shows the rates of non-achievement by gender across the different ethnic groupings in economics.

Table 9: Rates (%) of Non Achievement by Ethnicity: Economics

| | European | Asian | Maori | Pacific Island |
|--------------------|-----------------|--------------|--------------|-----------------------|
| Level One | | | | |
| Low Decile Female | 35 | 40% | 53% | 65% |
| Low Decile Male | 33 | 38% | 52% | 66% |
| High Decile Female | 19 | 20% | 34% | 39% |
| High Decile Male | 20 | 31% | 31% | 39% |
| Level Two | | | | |
| Low Decile Female | 50 | 53% | 67% | 76% |
| Low Decile Male | 46 | 55% | 61% | 72% |
| High Decile Female | 29 | 32% | 41% | 52% |
| High Decile Male | 35 | 39% | 43% | 55% |
| Level Three | | | | |
| Low Decile Female | 53 | 55% | 66% | 77% |
| Low Decile Male | 47 | 56% | 67% | 70% |
| High Decile Female | 36 | 38% | 52% | 55% |
| High Decile Male | 36 | 41% | 50% | 58% |

*** p < 0.01, ** p<0.5, * p<.0.10

As Table Nine shows (from left to right), European students have the lowest rate of not achievement, then Asian students, Maori students, and lastly Pacific Island students, which have the highest rates of not achievement. This corresponds to the number of students taking economics, with Europeans being the biggest group, followed by Asians, Maori and Pacific Island students in that order. This same pattern of not achievement is reflected in aggregate data on all subjects, as shown in Table Ten, with the exception of Asian students, where there is greater fluctuation across all subjects with regards to whether European students or Asian students receive lower rates of not achievement.

Table 10: Rates (%) of Non Achievement by Ethnicity: All Subjects

| | European | Asian | Maori | Pacific Island |
|--------------------|----------|-------|-------|----------------|
| Level One | | | | |
| Low Decile Female | 38 | 37% | 55% | 59% |
| Low Decile Male | 44 | 41% | 59% | 63% |
| High Decile Female | 22 | 17% | 36% | 38% |
| High Decile Male | 28 | 25% | 41% | 46% |
| Level Two | | | | |
| Low Decile Female | 46 | 44% | 57% | 63% |
| Low Decile Male | 52 | 47% | 61% | 68% |
| High Decile Female | 28 | 23% | 38% | 44% |
| High Decile Male | 35 | 31% | 47% | 52% |
| Level Three | | | | |
| Low Decile Female | 42 | 42% | 52% | 60% |
| Low Decile Male | 43 | 46% | 55% | 65% |
| High Decile Female | 27 | 26% | 37% | 45% |
| High Decile Male | 32 | 31% | 42% | 49% |

Conclusions

The results from this research show a statistically significant interaction effect between gender and school decile when comparing low decile school students to high decile school students. However, with the exception of level one, the statistically significant effect is between low decile schools and middle decile schools. The possible conclusions from these results are constrained by the fact that individual student ability is not able to be accounted for in the results. By not having this data, it cannot be discounted that low ability girls are choosing economics in low decile schools, where low ability boys in low decile schools are not to the same extent. If this is the case, however, it raises the question why? Are boys in low decile schools better able to select subjects which increase their chances of success than female students? Or is it that the choices of girls in low decile schools are more limited than boys, and that economics is merely the lesser of a few evils? Keef (1991) found that females did consistently better on the old Bursary economics examination, although the differences were relatively small and the statistical significance was not convincing. Interestingly, he found that at year thirteen, there were twice as many males as females in the accounting/economics combination. Although the data in this paper deals with economics alone, there is certainly nothing to suggest this level of gender difference still exists in subject selection.

An alternative possibility is that in economics, less academically able girls tend to sit externally assessed examinations, where less academically able boys tend to sit the alternative internally assessed unit standards, which can be resubmitted in the event of a failure, and tend to offer a greater chance of success than externally assessed standards. However, from 2004 to 2008, the percentage of the cohort sitting economics unit standards that are males mirrors the percentage of the cohort sitting externally assessed standards that are males until 2007, where there has actually been a decline in the male percentage entering unit standards to 52%, where the externally assessed male percentage in 2008 was

56%. This suggests that girls are actually over-represented in unit standard participation when compared to externally assessed standards, where chances of success are greater.

A third possibility is that the economics curriculum and assessment methods for whatever reason do not result in the same chances of success for low decile girls as for low decile boys. The assessment methods used in economics are however, similar to the assessment methods used in the majority of other subjects which have an invigilated examination. The answer to this question is beyond the scope of this paper. An examination of the high rates of non-achievement for girls from low decile schools does suggest it is a case of girls in low decile schools underperforming, rather than boys in low decile schools over performing.

Using a dependent variable of excellences rather than non-achievement, similar results were found at level one and two with respect to the interaction term. Interestingly, no significant interaction was found for level three.

When the results are broken down by ethnic grouping, the interaction effect is the most consistent and the strongest for Europeans. This finding seems to rule out the possibility that ethnic minorities which have a history of lower academic attainment relative to European students are over represented in the cohort of girls from low decile schools. The interaction effect is stronger amongst Europeans than other minority ethnic groupings. There is still the general effect of students from ethnic minorities as a group receiving greater rates of non-achievement than European students.

FUTURE RESEARCH

Future research incorporating student level data indicating student ability would be the next logical step to ascertaining whether the interaction between gender and decile is the result of lower performance by girls in low decile schools, or poorer subject choices by girls in low decile schools. A study of subject options available for girls in low decile schools relative to high decile schools may also be of interest.

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Chapter Three Outline

This chapter examines the interaction between gender and the decile of a secondary school a student attends (a proxy for socioeconomic status), and how it affects academic performance of students on accounting level three NCEA external assessments.

Accounting was chosen as it is the second of the two traditional ‘commerce’ subjects offered in schools, and would be subject to similar socialization effects in the home as financial literacy. It was also a subject identified by school principals where financial education was delivered. The place of this chapter in terms of the overall body of work is similar as for chapter two: to establish whether there is any evidence of a gender bias in accounting in terms of the academic achievement of females relative to males similar to that found on financial literacy quizzes, and to ascertain how the gender and socioeconomic status variables interact with each other across different ethnic groupings.

As mentioned in the previous chapter, the existing body of literature shows there is a positive correlation between socioeconomic status and educational achievement. According to the findings of Siron (2005), “family socioeconomic status at the student level is one of the strongest correlates of academic performance. At the school level, the correlations were even stronger” (p. 418). Siron (2005) then goes on to state that socioeconomic status is “not only directly linked to academic achievement but also indirectly linked to it through multiple interacting systems, including students’ racial and ethnic background, grade level, and school /neighbourhood location” (p. 420). This chapter follows a similar approach to chapter one, looking for interactions between gender and school decile, segmented by ethnicity, albeit using a slightly different statistical analysis.

Using externally assessed NCEA Level Three data collected from the New Zealand Qualifications Authority (NZQA) website in 2010, ordinary least squares and probit regressions were run to identify correlations between rates of non-achievement in externally assessed NCEA level three accounting achievement standards with decile, gender and decile-gender interaction variables. These results were also broken down by ethnic grouping, namely Maori, European, Pacific Islander and Asian.

A similar result was found for accounting as was found for economics in chapter two. While across all subjects females achieve at higher rates than males in level three externally assessed achievement standards, in level three externally assessed accounting standards, on average, a greater percentage of achieved or better grades are received by males than females. Rates of achievement are greater for higher decile students for both accounting and all subjects aggregated, and for Europeans relative to Maori and Pacific Island students when looking at solely accounting data. The interaction between gender and decile is significant for Asian, Pacific Island and Maori students, with female achievement relative to male achievement being worse for every ethnic grouping in low decile schools when compared to high decile schools.

As in chapter two, these findings could be indicative of some degree of socialization of female students from low decile schools, as per the social learning theory outlined in the introduction.

Abstract

This paper examines the effect on rates of achievement of the interaction of student gender and school socioeconomic status, using ordinary least squares and probit regressions. The data used is school achievement by students taking externally assessed accounting standards in their final year at New Zealand secondary schools, and covers the period 2004 to 2008. The paper concludes that the interaction of gender and school decile have a significant impact on achievement rates for Maori, Pacific Island and Asian girls relative to Maori, Pacific Island and Asian boys in low decile schools. A secondary contribution of this paper is to demonstrate that comparing the achievement of gender or socioeconomic status groups in isolation is insufficient when examining academic performance and evaluating subject curriculum. Interactions between variables need to be considered, whether they be gender and decile as this paper examines, or other variables not examined within this paper.

Keywords: National Certificate of Educational Achievement [NCEA], accounting, education, secondary school, assessment

Introduction

A large amount of researches exist, giving a range of positions on the impact of socioeconomic status on student academic achievement. This led Sirin (2005) to describe socioeconomic status as being “probably the most widely used contextual variable in education research” (p. 417). Sirin (2005) cited Bornstein and Bradley (2003), Brooks-Gunn and Duncan (1997), Coleman (1998) and McLoyd (1998) as being researchers who have examined educational processes, including academic achievement, in relation to socioeconomic background. Due to the amount of research on the topic, there have been several papers published summarising the relevant literature, including White (1982), Lipsey and Wilson (1993) and Sirin (2005). White (1982) carried out a study that reviewed the literature prior to 1980, which explored the link between socioeconomic factors and academic achievement. He found that the relationship depended on the types of socioeconomic status indicators used and how educational achievement was measured. Lipsey and Wilson (1993) also carried out a review of more than 300 meta-analyses, with their findings indicating a medium correlation between socioeconomic status and educational achievement. Sirin (2005) attempted to replicate White’s study on research published between 1990 and 2000. One of his goals was to establish how strong the relationship between socioeconomic status and academic achievement was. The study included 101,157 students, 6,871 schools, and 128 school districts gathered from 74 independent samples from the United States of America.

As Sirin (2005) stated, post White’s review of the literature, there has been a range of findings about the strength of the relationship between socioeconomic status and academic achievement. Sirin (2005) gave the example of a strong relation being found by Lamdin (1996) and Sutton and Soderstrom (1999), but no significant correlation at all being found by Ripple & Luthar (2000) and Seyfried (1998). Overall, Sirin (2005) found that there was “a medium level of association between SES and academic achievement at the student level and a large degree of association at the school level....Of all the factors examined in the meta-analytic literature, family SES at the student level is one of the strongest correlates of academic performance. At the school level, the correlations were even stronger” (Sirin, 2005, p. 418). He also stated that Brooks-Gunn and Duncan (1997), Bronfenbrenner and Morris (1998), Eccles, Lord, and Midgley (1991) all found socioeconomic status is “not only directly linked to academic achievement but also indirectly linked to it through multiple interacting systems, including students’ racial and ethnic background, grade level, and school/neighborhood location” (Sirin, 2005, p. 420).

Connolly (2006) attempted to establish if there was any interaction between ethnicity, gender, social class and academic attainment in GCSE. The intention of Connolly’s article was to “establish how gender differences may vary between social class groupings” (2006, p. 7). Connolly cited Hargreaves

(1967), Lacey (1970), Corrigan (1979) and Willis (1977) as examples of researchers that show “boys from the most marginalised backgrounds are more likely to develop anti-school subcultures that compensate for their relative lack of success in education.... A similar process has also been found among African Caribbean boys (Gillborn, 1990; Sewell, 1997; Macan, 1988)” (Connolly, 2006, p. 5).

Using log-linear analysis, Connolly (2006) found that “...while gender differences remain relatively small compared to ethnic and social class differences, they do appear to be relatively stable and constant across all social class and ethnic groups” (p. 5).

The New Zealand Context

The variable used to represent socioeconomic status in New Zealand schools is the decile ranking of the school the student attends. All New Zealand state secondary schools are given a decile rating, which represents the SES of the school’s catchment area. According to the New Zealand Ministry of Education website (Ministry of Education, 2010), in order to assess a school’s decile rating five factors are used to measure the socio-economic standing of its community: household income, occupation, household crowding, educational qualifications and income support (the percentage of parents who receive a benefit). Decile 1 schools are the 10% of schools with the highest proportion of students from low socio-economic communities, whereas decile 10 schools are the 10% of schools with the lowest proportion of these students. A low decile school would therefore draw on communities where there is a greater density of households that have low incomes, manual occupations, greater household crowding, lower educational qualifications and greater dependence on income support.

National Certificate of Educational Achievement (NCEA)

A National Certificate of Educational Achievement—or NCEA—is the most common secondary school qualification offered in New Zealand. It can be obtained at three levels. Generally, Year 11 students attempt a Level 1 certificate, Year 12 students attempt a Level 2 certificate, and Year 13 students attempt a Level 3 certificate. In order to obtain the NCEA students enter “standards” in a given subject. Standards represent the skills or knowledge a student is expected to acquire in that subject. For example, an accounting standard is: process financial information for partnerships and companies. Students are assessed, through assignments and internal and/or external exams, in order to measure how well they have met the standards. A student can earn a standard at the achieved, merit or excellence level for achievement standards, or some standards are assessed at a simple achieved/not achieved level.

The New Zealand Qualifications Authority (NZQA) has produced an analysis of student performance in NCEA from 2005 to 2007. Over the period of 2005 to 2007, NZQA found female students have acquired NCEA Level 3 during Year 13 at a rate approximately 12 percentage points higher than the rate for male students each year since 2005 (NZQA, 2009). They also found that students at high decile schools acquire NCEA Level 3 during Year 13 at a much higher rate than students at mid-decile schools, who in turn acquire it at a much higher rate than students at low decile schools. The NZQA data also reveals that the rates of achievement of NCEA level one are higher for Asian and European students than for Maori and Pacific Island students. The proportion of Asian students leaving school with NCEA level three is approximately three times that of Maori and Pacific Island students (NZQA, 2009). This differential in the relative performance of different ethnic groupings has also been revealed in documents such as the Ministry of Education publication PISA 2006: How ready are our 15-year-olds for tomorrow’s world? (Ministry of Education, 2007). This study found that Pakeha-European and Asian students were more likely to be at the higher end of scientific literacy, while Maori and Pasifika were over-represented at the lower end (Ministry of Education, 2007). Statistics New Zealand also found that in a 1994 study of 3,082 students, European and Asian students had higher achievement scores than Maori and Pacific Island students (Statistics New Zealand, 2010).

It is the above major patterns in NZQA published results on NCEA academic achievement that has

led to the choice of gender, decile and ethnicity as the variables to be studied in this paper. However, given that ethnic minorities are not spread evenly across different socioeconomic groups, there is clearly collinearity between decile and ethnicity. For this reason, ethnicity was not included as a variable in the regression model. Rather the regressions were run testing for any interaction between gender and decile for each major ethnic grouping separately.

The intention of this paper is to use regression analysis (rather than the log linear analysis used by Connelly (2006)) to establish the level of interaction between gender and school decile in Level Three NCEA externally assessed accounting standards. This paper differs from the approach used by Connelly (2006) in that an interaction will only be tested between gender and school decile, rather than including ethnicity in the model. This will allow a comparison between ethnic groupings of the interaction between gender and school decile, without suffering from problems associated with collinearity between school decile and ethnicity.

Rather than working with national statistics across all subjects, the subject of Accounting was chosen. This is due to prior research such as Whitehead (1996) which suggested that “differences in the perception of subjects and achievement appear to be linked to sex-stereotyped attitudes within a particular society rather than to innate sex differences in ability” (p. 149). Whitehead (1996) found in a study of Year 11 and Year 13 students in 14 schools in England and Wales that 39% of students believed business subjects were subjects that boys would do better than girls. She found that girls tended to not avoid masculine subjects to the same extent that boys were avoiding feminine subjects. For this reason, Accounting was considered to be a subject where there may have been some interesting gender and interaction effects. It is possible that the aggregated national statistics are masking more extreme differences in attainment between gender and socioeconomic groups in specific subjects such as accounting.

Method

To remove any potential bias in marking amongst schools, only externally assessed achievement standards national results were examined in this analysis. Data was collected from the NZQA website (New Zealand Qualifications Authority, 2010) on the number of students sitting level three externally assessed accounting standards, and the number of students who received a not achieved on an externally assessed level three accounting achievement standard, broken down by gender, decile and ethnicity. The data was collected for every year from 2004 to 2008, giving five years of data.

Separate ordinary least squares (OLS) regressions were run on the data to establish if there were any statistically significant interactions between gender and decile for any of the four ethnicity groupings of European, Asian, Maori and Pacific Islanders. The dependent variable in the model is rates of achievement. This is defined as a student receiving an achieved grade or better on a particular standard. This information is coded as 0 for achieved and 1 for not achieved, making it binary in nature. The two dependent variables of decile and gender were also binary dummy variables, with 0 for female and one for male for gender, and 0 for a student from a low decile school and 1 for a student from a high decile school. A third dependent variable was also introduced, which is an interaction variable of decile multiplied by gender. This variable will show the relative performance of a gender, given the decile of their school. Due to the fact the gender and decile variables were binary, the interaction variable was also binary. Because of the binary nature of the variables, probit regressions reporting changes in probabilities were run alongside every OLS regression as a check of significance.

The regression model therefore takes the form:

$$\text{Achieved grade or better} = \alpha + \beta_1 \text{ Gender} + \beta_2 \text{ SES} + \beta_3 \text{ Gender} \times \text{SES} + \varepsilon \quad (1)$$

where:

α = intercept;

Gender = the dummy variable for gender with male being 1 and female being 0;

SES = the dummy variable for decile grouping with high decile (8-10) being 1 and low decile (1-3) being 0;

Gender \times *SES* = the interaction term;

ε = the error term.

Regressions were run for each ethnic grouping. Additional regression using aggregated data across all ethnicities was also run. All of the regressions reported low R^2 values, which was not unexpected, as key variables such as the location, size and type of school were not included, the type of assessment set in a given year, possible changes in curriculum, along with the academic ability of the individual students.

Findings

Throughout these findings, the term achievement is defined as achieving an achieved grade or better.

The rates of achievement in externally assessed level three achievement standards nationally, by gender, for the years 2004 (the first year of level 3 NCEA) to 2008 are indicated in Table 1 (NZQA, 2009).

Table 1

Rates of Achieved Grades or Better in Externally Assessed Level Three Achievement Standards

| | 2004 % | 2005 % | 2006 % | 2007 % | 2008 % |
|----------------------------------|--------|--------|--------|--------|--------|
| Achieved or Better Male | 57 | 66 | 66 | 67 | 66 |
| Achieved or Better Female | 60 | 68 | 70 | 70 | 71 |

These statistics show that every year between 2004 and 2008, female students at level 3 NCEA recorded a greater percentage of achieved grades on the externally assessed standards than male students. From 2005, this has been a relatively consistent percentage.

In Table 2, the rates of achievement by gender and school decile are compared (NZQA, 2009). Interestingly, the relative performance of females and males varies across the decile groupings. In the high decile group (deciles 8-10), the average difference between male and female rates of achievement is 4.4%. In the low decile group (deciles 1-3), the average difference between male and female achievement is 2%. Although the pattern still holds that females have higher rates of achievement than males do, the gap is smaller in low decile schools than in high decile schools. In fact, from 2005 onwards, the gap between female and male rates of achievement for high decile schools is getting larger. Where male rates of achievement are staying constant, female rates of achievement are increasing.

Table 2

Rates of Achieved Grades or Better by Gender and School Decile for All Subjects

| | | Decile 1-3 | Decile 8-10 |
|------|----------|-------------------|--------------------|
| 2004 | Male % | 45 | 60 |
| | Female % | 48 | 64 |
| 2005 | Male % | 50 | 69 |
| | Female % | 53 | 72 |
| 2006 | Male % | 51 | 70 |
| | Female % | 52 | 74 |
| 2007 | Male % | 53 | 70 |
| | Female % | 55 | 75 |
| 2008 | Male % | 53 | 70 |
| | Female % | 54 | 76 |

The rates of achievement in externally assessed achievement standards for level three accounting students are illustrated in Table 3.

Table 3

Rates of Achieved Grades or Better in Externally Assessed Level Three Accounting Achievement Standards

| | 2004 % | 2005 % | 2006 % | 2007 % | 2008 % |
|----------------------------------|---------------|---------------|---------------|---------------|---------------|
| Achieved or Better Male | 70 | 69 | 64 | 63 | 66 |
| Achieved or Better Female | 67 | 67 | 62 | 62 | 68 |

As the table shows, with the exception of 2008, a greater percentage of achieved or better grades are earned by males than by females in the subject of accounting. This seems at odds with Table 1 which shows that across all subjects, a larger percentage of female students receiving achieved or better grades than males. This raises the question are females disadvantaged relative to males in the subject of accounting, and if a disadvantage does exist, is it consistent across socioeconomic groupings and does it vary by ethnicity? (In other words, what is the interaction of gender and, social class (decile) on rates of achievement in externally assessed level three NCEA standards for accounting students, and is it consistent across all ethnicities)?

The data in Table 4 shows that low decile schools have lower rates of achievement than high decile schools. It also shows that the ethnic groupings of Maori and Pacific Island students have lower rates of achievement than European students in externally assessed level three accounting achievement standards. When gender performance is categorised by decile and ethnicity, there are clear differences for different ethnic groupings by gender and by decile grouping.

Table 4

Achieved or Better Rates by Gender and Decile for Accounting Level 3 External Standards

| HIGH | 2004 | 2005 | 2006 | 2007 | 2008 | TOTAL |
|-----------------|-------------|-------------|-------------|-------------|-------------|-------------------|
| DECILE | | | | | | |
| Maori | | | | | | n = 900 |
| Male | 57% | 59% | 65% | 57% | 50% | 57% |
| Female | 56% | 53% | 66% | 66% | 76% | 64% |
| European | | | | | | n = 17,827 |
| Male | 76% | 76% | 70% | 68% | 71% | 72% |
| Female | 76% | 74% | 71% | 70% | 77% | 74% |
| Pacific | | | | | | |
| Male | 60% | 62% | 23% | 60% | 55% | 53% |
| Female | 55% | 49% | 21% | 58% | 54% | 49% |
| Asian | | | | | | n = 9,908 |
| Male | 70% | 68% | 63% | 62% | 63% | 65% |
| Female | 66% | 66% | 63% | 68% | 71% | 67% |
| | | | | | | |
| LOW | 2004 | 2005 | 2006 | 2007 | 2008 | |
| DECILE | | | | | | |
| Maori | | | | | | n = 596 |
| Male | 42% | 40% | 55% | 44% | 38% | 44% |
| Female | 38% | 59% | 31% | 32% | 28% | 40% |
| European | | | | | | n = 1,519 |
| Male | 62% | 56% | 65% | 57% | 61% | 61% |
| Female | 62% | 64% | 59% | 58% | 59% | 60% |
| Pacific | | | | | | n = 943 |
| Male | 40% | 31% | 32% | 34% | 38% | 36% |
| Female | 34% | 23% | 19% | 37% | 10% | 23% |
| Asian | | | | | | n = 1,326 |
| Male | 57% | 49% | 49% | 55% | 56% | 55% |
| Female | 52% | 56% | 39% | 46% | 51% | 50% |

Studying aggregate data in high and low decile schools over the five years from 2004 to 2008, the following points can be noted:

(1) In high decile schools Maori females have 7% higher rates of achievement than Maori males; but in low decile schools Maori females have 4% lower rates of achievement than Maori males (a net difference of 11%);

(2) In high decile schools European females have 2% higher rates of achievement than European males; but in low decile schools European females have a 1% lower rate of achievement than European males (a net difference of 3%);

(3) In high decile schools Pacific Island females have 4% lower rates of achievement than Pacific Island males; but in low decile schools Pacific Island females have 13% lower rates of achievement than Pacific Island males (a net difference of 9%);

(4) In high decile schools Asian females have 2% higher rates of achievement than Asian males; but in low decile schools Asian females have 5% lower rates of achievement than Asian males (a net difference of 7%).

Female achievement relative to male achievement is worse for every ethnic grouping in low decile schools when compared to high decile schools.

Clearly the aggregated level three accounting data comparing gender rates of achievement is hiding the fact that females do worse relative to males in low decile schools. This is compensated for by the performance of females in high deciles schools, thereby giving only a small underperformance by females relative to males overall.

There are some anomalies from year to year in the data such as 2005, where high decile Maori females have a lower rate of achievement than high decile males which is at odds with subsequent years. However Pacific Island high decile females for example had lower rates of achievement than high decile males for every year, so the anomaly is not consistent across all ethnic groupings. There are other forces at play in any given year such as the type of questions asked or the ability of the student cohort. This however, does not detract from the point that there does appear to be an interaction between school decile and gender. To establish if the interaction is statistically significant, the OLS model mentioned earlier was used to run regressions, alongside probit regressions.

The OLS and probit regression outputs using the aggregated data for all ethnicities from externally assessed level three accounting achievement standards are shown in Table 5.

Table 5
Regression Outputs for All Ethnicities

| All Ethnicities | OLS | Probit |
|--------------------------------|---------------------|---------------------|
| Gender (Male =1) | 0.07*** (4.68) | 0.06*** (4.35) |
| Decile (High=1) | 0.24*** (22.45) | 0.24*** (21.45) |
| Gender x Decile | -0.07*** (-4.64) | -0.06*** (-4.32) |
| Intercept | 0.54*** (54.76) | |
| R ² | 0.02 | 0.02 |
| Adjusted/Pseudo R ² | 0.02 | 0.02 |
| n | 33,623 | 33,623 |

Notes. $p < 0.01$.

All three variables are significant at the 99% confidence level. The OLS and probit regressions result very similar coefficients, and identical levels of significance. The coefficients can be interpreted as changes in rates of achievement. For the gender variable, male students have 7% (6% for the probit regression) higher rates of achievement than females. For the SES variable, high decile school students have 24% higher rates of achievement than low decile school students. The interaction variable coefficient tells us the difference between male and female achievement in low decile schools is 7% (or 6% on the probit regression) greater than the gap between males and female achievement in high decile schools, to the detriment of low females from low decile schools.

When the same regressions were run on data broken up by ethnicity, the results shown in Tables 6 and 7 were:

- Decile is significant at the 99% confidence level for all ethnicities. Low decile schools have statistically significantly lower levels of achievement than high decile schools.

- For European students, no variable other than decile is significant.
- For Asian students, gender is significant at the 90% confidence level for OLS, but not significant in probit regression. The interaction term is significant at the 95% confidence level for both types of regressions, with the coefficients being 6% for both regression types. This means that achievement of females relative to males in low decile schools is 6% lower than female achievement relative to male achievement in high decile schools.

Table 6

OLS Regression Outputs by Ethnicity

| | Maori | European | Pacific Island | Asian |
|-------------------------------|--------------------|--------------------|--------------------|--------------------|
| Gender (Male =1) | 0.04 (1.05) | 0.00 (0.18) | 0.14*** (4.47) | 0.05* (1.72) |
| Decile (High=1) | 0.25*** (6.74) | 0.13*** (7.15) | 0.26*** (7.59) | 0.16*** (8.70) |
| Gender x Decile | -0.11** (-2.14) | -0.02 (-0.87) | -0.09* (-1.82) | -0.06** (-2.11) |
| Intercept | 0.60*** (22.95) | 0.40*** (22.00) | 0.77*** (35.59) | 0.50*** (28.48) |
| R² | 0.04 | 0.01 | 0.06 | 0.01 |
| Adjusted R² | 0.04 | 0.01 | 0.06 | 0.01 |
| n | 1,496 | 19,346 | 1,547 | 11,234 |

Notes. *** $p < 0.01$, ** $p < 0.05$.

Table 7

Probit Regression Outputs by Ethnicity

| | Maori | European | Pacific Island | Asian | All Ethnicities |
|-----------------------------|--------------------|-------------------|--------------------|--------------------|---------------------|
| Gender (Male =1) | 0.04 (1.05) | 0.00 (0.16) | 0.15*** (4.61) | 0.04 (1.64) | 0.06*** (4.35) |
| Decile (High=1) | 0.25*** (6.60) | 0.14*** (7.01) | 0.27*** (7.52) | 0.16*** (8.52) | 0.24*** (21.45) |
| Gender x Decile | -0.12** (-2.15) | -0.02 (-0.90) | -0.10** (-2.10) | -0.06** (-2.05) | -0.06*** (-4.32) |
| Pseudo R² | 0.03 | 0.004 | 0.05 | 0.01 | 0.02 |
| n | 1,496 | 19,346 | 1,547 | 11,234 | 33,623 |

Notes. *** $p < 0.01$, ** $p < 0.05$.

For Maori students, gender is not statistically significant, but the interaction term is at the 95% confidence level. The coefficients suggest a more exaggerated difference between female and male achievement in low decile and high decile schools, with a coefficient of 11% for the OLS regression and 12% for the logit regression. Again, low decile females perform worse relative to low decile males, than high decile females relative to high decile males.

Lastly, for Pacific Island students, gender is statistically significant at the 99% confidence level, with the interaction term being significant at the 90% confidence level for the OLS regression, and 95% for the probit regression. Once again, low decile females perform worse relative to low decile males, than high decile females relative to high decile males; with the OLS and probit regressions reporting coefficients of 9% and 10% respectively.

Given that this model is helping to explain the significance of the raw data rather than being used to make any predictions, the relatively low R^2 values are less of a concern. The model certainly does not claim to be capturing all of the effects on student academic achievement. It does however show that for Maori, Pacific Island and Asian students, the interaction between gender and decile is statistically significant, once the individual effects of decile and gender are accounted for.

Conclusions

When the raw data on rates of achievement in externally assessed, level three accounting standards is broken up by gender and decile, it strongly suggests that male students are outperforming female students in low decile schools, relative to male versus female performance in high decile schools, across the three ethnic groupings of Maori, Asian and Pacific Island students. This however, is not the case for European students. This is substantiated by the regression model, which shows appropriate significant findings for both OLS and probit regressions. However, this interaction is lost when simple male versus female rates of non-achievement is compared for externally assessed level three accounting standards. The raw data simply suggests females have slightly lower rates of achievement than males in most years, with the greatest difference being 3% in any one year since the inception of level three NCEA in 2004. This highlights the risks of making statements about average male and female performance, without establishing any interaction between demographic variables. Relative performance of students also needs to be done on a subject by subject level, due to the individual characteristics of different curriculum areas.

The reasons for the interaction between gender and decile for different ethnic groups in accounting are difficult to pinpoint without having access to more detailed individual student level data. It could be that in low decile schools, more academically able ethnic minority boys, and less academically able ethnic minority girls are choosing to sit externally assessed accounting standards at level three. Another possibility is that less academically able boys are completing internally assessed standards that are not subject to invigilated examinations, while less academically able girls are sitting externally assessed standards. However, when one examines the numbers of students taking unit standards which are internally assessed on an achieved/not achieved basis, this theory is not supported. In high decile schools, 1,831 unit standards were taken by boys, and 1,589 were taken by girls. In low decile schools, 717 unit standards were taken by boys, and 878 were taken by girls.

Level three accounting is usually sat by students in their final year of high school education. Most if not all schools require accounting to have been previously studied at level two NCEA before the student is allowed to enter level three accounting. This tends to weaken the case for less able girls and more able boys in low decile school sitting level three externally assessed standards, as all students would usually have been exposed to accounting at level two. There is no intuitively obvious explanation as to why girls in certain ethnic groupings would be less able to make informed subject choices than boys in the same ethnic groupings based on previous exposure to a subject, other than the possibility that in low decile schools, girls have a more limited choose of viable subject options, and accounting is the lesser of many evils. Another possibility is that girls in these ethnic groupings are more compelled to choose a subject like accounting not because they have a particular aptitude for it, but because it is seen as being a professional subject. Student level data including a variable for performance in externally assessed standards in other level three subjects would go some way to answering this question.

If girls and boys in low decile schools do not differ significantly in terms of academic ability, the relative performance of Maori, Asian and Pacific Island girls in these schools is then brought into question. Boys outperforming girls in low decile schools can occur as a result of boys doing particularly well, or girls performing worse than they should. Based on the achievement rates of Asian, Pacific Island and Maori girls in low decile schools in this paper, it appears to be the latter; as all three ethnic groupings have average rates of achievement of 50% at best, with Pacific Island girls having achievement rates of only 23% on average across the five years. With Accounting being a subject that can lead to a professional occupation, the subject is possibly seen as being not as relevant to students in low decile schools as in high decile schools. Participation rates are certainly a lot greater in high decile schools (29,220 standards sat from 2004 to 2008) compared to low decile schools (4,384 standards sat from 2004 to 2008). If accounting is seen as being not particularly relevant, that could certainly have a demotivating effect on the students, and lead to poorer performance on externally assessed examinations. However, it is not clear why this would impact on girls to a greater degree than boys. That would require unmotivated Pacific Island, Maori and Asian girls to choose level three accounting, where unmotivated Pacific Island, Maori and Asian boys are choosing another subject.

One final possibility is that the level three accounting curriculum is better suited to boys than it is to girls, either through the content or the method of delivery the subject lends itself to. On average, girls receive lower rates of achievement than boys across both high and low decile schools, but once again, why would this impact be more severe in low decile schools? And why specifically Asian, Maori and Pacific Island girls more than European girls? There could well be cultural factors in play here. It is certainly more likely that girls and boys in high decile schools will be exposed to business concepts in the family life outside of school than students from low decile schools. In low decile schools, Asian, Maori and Pacific Island boys may be more likely to be exposed to business concepts outside of school, and hence develop more of a context to apply the accounting curriculum than Asian, Maori and Pacific Island girls in low decile schools are.

The purpose of this research is two-fold. To draw attention to the need to have analysis of student results done at a curriculum level rather than a national level. Even at the curriculum level, analysis should be broken down into subgroups of certain types of students, with interactions between variables examined.

The second purpose is to encourage more research into curriculum level analysis. Field experiments into methods of delivery, and the accounting curriculum itself would be useful to establish whether the relatively poor performance of low decile girls in ethnic minorities really is a teaching and learning issue. More qualitative research including interviews with students would also be another useful form of research to go some way to answering questions around reasons for subject choices, and the link between home life and performance in NCEA accounting.

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Chapter Four Outline

While chapters two and three have focused on gender, school decile and how they interact with reference to student achievement, chapter four introduces participation alongside achievement, concentrating on ethnicity and school decile in the subject of economics. Once again, economics data was chosen due to the similarities in content between economics and financial literacy. Participation was introduced alongside achievement as participation in economics could give some insight into interest levels in the subject of economics by ethnic minorities, which in turn may be a proxy for interest in financial literacy. Ethnicity was focused on as the literature suggests people from ethnic minorities tend to have lower levels of financial literacy. Ethnicity could also display similar characteristics to gender in terms of financial socialization in the home, a topic discussed in the latter chapters. The research in this chapter is framed in terms of the impact of the introduction of the NCEA qualification for two reasons. The introduction of the NCEA increased subject choice, so any dramatic movement away from economics may shed some light on whether students were taking economics due to limited subject choices, or if they had a more genuine interest. Secondly, the literature suggests the introduction of a standards based assessment rather than a norm referenced assessment regime should improve academic achievement of ethnic minorities and students from low socioeconomic backgrounds. If this is not the case, that may be suggestive of forces outside of the classroom such as socialization in the home exerting a stronger influence over achievement. If the change in assessment regime did result in improved achievement in economics, one could expect potentially to see improved levels of financial literacy as well.

The academic underachievement of Maori and Pacific Island students has been well documented, and has resulted in such government initiatives as 'Closing the Gaps', which aimed to assist socially disadvantaged ethnic groups. According to Shulruf et al (2009), one reason the NCEA was introduced was the belief that the existing norm-referenced assessment system had disadvantaged Maori and Pacific students as well as students from lower-income families. Strathdee (2003) concur, describing one of the intended aims of the NCEA as removing barriers to low achievers and globalization the imbalance due to race, class and income. He specifically referred to a need to lift standards of achievement for Maori and Pacific Island students due to globalization and the introduction of new technology. Along similar lines, Shulruf et al (2010) stated 'The development and introduction of NCEA was a major change in New Zealand education policy. It aimed to ensure that all young people, regardless of their ethnicity and family income, have the opportunity to develop the knowledge and skills to enable their participation in the changing workforce and, at the same time, promote a culture of lifelong learning within society' (p. 141). One could equally add to the list a need to be financially literate in an ever more complex financial environment. Success

Using economics externally and internally assessed NCEA Levels One to Three data collected from the New Zealand Qualifications Authority (NZQA) website in 2010, basic percentage change and percentage of the total calculations were completed to examine changes in participation. Logit and probit regressions were run along with chi-square analysis to identify correlations between rates of achievement by ethnicity and by school decile grouping.

Over the first five years of the introduction of the NCEA, the percentage of economics standards sat from students from low deciles schools dropped from 25% to 17%. Although this percentage change could have been caused by creases in the number of standards being sat by low decile school students, or an increase in the number of standards being sat by medium or high decile school students, low decile school students are still sitting fewer economics standards relative to their higher decile peers. Over the same period, the rates of achievement for low-decile-school students decreased, while medium-decile schools saw a 6% increase in achievement, and high-decile schools saw a 7% increase. The academic performance of low-decile-school students in economics is actually significantly worse at the 99% confidence level.

Both Maori and Pacific Island students have seen an increase in the number of economics standards entered. The academic performance of Maori and Pacific Island students has improved in economics, however when the ethnicity data are stratified according to SES, all of the improvement in Maori and Pacific Island students is at the medium decile level or higher. There has been no significant improvement in academic achievement for low-decile Pacific Island students; however, academic achievement for low-decile Maori students is significantly worse at the 99% confidence level. While it can be said that the first five years of full implementation of the NCEA have been successful in raising the academic performance of Maori and Pacific Island students, it has not been increased sufficiently to mitigate the negative impact on academic achievement of low SES. In fact, because the academic achievement of low-SES students in economics has become significantly worse, the academic performance of low-decile Maori students has deteriorated in the first five years of the NCEA. There has been no significant change in the academic performance of low-decile Pacific Island students in economics.

The above findings suggest that despite the introduction of a standards based assessment regime the academic performance of low decile Maori students has declined, while the academic performance of low decile Pacific Island students has not significantly changed in the subject of economics. At the same time, the performance of higher decile ethnic minorities has been improving. This suggests there is some way to go in improving the knowledge and understanding of low decile students, particularly ethnic minorities, in economics, a subject with similarities to financial literacy content.

Agnew, S. (2011). Has the academic performance of low socioeconomic students and students from ethnic minorities improved in the subject of economics over the first five years of a standards-based assessment regime? *Citizenship, Social and Economics Education*, 10(1), p. 3-13.

Abstract

This article aims to establish whether the first five years of full implementation of the National Certificate of Educational Achievement (NCEA) has seen improvement in the achievement of students from low socioeconomic status (SES) schools, and from ethnic minorities, in the subject of economics. The findings show that the academic performance of low-SES students in economics has significantly worsened from 2004 to 2008. When data are stratified by ethnicity and SES status, Asian students have seen an increase in academic performance in economics across all SES groupings. Pacific Island students have seen no significant change in their academic performance in economics for low and medium-decile school students, but a significant improvement in academic performance for students from high-decile schools. Maori students have seen significant improvement in academic performance in economics in medium- and high-decile schools, but have experienced a significant deterioration in academic performance in low-decile schools. There has also been a large decrease in the number of students from low-SES schools taking the subject of economics. This raises questions around the relevance and suitability of the current secondary school economics curriculum to low-SES students, as well as around its suitability for the new NCEA assessment regime.

Introduction

The National Certificate of Educational Achievement (NCEA) is a standards-based assessment regime which was fully implemented in New Zealand secondary schools at Levels 1, 2 and 3 in 2004. The NCEA replaced the previous norm-referenced examination system. Shulruf et al (2009) state: 'This change was a result of a lengthy reform process influenced by arguments that the norm based assessment system had, for example, disadvantaged students from certain ethnicities, particularly Maori and Pacific, and students from lower income families' (p. 16). In coming to this conclusion, Shulruf et al (2009) reference Strathdee, 2003; Dobric, 2005; Vlaardingerbroek, 2006; and Thomas, 2007.

This article aims to use New Zealand Qualifications Authority (NZQA) data to establish whether the first five years of full implementation of the NCEA have seen an improvement in the participation and/or achievement of students from low-socioeconomic-status (SES) schools, and ethnic minorities, in the subject of economics. Economics was chosen as it traditionally has low levels of participation and achievement amongst lower-SES schools and non-European students. Economic and financial literacy is also an area that has received significant publicity recently, given the global financial crises. Low-SES individuals are often identified as having lower economic and financial literacy levels, and thus as becoming more likely to make poor financial decisions.

New Zealand Context

NCEA. An NCEA can be obtained at three levels. It is obtained by students once they have successfully earned 80 credits towards their certificate, by completing standards in various subjects. Generally, Year 11 students attempt a Level 1 certificate, Year 12 students attempt a Level 2 certificate, and Year 13 students attempt a Level 3 certificate.

Standards come in three different varieties:

1. Unit standards. These existed prior to the implementation of NCEA, and were often completed as an alternative to norm-referenced examinations. This is a standards-based assessment, where the student either meets the standard or does not. It is a pass/fail assessment. If a student meets the standard, they get awarded a certain number of credits (depending on the standard) to contribute towards their NCEA. These are assessed internally by their teacher, and marked by teachers in the school. These may be in the form of invigilated assessments or they may be completed out of class. Assessments and samples of student work are periodically moderated by NZQA as a form of quality control.
2. Internally assessed achievement standards. The difference between these standards and unit

standards is that if a student meets the standard, they can be awarded the credits at an achieved, merit or excellence level, rather than as a simple pass/fail.

3. Externally assessed achievement standards. The difference between these and internally assessed achievement standards is that they usually take the form of examinations completed at the end of the school year, and are externally moderated and marked.

A major change with the introduction of the NCEA was that unit standards, which previously were completed as an alternative to externally assessed examinations, and could not be used as part of the university entrance qualification, were now able to be used not only towards an NCEA, but also towards the university entrance qualification.

Socioeconomic status. New Zealand state secondary schools are given decile ratings which represent the SES of the students who attend the schools. From the Ministry of Education website (Ministry of Education, 2010), a school's decile indicates the extent to which the school draws its students from low-SES communities. Decile 1 schools are the 10% of schools with the highest proportion of students from low socioeconomic communities, whereas Decile 10 schools are the 10% of schools with the lowest proportion of these students. The five factors that make up decile as a socioeconomic indicator are:

1. Household income
2. Occupation
3. Household crowding
4. Educational qualifications
5. Income support (the percentage of parents who receive a benefit)

Literature Review

Fullarton & Ainley (2000) state that previous studies using UK data have shown students from higher socioeconomic backgrounds and students from non-English-speaking backgrounds are more likely to participate in subjects that lead into higher education and the professions. Surprisingly, Fullarton & Ainley (2000) found enrolments in economics and business to be higher for the lowest socioeconomic level, and that students whose parents were born in a non-English-speaking country were more likely to study economics and business. It is difficult to draw a parallel with economics in New Zealand from this study due to the diverse range of subjects that came under the heading of business and economics, which included legal studies, tourism and secretarial studies, as well as accounting, economics and business studies.

As mentioned in the introduction by Shulruf et al (2009), one reason the NCEA was introduced was the belief that the existing norm-referenced assessment system had disadvantaged Maori and Pacific students as well as students from lower-income families. Rawlins et al (2005) conducted a review of the literature around standards-based assessment (SBA) in the senior secondary school. They describe advocates of SBA who believe it results in improved understanding and transparency of the assessment process (Barker, in Peddie & Tuck, 1995; Francisco, 1999; Tomlinson, 2002), higher levels of student achievement (Supovitz, 2001), and improved links between knowledge and performance (Barker, in Peddie & Tuck, 1995).

The research suggests that although diverse students perform better under SBA than under a norm-referenced system, there is still a significant gap between the achievement of students with special needs and their middle-class-majority peers (Ortiz, 2000), particularly for minority students and those from low-income households (Kannapel et al, 2001; Madaus & Clarke, 2001; Rawlins et al, 2005, p. 111). Rawlins et al (2005) continue: 'Standards-based assessment potentially provides schools with greater opportunity to adapt assessment tasks to meet the needs of diverse learners, while still assessing the set standard(s) (Hager et al, 1994; Hipkins et al, 2004)' (Rawlins et al, 2005, p. 111). Shulruf et al (2010) concur when they say: 'The development and introduction of NCEA was a major change in New Zealand education policy. It aimed to ensure that all young people, regardless of their ethnicity and family income, have the opportunity to develop the knowledge and skills to enable their participation in the changing workforce and, at the same time, promote a culture of lifelong learning within society' (p. 141).

The academic underachievement of Maori and Pacific Island students has been well documented, and has resulted in such government initiatives as 'Closing the Gaps', which aimed to assist socially disadvantaged ethnic groups. Nash (2000), quoting Ministry of Education data from 1997, highlights the gaps in educational achievement between different ethnic groupings. For school leavers, 47.6% of Europeans left with a school qualification at the seventh-form level (the last year of secondary school education). The comparable figures for Maori and Pacific Island students were 17.8% and 26.5%, respectively (Nash, 2000). These results are reflected in the makeup of school leavers going on to degree-level tertiary study in 2008. For Europeans, 24.8% of school leavers went on to tertiary-level degree study, compared with 8.5% for Maori and 9.3% for Pacific Island students (Nash, 2000). This is further substantiated by Engelbrecht & Mahon (2003), quoting Waldegrave & Pole (2001). They state that in 1999, 4.5% of Maori school leavers had received an A or B bursary, compared with 19.8% for all school leavers.

Strathdee (2003) described one of the intended aims of the NCEA as removing barriers to low achievers and equalising the imbalance due to race, class and income. He specifically referred to a need to lift standards of achievement for Maori and Pacific Island students due to globalisation and the introduction of new technology. Strathdee (2003) also touches on why the NCEA was expected to give low-SES and ethnic-minority groups of students greater chances of success. 'Experience has shown children do not have equal opportunity. Race, class, and income are more likely to determine success than innate ability. The emphasis on written examinations has ... meant that ability has been recognised only within a narrow range of intellectual skills. Practical and creative skills, for example, go unrecognised in such a system' (Hood, in Strathdee, 2003, p. 151). Strathdee (2003) also states that where norm-referenced assessment is scaled to a bell curve, which establishes pre-determined pass rates irrespective of the overall ability of the students being assessed, assessment against standards allows all who meet the standard to receive recognition for their achievement. This can be more motivating for students who have previously performed poorly under norm-referenced assessment techniques. Strathdee & Hughes (2001) found that low-ability students who had been completing unit standards prior to the introduction of the NCEA were achieving unit standards, but not at a high enough level to make a difference to their life chances. Unit standards were certainly introduced as an alternative to the norm-referenced examinations of the time, and were geared towards increasing the chances of success of low-ability students. Philips (2003) describes how unit standards have similar features to the modular approach adopted in Scotland for non-advanced vocational qualifications in the 1980s. Vlaardingerbroek (2006) describes unit standard intensive programmes as alternative courses for lower-ability students. Thomas (2007) describes how leaders of low-decile schools are opposed to changes in unit standards, as unit standards are the main form of assessment in low-decile schools. Leaders in high-decile schools want unit standards tightened up, believing their use leads to 'inflated pass rates in some schools by pupils choosing easier options' (Thomas, 2007, p. 7).

Philips (2003) describes how, in recent education reforms in New Zealand, 'the government has focused on policies aimed at increasing the participation and achievement of Maori and Pasifika learners, who have traditionally been under-represented or achieved at a lower level than the majority of students in post-compulsory education and training' (p. 290). Any changes in the demographic make-up of students studying economics at secondary school are likely to filter through to the tertiary level. Ashworth & Evans (2001) found that prior knowledge of economics at secondary school influences the decision to take economics at the tertiary level, as did mathematical aptitude. Ashworth and Evans (2001) also found that the early study of economics influenced choice at both A level and university. These findings suggest that any SES or ethnic grouping bias that exists at secondary school with regard to economics also flows on to the tertiary level.

The aim of this article is to establish whether the stated objectives of the NCEA, of increasing the academic performance of students from low-SES backgrounds and students from Maori and Pacific Island backgrounds, have been achieved in the subject of economics.

Methodology

Data have been collected from the NZQA and the Ministry of Education for the period from 2004 to 2008, inclusive. Basic statistical calculations have been completed, such as percentage change

calculations and percentage of the total calculations. These calculations were applied to data relating to the number of standards entered, as well as data pertaining to rates of achievement. To establish whether any of the percentage calculations pertaining to rates of achievement were statistically significant, logit and probit regressions were run on the data, with the dependent variable being whether a student failed a standard (received a not-achieved grade), or an achieved or better grade. Due to the binary nature of the dependent variable, a dummy variable was used, with 0 representing a not-achieved grade, and 1 representing a grade of achieved or better. The explanatory variable in the regression model was year, comparing rates of non-achievement in 2004 with rates of non-achievement in 2008. Due to its binary nature, the explanatory variable was also a dummy variable, with 0 for 2004 and 1 for 2008 data. Regressions were run for data stratified by decile grouping, by ethnicity, and for data stratified by decile and ethnicity.

As the data were binary and nominal by nature, a two by two contingency table analysis was performed calculating a chi-square statistic. The probit regressions were run, reporting changes in probability, which equate to the risk differences which can be calculated from a two by two contingency table. The coefficients of these regressions can be interpreted as changes in the percentage of students failing a standard (receiving a not-achieved grade). The regressions also give associated levels of significance. The logit regressions were run, reporting the odds ratios that can be calculated from a two by two contingency table. Chi-square statistics and associated levels of significance were also calculated. All statistical methods reported the same level of significance.

Results

Unless otherwise stated, the data contained in the tables were gathered from the NZQA website (NZQA, 2010), and pertain to the period 2004 to 2008. There has been a 5% reduction in the number of students taking economics from 21,146 to 20,162 (Ministry of Education, 2010). This does not necessarily equate to a 5% reduction in the number of standards entered, however, as some schools offer a combination of standards from different subjects in one course. A common combination, for example, is some economics standards and some accounting standards mixed into a 'business' course. The Ministry of Education's definition of a student taking economics is a student who has enrolled and participated in the subject for 20 hours or more per year. It is therefore more relevant to examine the number of standards taken rather than the number of students taking a subject. The change in the number of economics standards entered from 2004 to 2008 is shown in Table I.

| Assessment Type | 2004 | 2005 | 2006 | 2007 | 2008 | % Δ |
|--------------------------------|---------|---------|---------|---------|---------|-------|
| Unit Standard | 6,919 | 10,061 | 14,171 | 14,463 | 15,847 | +129% |
| Internal Achievement Standards | 30,231 | 25,688 | 22,649 | 22,569 | 22,175 | -27% |
| External Achievement Standards | 71,373 | 76,359 | 76,948 | 68,486 | 66,022 | -7% |
| Total Standards | 108,523 | 112,108 | 113,768 | 105,518 | 104,044 | -4% |

Table I: Economics standards entered by assessment type; levels 1-3.

There has been a 129% increase in the number of unit standards entered, although unit standards only make up a small proportion of total standards that students sit in economics. There has been a 27% decrease in the number of internally assessed achievement standards entered, and a 7% decrease in the number of externally assessed achievement standards entered. Due to the small number of unit standards entered, this equates to a 4% decrease in the total number of economics standards entered.

Table II stratifies the information shown in Table I by school decile grouping, and also adds the number of not-achieved grades received for each type of assessment. Note that the totals in Table II are slightly different from the totals in Table I, as a very small number of students sitting economics standards at small private schools which have not been given a decile classification by the Ministry of Education have been excluded from Table II.

| | 2004 | 2005 | 2006 | 2007 | 2008 | %Δ |
|-------------------------|--------|--------|--------|--------|--------|------|
| <i>Deciles 1 - 3</i> | | | | | | |
| TOTAL Standards Entered | 12,708 | 10,503 | 9,932 | 9,899 | 9,323 | -27% |
| TOTAL Not Achieved | 5,566 | 4,590 | 4,707 | 3,973 | 4,333 | -22% |
| <i>Deciles 4 - 7</i> | | | | | | |
| TOTAL Standards Entered | 38,550 | 34,894 | 45,052 | 41,637 | 40,002 | 4% |
| TOTAL Not Achieved | 14,375 | 14,736 | 14,617 | 12,874 | 12,654 | -12% |
| <i>Deciles 8 - 10</i> | | | | | | |
| TOTAL Standards Entered | 51,287 | 51,026 | 51,023 | 47,175 | 54,229 | 6% |
| TOTAL Not Achieved | 15,619 | 13,895 | 13,442 | 11,112 | 12,807 | -18% |

Table II. Economics standards entered by decile, levels 1-3.

The number of standards entered by students from low-decile schools has decreased by 27%, but the number of not-achieved grades earned has reduced by only 22%. For mid-decile schools, students entered 4% more standards, while the number of not-achieved grades received fell by 12%. For high-decile schools, students entered 6% more standards, and received 18% fewer not-achieved grades. To determine whether the above changes in participation are the result of changes in the number of students taking economics, or of changes in the number of standards each student is entering, data were obtained from the Ministry of Education showing changes in the number of students taking senior economics. The number of students in low-decile schools taking economics has decreased by 24%, which is very similar to the 27% decrease in the number of standards entered by students from low-decile schools. There was a 3% decrease in the number of students from mid-decile schools taking economics, despite the number of standards being entered by this group increasing by 4%. The number of students from high-decile schools taking economics increased by 8%, similar to the 6% increase in the number of standards being entered.

Similar calculations were also completed for the same data stratified by ethnicity rather than decile. Data relating to the ethnic grouping of students sitting economics from 2004 to 2008 are not available; however the ethnic make-up of all students, not just those studying economics, is available. The number of European students has fallen by 5%, with the number of Maori students increasing by 3%. The number of Pacific Island and Asian students increased by 11% and 12% respectively. A key statistic is that there has been a 32% fall in the number of fee-paying students from 2004 to 2008. As NZQA data do not have a full fee-paying category when they present NCEA data, the majority of these students would be categorised within the Asian data. For the Ministry of Education statistics, they are separated into two categories.

| <i>Ethnic Group</i> | 2004 | 2005 | 2006 | 2007 | 2008 | % Δ |
|-------------------------|--------|--------|--------|--------|--------|------|
| <i>European</i> | | | | | | |
| Total Standards Entered | 63,763 | 68,840 | 71,390 | 67,068 | 65,346 | 2% |
| Number of Not Achieved | 18,590 | 18,053 | 18,619 | 16,174 | 16,478 | -11% |
| <i>Maori</i> | | | | | | |
| Total Standards Entered | 7,604 | 8,487 | 8,987 | 8,807 | 8,626 | 13% |
| Number of Not Achieved | 3,445 | 3,387 | 3,531 | 3,350 | 3,636 | 6% |
| <i>Pacific Island</i> | | | | | | |
| Total Standards Entered | 6,279 | 7,188 | 7,718 | 7,075 | 6,833 | 9% |
| Number of Not Achieved | 3,148 | 3,693 | 3,956 | 3,353 | 3,224 | 2% |
| <i>Asian</i> | | | | | | |
| Total Standards Entered | 27,166 | 24,777 | 23,763 | 20,664 | 21,540 | -21% |
| Number of Not Achieved | 10,639 | 8,626 | 7,317 | 5,722 | 6,074 | -43% |

Table III. Number of economics standards entered, and rates of non-achievement by ethnicity.

Table III shows the number of standards entered and the corresponding number of not-achieved grades earned, broken up by ethnic grouping. All four ethnic groupings are performing better in 2008 than in 2004 in terms of the ratio of not-achieved grades to the number of standards entered. Both Maori and Pacific Island students have seen an increase in the number of standards entered, and a less-than-proportionate increase in the number of not-achieved grades received. As a group, Asian students sat fewer standards, and experienced a greater-than-proportionate decrease in the number of not-achieved grades received. European students as a group received fewer not-achieved grades, even though they actually entered a greater number of standards. Table IV shows the performance of each ethnic grouping further broken up by school decile.

| <i>Low Decile</i> | 2004 | 2008 | % Δ |
|-------------------------|--------|--------|------|
| <i>European</i> | | | |
| Total Standards Entered | 4,149 | 3,035 | -27% |
| Number of Not Achieved | 1,469 | 1,229 | -16% |
| <i>Maori</i> | | | |
| Total Standards Entered | 2,450 | 1,888 | -23% |
| Number of Not Achieved | 1,133 | 982 | -13% |
| <i>Pacific Island</i> | | | |
| Total Standards Entered | 3,068 | 2,645 | -14% |
| Number of Not Achieved | 1,645 | 1,436 | -13% |
| <i>Asian</i> | | | |
| Total Standards Entered | 2,645 | 1,680 | -36% |
| Number of Not Achieved | 1,122 | 656 | -42% |
| <i>Mid Decile</i> | | | |
| <i>European</i> | | | |
| Total Standards Entered | 23,074 | 25,344 | 10% |
| Number of Not Achieved | 7,400 | 7,235 | -2% |
| <i>Maori</i> | | | |
| Total Standards Entered | 3,225 | 4,157 | 29% |
| Number of Not Achieved | 1,521 | 1,850 | 22% |
| <i>Pacific Island</i> | | | |
| Total Standards Entered | 1,993 | 2,598 | 30% |
| Number of Not Achieved | 931 | 1,190 | 28% |
| <i>Asian</i> | | | |
| Total Standards Entered | 9,127 | 7,224 | -21% |
| Number of Not Achieved | 4,017 | 2,120 | -47% |
| <i>High Decile</i> | | | |
| <i>European</i> | | | |
| Total Standards Entered | 32,550 | 36,738 | 13% |
| Number of Not Achieved | 8,846 | 7,954 | -10% |
| <i>Maori</i> | | | |
| Total Standards Entered | 1,806 | 2,485 | 38% |
| Number of Not Achieved | 764 | 769 | 1% |
| <i>Pacific Island</i> | | | |
| Total Standards Entered | 894 | 1,460 | 63% |
| Number of Not Achieved | 388 | 534 | 38% |
| <i>Asian</i> | | | |
| Total Standards Entered | 13,966 | 12,621 | -10% |
| Number of Not Achieved | 4,881 | 3,296 | -32% |

Table IV. Number of economics standards entered, and rates of non-achievement by ethnicity and decile.

The pattern of improved performance in terms of the number of not-achieved grades earned relative to the number of standards entered revealed in Table IV also holds for Table V, but only for students from mid- and high-decile schools. Low-decile schools have seen a reduction in the number of standards entered in every ethnic grouping. However, for the Maori and European ethnic groupings there has been a less-than-proportionate decrease in the number of not-achieved grades received. For Pacific Island students, there was an almost exactly proportionate decrease. Fewer standards are being sat by Asian students across all decile groupings. This is probably a result of the declining number of international students in New Zealand secondary schools over the corresponding period. The number of standards entered by Pacific Island and Maori students in mid and high decile schools has increased markedly. In high-decile schools, Maori students entered 38% more standards, and only received 1% more not-achieved grades as a group. Pacific Island students entered 63% more standards, and only experienced a 38% increase in the number of not-achieved grades. In order to establish whether there have been any statistically significant changes in the rate of achievement from 2004 to 2008, OLS, probit and logit regressions and chi-square analysis were undertaken. The results are shown in Table V.

| Ethnicity | OLS | χ^2 | Logit | Probit |
|----------------|--------------------|-----------------------------|--------------------|--------------------|
| Maori | 0.03*** (4.04) | 16.34*** (1, N=16,230) | 1.14*** (4.04) | 0.03*** (4.04) |
| Pacific Island | 0.03*** (3.38) | 11.42*** (1, N=13,112) | 1.13*** (3.38) | 0.03*** (3.38) |
| Asian | 0.11*** (25.48) | 640.77*** (1, N=48,706) | 1.64*** (25.22) | 0.11*** (25.35) |
| European | 0.04*** (15.92) | 253.01*** (1, N=129,109) | 1.22*** (15.90) | 0.04*** (15.90) |

*** p< 0.01, ** p<0.5, * p<0.10

Table V. Regression and chi square outputs for changes in rates of achievement by ethnicity.

The probit and OLS coefficients can be interpreted as the changes in the percentage of passing grades (achieved, merit or excellence). All of the ethnic groupings have shown an increase in the rates of achievement from 2004 to 2008, with all results being significant at the 99% confidence interval. Thus, Maori and Pacific Island students both had a 3% increase in the percentage of achieved or better grades received, while European students had a 4% increase, and Asian students an 11% increase. The chi-square statistic confirms the levels of significance established by the regression analysis. The logit coefficients can be interpreted as the probability of receiving an achieved grade or better in 2008 relative to 2004. As the logit coefficients are all greater than one, the probability of receiving an achieved grade or better are higher in 2008 compared with 2004 for all ethnic groupings.

Table VI shows the same statistical tests with the data broken up by decile grouping rather than ethnic grouping. All results are significant at the 99% confidence level. In mid- and high-decile schools, students have shown a 6% and 7% increase in achievement, respectively. Low decile school students, however, have received a 3% lower percentage of achievement in 2008 than in 2004. The odds of a student from a low-decile school receiving an achieved grade or better in 2008 are only 90% of the odds of a student from a low-decile school receiving an achieved grade or better in 2004. The comparable figure for a student from a high-decile school is 142%.

| Decile | OLS | χ^2 | Logit | Probit |
|--------|---------------------|-----------------------------|--------------------|---------------------|
| 1 – 3 | -0.03*** (-3.94) | 15.58*** (1, N=22,031) | 0.90*** (-3.95) | -0.03*** (-3.95) |
| 4 - 7 | 0.06*** (16.71) | 278.24*** (1, N =78,552) | 1.29*** (16.67) | 0.06*** (16.68) |
| 8 – 10 | 0.07*** (25.10) | 626.11*** (1, N=105,516) | 1.42*** (24.97) | 0.07*** (25.00) |

*** p< 0.01, ** p<0.5, * p<0.10

Table VI. Regression and chi-square outputs for changes in rates of achievement by decile.

The ethnic data were then stratified by decile grouping, to establish whether low-decile-school students' worse performance in 2008 was consistent across each ethnic grouping. The results are shown in Table VII.

| Ethnicity | OLS | χ^2 | Logit | Probit |
|----------------|---------------------|----------------------------|--------------------|---------------------|
| Maori | | | | |
| Low Decile | -0.06*** (-3.77) | 14.20*** (1, N=4,338) | 0.79*** (-3.77) | -0.06*** (-3.77) |
| Mid Decile | 0.03** (2.28) | 5.18** (1, N=7,382) | 1.11** (2.28) | 0.03** (2.27) |
| High Decile | 0.11*** (7.72) | 58.76*** (1, N=4,291) | 1.64*** (7.64) | 0.11*** (7.64) |
| Pacific Island | | | | |
| Low Decile | -0.01 (-0.51) | 0.23 (1, 5,713) | 0.97 (-0.51) | -0.01 (-0.51) |
| Mid Decile | 0.01 (0.61) | 0.36 (1, N=4,591) | 1.04 (0.61) | 0.01 (0.64) |
| High Decile | 0.07*** (3.30) | 10.84*** (1, N=2,354) | 1.33*** (3.29) | 0.07*** (3.29) |
| Asian | | | | |
| Low Decile | 0.03** (2.20) | 4.83** (1, N=4,325) | 1.15** (2.20) | 0.03** (2.20) |
| Mid Decile | 0.15*** (19.45) | 369.91*** (1, N=16,351) | 1.89*** (19.13) | 0.15*** (19.26) |
| High Decile | 0.09*** (15.66) | 242.94*** (1, N=26,587) | 1.52*** (15.54) | 0.09*** (15.59) |
| European | | | | |
| Low Decile | -0.05*** (-4.40) | 19.35*** (1, N=7,184) | 0.81*** (-4.40) | -0.05*** (-4.39) |
| Mid Decile | 0.04*** (8.44) | 71.1*** (1, N=48,418) | 1.18*** (8.43) | 0.04*** (8.43) |
| High Decile | 0.06*** (16.97) | 286.94*** (1, N=69,288) | 1.35*** (16.91) | 0.06*** (16.92) |

***p < 0.01, **p < .5, *p < .10.

Table VII. Regression and chi-square outputs for changes in rates of achievement by ethnicity and decile.

For Maori students, students from mid-decile schools have shown a 3% increase in the rate of achievement from 2004 to 2008, which is significant at the 95% confidence level, and students from high-decile schools have shown an 11% increase in the rate of achievement, significant at the 99% confidence level. However, students from low-decile schools have seen a 6% decrease in the rate of achievement, significant at the 99% confidence level. The only significant change between 2004 and 2008 for Pacific Island students is for students from high-decile schools, where rates of achievement have increased by 7%, significant at the 99% confidence level. Each decile grouping for Asian students has shown a significant improvement in achievement, at the 95% confidence level for low decile school students, and at the 99% confidence level for the other two decile categories. Results for European students mirror those of Maori students, where low-decile-school students have lower rates of achievement, but mid- and high-decile-school students have higher rates of achievement. All of the European student results are significant at the 99% confidence level. The logit coefficients show that for Maori students, the odds of an achieved grade or better in 2008 for students from a low-decile school are only 79% of the odds in 2004. This contrasts with Maori students from high-decile schools, where the odds in 2008 are 164% of the odds in 2004. European students show a similar pattern, with

corresponding odds of 81% for students from low-decile schools, and 135% for students from high decile schools. Asian students from all school decile groupings have shown increased odds in 2008 from 2004. For Pacific Island students, the only significant result has been an increase in odds for students from high-decile schools.

Conclusions

Two of the goals of the NCEA were to increase the academic achievement of low-SES students, and to increase the academic achievement of Maori and Pacific Island students. Prior to the NCEA, student academic achievement was measured in terms of students. Statements like '50% of students passed economics' could be made. Under the NCEA, there is no definitive number of standards a student has to sit in any particular subject. Academic performance is therefore measured in terms of standards passed rather than in terms of numbers of students passing. It is this measurement complication which makes a direct comparison of the situation before and after the NCEA beyond the scope of this article. This article does, however, analyse academic achievement in economics during the first five years of full implementation of the NCEA.

The subject of economics has been one that traditionally has an SES bias when it comes to participation and academic achievement. In 2004, 25% of standards entered were by students from low SES schools. In 2008, this figure was 17%. Over the same period, the rates of achievement for low decile-school students decreased. For the corresponding period, medium-decile schools saw a 6% increase in achievement, and high-decile schools saw a 7% increase. Clearly, the academic performance of low-SES students in economics has not improved during the first five years of full implementation of the NCEA. The academic performance of low-decile-school students in economics is actually significantly worse at the 99% confidence level.

The academic performance of Maori and Pacific Island students has improved in economics. Using the same statistic of what percentage of the students who entered economics standards received an achieved grade or better, Maori and Pacific Island students both had a 3% improvement, which was a significant improvement at the 99% confidence level. However, when the ethnicity data are stratified according to SES, all of the improvement in Maori and Pacific Island students is at the medium decile level or higher. There has been no significant improvement in academic achievement for low-decile Pacific Island students; however, academic achievement for low-decile Maori students is significantly worse at the 99% confidence level. For Maori students from low-decile schools, there has been a 6% decrease in the percentage of students who enter economics standards and receive an achieved grade or better, whereas high-decile Maori students have shown an 11% improvement, significant at the 99% confidence level. While it can be said that the first five years of full implementation of the NCEA have been successful in raising the academic performance of Maori and Pacific Island students, it has not been increased sufficiently to mitigate the negative impact on academic achievement of low SES. In fact, because the academic achievement of low-SES students in economics has become significantly worse, the academic performance of low-decile Maori students has deteriorated in the first five years of the NCEA. There has been no significant change in the academic performance of low-decile Pacific Island students in economics.

Although the first full five years of the NCEA have been positive for ethnic-minority students, it is debatable whether the improvement in the academic performance of Maori students in high decile schools, coming at the expense of the academic performance of Maori students in low-decile schools, would be viewed as an acceptable trade-off. Although the academic performance of European students mirrors that of Maori students, one group that appears to have benefited across all SES groupings from the first full five years of the NCEA is Asian students. Although there are far fewer economics standards being entered by Asian students, this appears to be a result of the large decrease in the number of foreign fee-paying students studying in New Zealand secondary schools from 2004 to 2008.

Implications and Further Research

The findings of this article have some important implications for the subject of economics. There is a clear movement away from economics in low-decile schools, in terms of both the number of students sitting economics and the number of standards being entered. Further research is required to ascertain the

reasons for this decline amongst low-SES students. Are students opting out of economics because their chances of success are greater in other subjects, or do low-SES students not see economics as being as relevant as higher-SES students do? It may be time for the economics curriculum to undergo a thorough review to ensure it is seen as being relevant to low-SES students, and is framed in a context that increases the chances of low-SES students engaging fully in the subject, thus increasing their chances of academic success. It is also important to establish why, when one of the stated goals of the NCEA was to increase the academic performance of low-SES students, there has been no improvement in the academic performance of low-SES students in the subject of economics during the first five years of full implementation of the NCEA. It is in the best interests of the nation to have citizens who are able to make wise financial, economic and political decisions. The subject of economics has an important part to play in this process, so it is important that it is accessible and relevant to students from all SES backgrounds. Further research to ascertain reasons for the success of Asian students in the first five years of the NCEA may also be of interest.

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Chapter Five Outline

Chapter five uses a similar approach to chapter four, examining the participation and academic achievement of students under the first five years of the NCEA qualification, but this time for the subject of accounting, the second of the traditional commerce subjects at secondary schools in New Zealand.

Using accounting externally and internally assessed NCEA Levels One to Three data collected from the New Zealand Qualifications Authority (NZQA) website in 2010 basic percentage change and percentage of the total calculations were completed to examine changes in participation. Ordinary least squares and probit regressions were run along with chi-square analysis to identify correlations between rates of achievement by ethnicity and by school decile grouping.

Since the introduction of the NCEA qualification more students are studying accounting, but they are choosing to enter fewer accounting standards. In terms of socio-economic status, low decile schools have seen the largest drop in the number of accounting standards entered, with a reduction of over 25%. Conversely, high decile schools saw a reduction of only 1%. With the number of students from low decile schools achieving standards falling, the result of the introduction of the NCEA has been fewer students from low decile schools studying accounting, with lower rates of achievement. Students at high decile schools have not experienced a significant reduction in participation or achievement. In terms of ethnicity, more accounting standards are being entered by Pacific Island students, but their performance has worsened, with a more than proportionate increase in non-achievement. There has been a reduction in the number of standards entered by Maori students, but their performance has remained relatively constant. With regard to the overall ethnic mix of students sitting accounting standards, the decrease in the number of Maori students has been more than replaced by Pacific Island students. However, given the poor performance of Pacific Island students, the number of Maori and Pacific Island students passing accounting standards has actually reduced.

These findings reinforce similar findings in chapter three, that the introduction of the NCEA has reduced the exposure to and academic achievement of groups studying accounting who the literature identify as displaying lower levels of financial literacy, namely low socioeconomic students and ethnic minority students. This could have future negative implications for these groups, given the similarity between financial literacy and accounting topics such as budgeting and so on.

Abstract

This paper identifies trends in secondary school accounting participation and achievement during the first five years of the full implementation of the National Certificate of Educational Achievement (NCEA) in New Zealand schools. NCEA marks a shift from a norm-referenced assessment regime to standards-based assessment. Literature suggests that standards-based assessment increases the academic performance of minority ethnic groups (such as Maori and Pacific Island students), and low socio-economic status (SES) students. The author pays particular attention to these groups and his analysis reveals some interesting results: in accounting, the NCEA has not met expectations for these students. From 2004 to 2008, the number of low SES accounting students has dropped, as has the number of accounting standards entered and the rates of achievement. Likewise, there has been no significant improvement in the academic performance of Maori students taking accounting standards, while Pacific Island students have experienced a significant decrease in achievement. The author also discusses how studying high school accounting impacts on tertiary level study and offers some future implications of this research.

Keywords: Accounting education; NCEA; Low socio-economic status; School achievement; High school accounting.

JEL Classification: M48, I21.

1. Introduction

There has been a great deal of research carried out on the impact of secondary school subject choices on tertiary level study. In a summary of Australian and US research, Tickell and Smyrnios (2005) state “research indicates that one of the strongest predictors of tertiary academic performance is prior academic performance” (p241). They further conclude that “Year 12 score is the best single predictor of academic success in first-semester university with correlations ranging between $r=.30$ and $r=.50$ ” (p241), citing Clayton, Goleby and McMicken (1992). Clayton, Goleby & McMicken (1992) cite Masters & Beswick (1986) when they say that “Year 12 score, as a predictor of first-year university academic performance, is hard to improve upon” (p14) – reporting a middling to high correlation of $r=.60$. (Masters & Beswick (1986), in Clayton, Goleby & McMicken (1992)). Urban et al. (1999) found Year 12 score to be a significant predictor of bachelor degree completion: 78% of students with a Year 12 score in the top decile completed their degree, compared to only 55% of students in the bottom decile. Australian-based research has yielded similar results, with Archer, Cantwell and Bourke (1999), and Evans and Farley (1998) all finding Year 12 scores to be significant predictors of first-semester university academic performance.

Tickell and Smyrnios (2005) went on to ask: “What are the short-term and long-term effects of completing Year 12 Accounting?” (p242). They found empirical research has drawn mixed results, quoting Baldwin and Howe (1982), Bergin (1983), Doran, Bouillon and Smith (1991) and Mitchell (1985), who all found that studying accounting in secondary school did not result in higher first-year tertiary level accounting grades. However, Auyeung and Sands (1994) found that a group who had studied accounting at secondary school out-performed a group who had not. Christopher and Debreceeny (1993) and Evans and Farley (1998) both reported similar findings. Evans and Farley (1998) found that the higher the Year 12 accounting score, the greater the likelihood of passing first semester university accounting.

University and secondary school curriculum and assessment methods do not remain static. It is

conceivable that over time the first year tertiary accounting curriculum and secondary school accounting curriculum have become more closely aligned. As a result, stronger correlations are now found between high school accounting performance and first year tertiary accounting performance. Tickell and Smyrnios (2005) reported “successful Year 12 Accounting completion had an enduring positive effect for all university accounting grades” (p239). In another study, Rohde and Kavanagh (1996) found that “for students entering tertiary courses with similar academic ability, i.e. obtained the same entrance score, the first year tertiary accounting result obtained by a student who studied accounting previously is between one and two grades higher than that of a student who did not study accounting at high school” (p275). In a study using Hong Kong data, Gul and Fong (1993) also found that previous knowledge of accounting has a positive and significant impact on student performance in introductory accounting courses at tertiary level.

New Zealand-based research on this topic is relatively scarce. Keef (1992) found that studying accounting in the fifth form (now known as Year 11), the sixth form (Year 12), or the fifth and sixth form “did not provide a comparative advantage over the total absence of such study in the corresponding first-level course at Massey University in New Zealand” (p66). This study, however, neglected to include the seventh form (Year 13), the final year of schooling in New Zealand. In recent research, Engler (2010) suggests “Higher performance at university is more closely related to how well students performed at school, rather than to the particular subjects they studied at school” (p2). However, Engler also reports “There are some skills and knowledge that do appear to be important to performance at university. Mathematics at school is associated with better performance in mathematical science, chemistry with chemical science, English with studies in law. The strongest effect was for accounting students taking courses in accountancy” (p2).

Given the correlation between academic performance in secondary school accounting and first year tertiary level accounting, it is pertinent for tertiary institutions to examine the impact of the National Certificate of Educational Achievement (NCEA) on the subject of Accounting in New Zealand secondary schools.

The New Zealand Context

All New Zealand state secondary schools are given a decile rating, which represents the socioeconomic status (SES) of the school’s catchment area. According to the New Zealand Ministry of Education website (Ministry of Education 2010), in order to assess a school’s decile rating, five factors are used to measure the socio-economic standing of its community: household income, occupation, household crowding, educational qualifications and income support (the percentage of parents who receive a benefit). Decile 1 schools are the 10% of schools with the highest proportion of students from low socio-economic communities, whereas decile 10 schools are the 10% of schools with the lowest proportion of these students. A low decile school would therefore draw on communities where there is a greater density of households having low incomes, manual occupations, greater household crowding, lower educational qualifications and greater dependence on income support.

The NCEA is a standards-based assessment regime in which students’ performance is measured against standards of achievement or competence. Its introduction marks a shift from the norm-based assessment that had previously existed in New Zealand secondary schools. The ideological reason for the change is summed up by Shulruf et al. (2009) when they state: “This change was a result of a lengthy reform process influenced by arguments that the norm-based assessment system had, for example, disadvantaged students from certain ethnicities particularly Maori and Pacific and students from lower income families” (p16).

In a review of the literature of standards-based assessment (SBA) in senior secondary schools, Rawlins et al. (2005) describe advocates of SBA who believe it results in improved understanding and transparency of the assessment process (Barker 1995, in Peddie & Tuck 1995; Francisco 1999;

Tomlinson 2002), higher levels of student achievement (Supovitz 2001), and improved links between knowledge and performance (Barker 1995, in Peddie & Tuck 1995). However, Rawlins et al. (2005, p111) go on to say:

The academic achievements of diverse learners within SBA systems have been mixed. The research suggests that although diverse students perform better under SBA than under a norm-referenced system, there is still a significant gap between the achievement of students with special needs and their middle class majority peers (Ortiz 2000), particularly minority students and those from low income households (Kannapel et al. 2001; Madaus & Clarke 2001).

They then continue “Standards-based assessment potentially provides schools with greater opportunity to adapt assessment tasks to meet the needs of diverse learners, while still assessing the set standard(s) (Hager, Gonczi & Athanasou 1994; Hipkins et al. 2004)” (Rawlins et al. 2005, p111). Shulruf, Hattie and Tumen (2010, p141) concur when they say:

The development and introduction of NCEA was a major change in New Zealand education policy. It aimed to ensure that all young people, regardless of their ethnicity and family income, have the opportunity to develop the knowledge and skills to enable their participation in the changing workforce and, at the same time, promote a culture of lifelong learning within society

Strathdee (2003) states one aim of the NCEA is to remove barriers for low achievers and thus to equalise the imbalances due to race, class and income. He specifically refers to a need to lift the standards of achievement for Maori and Pacific Island students. Philips (2003) describes that in recent education reforms in New Zealand, “the government has focused on policies aimed at increasing the participation and achievement of Maori and Pacific Island students, who have traditionally been under-represented or achieved at a lower level than the majority of students in post-compulsory education and training” (p290).

NCEA

A National Certificate of Educational Achievement – or NCEA – is the most common secondary school qualification offered in New Zealand. It can be obtained at three levels. Generally, Year 11 students attempt a Level 1 certificate, Year 12 students attempt a Level 2 certificate, and Year 13 students attempt a Level 3 certificate. Under the former norm-referenced system students entered subjects; but in order to obtain the NCEA students now enter ‘standards’ in a given subject. Standards represent the skills or knowledge a student is expected to acquire in that subject. For example, an accounting standard is: process financial information for partnerships and companies. Students are assessed, through assignments and internal and/or external exams, in order to measure how well they have met the standards.

Schools assess three types of standards:

Unit standards. These existed prior to the implementation of the NCEA, and were often completed as an alternative to norm-referenced examinations. Unit standards are a standards-based pass/fail assessment. They are assessed and marked internally. Assessments and samples of student work are periodically moderated by the New Zealand Qualifications Authority (NZQA) as a form of quality control.

Internally assessed achievement standards. The difference between these and unit standards is that if a student meets the standard, then they can be awarded the credits at an achieved, merit or excellence level, rather than a simple pass/fail.

Externally assessed achievement standards. The difference between these and internally assessed achievement standards is that these usually take the form of externally

moderated and marked examinations completed at the end of the school year.

A major change with the introduction of the NCEA was that unit standards – which were previously completed as an alternative to externally assessed examinations and could not be used as part of the University Entrance qualification – could now count not only towards the NCEA, but also towards University Entrance.

This paper identifies trends in participation and achievement in secondary school accounting in the first five years since the full implementation of the NCEA, and it seeks to clarify whether the NCEA has improved academic outcomes for low SES students and students from ethnic minorities studying accounting in New Zealand secondary schools. The ethnic groupings analysed are European, Maori, Pacific Islanders and Asian.

2. Method

The New Zealand Qualifications Authority (NZQA) and the Ministry of Education supplied data by email and webpages. Basic statistical calculations – such as percentage change calculations and the percentage of the total calculations – were completed and applied to data relating to the number of standards entered, as well as to data pertaining to rates of non-achievement.

To establish if any of the percentage calculations pertaining to rates of non-achievement were statistically significant, the data were analysed using various statistical techniques. For ease of reporting, ordinary least squares (OLS) regressions were conducted, with the dependent variable being whether a student received a *Not Achieved* grade, or an *Achieved* or better grade. Due to the binary nature of the dependent variable, a dummy variable was used – with 0 representing a *Not Achieved* grade, and 1 representing a grade of *Achieved* or better. Where a student was entered for a standard but a grade was not reported by the school (for unit standards and internally assessed achievement standards), the non-reported grade was coded as a *Not Achieved* grade, as many schools simply did not report *Not Achieved* grades.

The explanatory variable in the regression model was *Year*, comparing rates of non-achievement in 2004 to rates of non-achievement in 2008. Due to its binary nature, the explanatory variable was also a dummy variable, with 0 for 2004 and 1 for 2008 data. The OLS regression coefficients can therefore be interpreted as changes in the percentage of students receiving an *Achieved* grade or better.

The model took the form:

$$\text{Rate of Achievement} = \alpha + \beta 1 \text{ Year} + \varepsilon$$

Where:

Rate of Achievement = dummy variable (*Not Achieved* = 0; *Achieved* or better = 1)

Year = dummy variable (2004 = 0; 2008 = 1)

ε = the error term

α = the intercept

Regressions were run for data segregated by decile grouping and ethnicity.

As the data was binary and nominal by nature, a two by two contingency table analysis was performed using a chi-square statistic. Risk differences were calculated by running a probit regression reporting changes in probability. The changes in probability reported by the probit regression were then cross-checked for accuracy against coefficients reported in the OLS regressions. Odds ratios were calculated by running a logit regression reporting odds ratios. All statistical methods reported the same level of significance.

3. Results

From 2004 to 2008, there has been a 1% increase from 17,713 to 17,952 in the number of students taking senior accounting (Years 11, 12 and 13). According to the Ministry of Education's definition, a student is deemed to be taking accounting if that student is enrolled and participating in the subject for 20 hours or more per year. As a student could in theory only enter one accounting standard in a year, but still be counted as "doing" accounting, it is also relevant to analyse trends in the number of accounting standards that students are choosing to enter.

Table 1 reveals that from 2004 to 2008 there has been a 10% reduction in the number of accounting standards that students are choosing to enter. As a group, more students are doing fewer standards.

Table 1
Accounting Standards Entered by Assessment Type for Levels 1-3

| Assessment Type | 2004 | 2005 | 2006 | 2007 | 2008 | % Δ |
|--------------------------------|----------------|---------------|----------------|---------------|---------------|-------------|
| Unit Standard | 5,291 | 5,954 | 8,246 | 10,190 | 12,293 | +132% |
| Not Achieved | 2160 | 2663 | 3052 | 3609 | 5284 | 145% |
| Internal Achievement Standards | 26,718 | 26,177 | 26,677 | 24,451 | 25,189 | -6% |
| Not Achieved | 4955 | 4642 | 4774 | 3780 | 5780 | 17% |
| External Achievement Standards | 74,764 | 66,073 | 66,629 | 62,349 | 58,478 | -22% |
| Not Achieved | 23745 | 21893 | 21587 | 19915 | 17970 | -24% |
| Total Standards | 106,773 | 98,204 | 101,552 | 96,990 | 95,960 | -10% |
| Not Achieved | 30,860 | 29,198 | 29,413 | 27,304 | 29,034 | -6% |

In percentage terms, there has been a large increase (132%) in the number of unit standards that students are choosing to enter. However, there has also been a more than proportionate increase (145%) in the number of students who are failing to achieve the unit standards. Internally assessed achievement standards have seen a 6% reduction in the number of entries, but a 17% increase in the number of *Not Achieved* grades. Externally assessed achievement standards have seen a 22% decline in the number of standards entered, and a corresponding 24% decline in the number of *Not Achieved* grades. When the totals of all three different types of standards are aggregated, there has been a 10% reduction in the number of accounting standards entered, and a 6% reduction in the number of *Not Achieved* grades.

This data has been stratified according to SES, with the results shown in Table 2.

Table 2
Standards Entered and Not Achieved Grades Received, by School Decile

| | 2004 | 2005 | 2006 | 2007 | 2008 | % Δ |
|------------------------------|-------|-------|-------|-------|-------|------|
| Low Decile School Entries | 14185 | 10298 | 10581 | 9821 | 10155 | -28% |
| Number of Not Achieved | 6348 | 4975 | 4869 | 4462 | 5032 | -21% |
| Medium Decile School Entries | 41230 | 42193 | 44310 | 42737 | 39220 | -5% |
| Number of Not Achieved | 12299 | 13289 | 13564 | 12471 | 12750 | 4% |
| High Decile School Entries | 45807 | 40620 | 41747 | 39602 | 45421 | -1% |
| Number of Not Achieved | 10812 | 9852 | 10011 | 9439 | 10798 | 0% |

There has been a large (28%) decrease in the number of standards that students from *Low Decile Schools* (Decile 1–3) are choosing to enter, with a less than proportionate (21%) decrease in the number of *Not Achieved* grades received by students in *Low Decile Schools*. *Medium Decile Schools* (Decile 4–7) have seen a reduction of 5% in the number of standards entered, but a 4% increase in the number of *Not Achieved* grades. For students from *High Decile Schools* (Decile 8–10), there has been a 1% reduction in the number of standards entered, and no change to the rate of non-achievement. The total

number of accounting standards entered by students from *Low Decile Schools* has shrunk from 14% to 11%.

OLS, probit and logit regressions and chi-square analysis were undertaken in order to establish whether there have been any statistically significant changes in the rates of achievement for each decile grouping from 2004 to 2008. The results are shown in Table 3.

Table 3
Achievement, by School Decile

| Decile | |
|---------------|---------------------|
| 1 - 3 | -0.05*** (-7.41) |
| 4 - 7 | -0.03*** (-8.20) |
| 8 - 10 | -0.00 (-0.60) |

*** p < 0.01

Low and medium decile groupings show a decrease in the rates of achievement from 2004 to 2008, significant at the 99% confidence interval. The probit and OLS coefficients can be interpreted as the change in the percentage of *Achieved* grades or better received. Students from *Low Decile Schools* experienced a 5% decrease, and students from *Medium Decile Schools* experienced a 3% decrease, in the percentage of *Achieved* grades or better received. Students from *High Decile Schools* did not experience a significant change in their rates of achievement, as shown by the change in the percentage of *Achieved* grades or better received being 0%. The chi-square statistic confirms the levels of significance reported by all three regressions. The logit coefficients can be interpreted as the probability of receiving an *Achieved* grade or better in 2008 relative to 2004. The odds of students from *Low Decile Schools* receiving an *Achieved* grade or better in 2008 relative to 2004 are 0.82. The corresponding odds for students from *Medium Decile Schools* are 0.88. There is no significant difference in the probability of receiving an *Achieved* grade or better in 2008 relative to 2004 for students from *High Decile Schools*. Table 4 shows the number of students taking accounting by school decile grouping from 2004 to 2008.

Table 4
Students taking Accounting, by School Decile

| | 2004 | 2005 | 2006 | 2007 | 2008 | % Δ |
|--------------------|-------------|-------------|-------------|-------------|-------------|------------|
| Decile 1-3 | 2276 | 1892 | 1863 | 1879 | 1734 | -24% |
| Decile 4-7 | 6534 | 7290 | 7673 | 7985 | 7015 | 7% |
| Decile 8-10 | 7645 | 7024 | 7276 | 7153 | 8631 | 13% |

Low Decile Schools show a 24% reduction in the number of students taking accounting, which is similar to the 28% reduction in the number of accounting standards entered by students from these schools. In *Medium Decile Schools*, although there was a 5% reduction in the number of accounting standards being entered, there was a 7% increase in the number of students taking accounting. In *High Decile Schools* there was a 1% decrease in the number of accounting standards being entered, but a 13% increase in the number of students studying accounting. As a group, there are more students choosing to do accounting, but they are entering fewer accounting standards.

Table 5 shows the number of standards being entered (*Total Standards Entered*) and the number of *Not Achieved* grades received, by ethnicity.

Table 5
Standards and Grades, by Ethnicity

| Ethnic Group | 2004 | 2005 | 2006 | 2007 | 2008 | % Δ |
|--------------------------------|-------------|-------------|-------------|-------------|-------------|------------|
| <i>European</i> | | | | | | |
| <i>Total Standards Entered</i> | 57846 | 54935 | 58158 | 56063 | 53985 | -7% |
| <i>Number of Not Achieved</i> | 13895 | 14140 | 14314 | 13487 | 14147 | 2% |
| <i>Maori</i> | | | | | | |
| <i>Total Standards Entered</i> | 8587 | 7863 | 8516 | 7910 | 7726 | -10% |
| <i>Number of Not Achieved</i> | 3773 | 3385 | 3540 | 3322 | 3391 | -10% |
| <i>Pacific Island</i> | | | | | | |
| <i>Total Standards Entered</i> | 7343 | 7301 | 7533 | 7915 | 8446 | 15% |
| <i>Number of Not Achieved</i> | 3558 | 3821 | 3937 | 3748 | 4390 | 23% |
| <i>Asian</i> | | | | | | |
| <i>Total Standards Entered</i> | 29475 | 25580 | 25210 | 23202 | 23990 | -19% |
| <i>Number of Not Achieved</i> | 8451 | 7037 | 6893 | 6066 | 6474 | -23% |

European students show a 7% decrease in the *Total Standards Entered*, with a 2% increase in the number of *Not Achieved* grades received. Maori students show a 10% decrease in the *Total Standards Entered*, with an equivalent reduction in the number of *Not Achieved* grades. Asian students recorded the biggest change, with a 19% decrease in the *Total Standards Entered*, and a 23% reduction in the number of *Not Achieved* grades. The only ethnic grouping to increase the *Total Standards Entered* – by 15% – was Pacific Island students. However, there was a more than proportionate 23% increase in the number of *Not Achieved* grades for this group.

Regressions and chi-square analysis, stratified by ethnic grouping, established whether there had been a significant change in the rate of achievement for the different ethnic groupings from 2004 to 2008. These results are shown in Table 6.

Table 6
Changes in Rates of Achievement, by Ethnicity

| Ethnicity | |
|-----------------------|---------------------|
| Maori | 0.00 (0.05) |
| Pacific Island | -0.04*** (-4.42) |
| Asian | 0.02*** (4.32) |
| European | -0.02*** (-8.43) |

*** p < 0.01

There was no significant change in the *Rate of Achievement* for Maori students, as is shown by the change in percentage of *Achieved* grades or better being 0%. For Pacific Island students, there was a 4% decrease in the number of *Achieved* grades or better, with European students experiencing a 2% decrease. Asian students experienced a 2% increase in the number of *Achieved* grades or better. This is reflected in their odds ratio, with Asian students having a 1.09 greater probability of receiving an *Achieved* grade or better in 2008, compared to 2004. The corresponding odds for Pacific Island and European students are 0.87 and 0.89 respectively. Changes in the *Rate of Achievement* for Pacific Island, European and Asian students are significant at the 99%

confidence level.

Data to this point has been stratified by the ethnic grouping of the student entering each standard. This does not tell us what has been happening to the number of students taking accounting by ethnic grouping. Unfortunately this information is not available; however, an ethnic breakdown of all students in Years 11-13 in New Zealand schools is available. There has been a 5% reduction in the number of European students in senior school, which is similar to the 7% reduction in the *Total Standards Entered* by European students. Even though there was a 10% reduction in the *Total Standards Entered* by Maori students, there was a 3% increase in the number of Maori students in senior school. There was an 11% increase in the number of Pacific Island students in senior school, which is similar to the 15% increase in the *Total Standards Entered* by these students. Finally, the 12% increase in the number of Asian students in senior school seems at odds with the 19% reduction in the *Total Standards Entered* by Asian students for the same period. This may be explained by the 32% decrease in the number of full fee paying (FFP) students who choose to study accounting. The NZQA does not identify FFP students as a separate category when reporting entries and results, and it is likely that many of the students classified as FFP by the Ministry of Education would, in fact, be classified as Asian by the NZQA in its reporting.

Some literature – as discussed above – has drawn a link between academic performance in the final year of secondary school and the first year of tertiary study. Therefore this research focusses on achievement data for students entering Level 3 (the final year of NCEA for most students) accounting standards.

Table 7
Standards Entered and Grades Not Achieved, Level 3

| | 2004 | 2005 | 2006 | 2007 | 2008 | % Δ |
|--------------------------------|--------------|--------------|--------------|--------------|--------------|------------|
| External Achievement Standards | | | | | | |
| Total | 13915 | 12972 | 12456 | 11504 | 11820 | -15% |
| NA | 4325 | 4101 | 4506 | 4216 | 3915 | -9 |
| Internal Achievement Standards | | | | | | |
| Total | 2740 | 2809 | 2686 | 2565 | 2817 | 3% |
| NA | 391 | 420 | 366 | 386 | 560 | 43% |
| Unit Standards | | | | | | |
| Total | 1117 | 1173 | 1884 | 2928 | 3749 | 236% |
| NA | 579 | 613 | 686 | 955 | 1366 | 136% |
| TOTAL | 17772 | 16954 | 17026 | 16997 | 18386 | 3% |
| NA | 5295 | 5134 | 5558 | 5557 | 5841 | 10% |

Table 7 shows that there has been a 15% decrease in the number of externally assessed standards entered, and a 9% decrease in the number of *Not Achieved* grades. Internally assessed achievement standards have seen a small (3%) increase in the *Total Standards Entered*, but a much greater than proportionate increase in the number of *Not Achieved* grades (43%). There has been a very large increase in the number of unit standards entered (236%), but only a 136% increase in the number of *Not Achieved* grades. When all standards are aggregated, there has been a 3% increase in the *Total Standards Entered* at Level 3, and a 10% increase in the number of *Not Achieved* grades received. For the corresponding period, the number of students studying Level 3 accounting has increased by 8%, from 3,415 to 3,695.

When regressions and chi-square analysis were run on the different types of assessments in Level 3 accounting, all results were significant at the 99% confidence level, as shown in Table 8.

Table 8
Changes in Rates of Achievement for Level 3, by Assessment Type

| Assessment Type | OLS | X ² | Logit | Probit |
|---|---------------------|----------------------------|--------------------|---------------------|
| Externally Assessed Achievement Standards | -0.02*** (-3.50) | (12.13)*** 1,N=25,735) | 0.91*** (-3.50) | -0.02*** (-3.49) |
| Internally Assessed Achievement Standards | -0.06*** (-5.57) | (30.42)*** (1,N=5,557) | 0.67*** (-5.53) | -0.06*** (-5.55) |
| Unit Standards | 0.15*** (9.30) | (84.41)*** (1,N=4,866) | 1.88*** (9.15) | 0.15*** (9.15) |
| All Standards | -0.02*** (-4.07) | (16.44)*** (1,N=36,158) | 0.91*** (-4.07) | -0.02*** (-4.07) |

*** p < 0.01

Unit Standards have seen a 15% increase in the number of *Achieved* grades or better being awarded, whereas *Internally Assessed Achievement Standards* and *Externally Assessed Achievement Standards* have experienced decreases of 6% and 2% respectively. Across all standards, this equals a 2% decrease in the number of *Achieved* grades or better. These results are also reflected in the large differences in odds ratios between the different types of assessment. A student sitting a Level 3 *Unit Standard* in 2008 had a 1.88 greater chance of receiving an *Achieved* grade or better than in 2004. However, the odds of receiving an *Achieved* grade or better for Level 3 *Internally Assessed Achievement Standards* in 2008 were 0.67, relative to 2004. The corresponding figure for Level 3 *Externally Assessed Achievement Standards* was 0.91, which mirrors the odds ratio for all Level 3 standards (*All Standards*).

4. Conclusions

In the years since the full implementation of the NCEA there have been some noticeable changes in the way that senior secondary school students approach studying accounting. More students are studying accounting, but they are choosing to enter fewer accounting standards, which tends to suggest that they (or their teachers) are becoming more selective in their choices. Yet despite there being fewer standards entered, the proportion of *Not Achieved* grades has risen. A 10% reduction in the *Total Standards Entered* has only seen a 6% reduction in the number of *Not Achieved* grades received. The final year (Level 3) accounting standards cohort studied in this research actually performed more poorly in 2008 than the equivalent group did in 2004. Even though there was only a 3% increase in the number of Level 3 accounting standards entered, there was a 10% increase in the number of *Not Achieved* grades received.

There has been a pronounced shift away from achievement standards – especially externally assessed achievement standards – and a large percentage increase in the number of unit standards entered. However, because the number of entries in unit standards was initially low, there has been an overall decrease in the number of standards entered. At Level 3, the shift away from externally assessed achievement standards to unit standards has been even more pronounced. This is not surprising, and appears to be a natural reaction to unit standards now being able to be used to obtain the University Entrance qualification.

In terms of socio-economic status, *Low Decile Schools* have seen the largest drop in the number of accounting standards entered, with a reduction of over 25%. Conversely, *High Decile Schools* saw a reduction of only 1%. This is of concern. In 2004, only 14% of accounting standards were entered by students from *Low Decile Schools*, and in 2008 this had dropped to 11%. The 28% reduction in the number of accounting standards entered by students from *Low Decile Schools* also saw a 21% reduction in the number of *Not Achieved* grades received by these students. Consequently, a smaller number of standards were passed by students from *Low Decile Schools* under the first five years of the NCEA. There has been a 5% reduction in the number of *Achieved* or better grades received by students from *Low Decile Schools*, significant at the 99% confidence level. There has been a similar 3% reduction in

the number of *Achieved* or better grades received by students from *Medium Decile Schools*, significant at the 99% confidence level. However, there has been no significant change for students from *High Decile Schools*. One of the stated aims of introducing a standards-based assessment regime was to raise the academic performance of low SES students. This has clearly not been successful in accounting. Not only has their performance worsened, but there are now fewer low SES students studying accounting.

There has been a sharp increase in the number of accounting standards entered by Pacific Island students; however, their performance has not been good, with a more than proportionate increase in the number of *Not Achieved* grades being received. On the other hand, there has been a sharp reduction – of approximately 20% – in the number of accounting standards entered by Asian students. As mentioned earlier, this is possibly due to the decrease in the number of full fee paying students coming to New Zealand, as accounting has been a popular subject with that particular cohort. There has been a 10% reduction in the number of accounting standards entered by Maori students, with an exactly proportionate decrease in the number of *Not Achieved* grades received. European students have a smaller reduction (7%) in the number of accounting standards entered, with an actual increase in the number of *Not Achieved* grades received. With regard to the overall ethnic mix of students sitting accounting standards, the decrease in the number of Maori students has been more than replaced by Pacific Island students. However, given the poor performance of Pacific Island students, we can conclude that the ethnic diversity of students passing accounting standards has actually reduced. The stated goal of improving the academic performance of ethnic minorities such as Maori and Pacific Island students through the introduction of the NCEA has not been successful in accounting. There has been no significant change in achievement rates for Maori students entering accounting standards, and there has been a 4% decrease in rates of achievement for Pacific Island students, significant at the 99% confidence level. Maori students are performing relatively better, but only because Pacific Island and European students are performing worse.

There were more students studying accounting in their final year of secondary schooling in 2008 than in 2004, and more accounting standards entered. However, there was also a more than proportionate increase in the number of *Not Achieved* grades received. Across NCEA at Levels 1 and 2 the number of accounting standards entered is declining; however at Level 3, the number of accounting standards entered appears to be increasing. As mentioned above, this may be explained by the University Entrance qualification. For University Entrance, the number of standards that a student achieves is more important than the level of achievement. This may be especially significant for marginal students and may also explain the large percentage increase in the number of unit standards entered. Students may be increasing the number of standards they enter in order to maximise their chances to obtain University Entrance. As unit standards are internally assessed, any tests can be re-sat, thus increasing the chances of success; whereas externally assessed achievement standards are assessed once in an invigilated examination. From 2004 to 2008, Level 3 accounting unit standards have shown a 15% increase in the number of *Achieved* grades received, significant at the 99% confidence level. By contrast, internally assessed achievement standards have shown a 6% decrease, and externally assessed achievement standards a 2% decrease in rates of achievement, both significant at the 99% confidence level.

There are several potential flow-on effects for tertiary study. Although more students are now studying accounting at secondary school, they are doing fewer standards. This may have repercussions for the tertiary sector, if students are arriving at tertiary institutions with a narrower range of accounting content coverage and basic skills. Given that the decrease in the number of *Not Achieved* grades received is not falling as rapidly as the number of accounting standards entered, it would appear that students who have studied accounting at school now have a weaker grasp of content than when NCEA was fully introduced in 2004. Furthermore, with the rise in popularity of unit standards, it is also more likely that accounting students' experience of assessment is that of non-invigilated internal assessment. This is especially noticeable at Year 13 (Level 3), where there has been an overall 3% increase in the number of

accounting standards entered, but a 15% decrease in the number of externally assessed accounting standards entered.

Implications for Further Research

This paper underscores the need for further research. For example, it would be useful to explore reasons for the decline in the number of NCEA accounting standards entered by students from low SES schools, so that appropriate measures could be taken to ameliorate the SES bias; or to find out why some ethnic groups (such as Pacific Island students), underperform academically in accounting. A follow-up study on the impact of the NCEA on first-year tertiary level performance in accounting could also yield some interesting results.

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Chapter Six

Chapter six signals a shift toward examining data on financial literacy tests results, rather than similar subjects in the secondary system where large datasets are available. The purpose of this chapter is to examine the effect of socioeconomic status and ethnicity, specifically Maori ethnicity, on financial literacy knowledge and behaviours of adults in New Zealand.

Researchers such as Lusardi and Mitchell (2007) have found that ethnic minorities (in their case Blacks and Hispanics) are less likely to answer economic questions quickly. However Perry and Morris (2005) stated that any relationship between ethnicity and financial behavior that does exist is more likely to be the result of social, economic and psychological factors rather than simply from racial or ethnic variations. They go on to state that differences in financial management behavior by ethnicity could be due to differences in beliefs. Cole and Shastry (2007) found that lower participation among ethnic minorities in financial markets even accounting for income, education and financial literacy could suggest other factors such as culture reduces participation.

Given these findings in the literature, this paper uses data from the nationwide 2009 Financial Knowledge Survey collected by Colmar Brunton to establish if there is still a difference in European and Maori financial literacy and behaviours after accounting for age, gender, income and education? Chi-square analysis and odds ratios are used along with logit regressions reporting odds ratios to test for any significant differences in the data resulting from 850 face-to-face interviews.

The results showed that high income respondents recorded higher scores than low income respondents on the financial literacy questions. The same result was found for Maori relative to Europeans, even allowing for age, income, gender and education. This was the case for questions that required a response that relied on a calculation, description of a behavior or completing a calculation.

The chapter finishes with a discussion around whether cultural factors such as beliefs could be contributing to the ethnic differential, or if the teaching and/or measuring of financial literacy topics are designed with the European culture in mind.

Abstract

This paper uses data from the 2009 Financial Knowledge Survey conducted in New Zealand to ascertain if there is any difference in scores between the ethnic minority Maori (the indigenous people of New Zealand) and Europeans. The results show that high income respondents produce more correct responses than low income respondents. Once accounting for income, age, gender and highest qualification, Europeans are significantly more likely than Maori to give a correct response. When question types are categorised according to whether the response relied on a calculation, knowledge, or asked for a behaviour, Europeans are significantly more likely than Maori to produce more correct responses across all three types of questions, with the biggest difference in calculations, where Europeans are three times more likely to give a correct response than Maori. This raises the question is simply providing greater access to financial literacy programs for ethnic minorities the best strategy, or do cultural differences need to be considered.

Keywords: Financial literacy, Maori, Financial Education, Ethnic Minorities, New Zealand

Topic Area 8 Economics II (Applied and Empirical Research) or 14 International and Global Economics

Introduction

Braunstein and Welch (2002) describe a “complex, specialised financial services marketplace that requires consumers to be actively engaged if they are to manage their finances effectively” (p. 445). They describe how increased competition, technology and market innovation have resulted in a sophisticated industry which has expanded access to credit for younger populations, and increased employee responsibility for directing their own investments in pension plans. At the same time, Braunstein and Welch (2002) describe how increased diversity of the population can result in households that may face cultural barriers to establishing a banking relationship. In their own analysis, Braunstein and Welch (2002) found that respondents with higher financial literacy test scores, greater income, and a higher level of education were more likely to rank above the median in terms of the number of financial products they used or owned, and the number of financial behaviours they exhibited. They also found that personal experience was most commonly cited as the most important source of information about personal finances. Lusardi and Mitchell (2007) concur with Braunstein and Welch’s (2002) description of a complex financial services marketplace, stating that “Workers and retirees have increasingly been asked to take on an unprecedented degree of responsibility for their retirement and other saving” (p. 36). Accordingly Lusardi and Mitchell (2007) describe how “consumers now confront a bewildering array of financial decisions and a wide range of financial products” (p. 36). From this they imply that economic know-how is becoming even more important for households to acquire and manage.

For equitable outcomes, it is therefore important that certain sectors of society are not disadvantaged in their understanding of the ‘economic know-how’ which Lusardi and Mitchell (2007) refer to. Much of the literature on financial literacy focuses on the demographic factors that influence financial literacy knowledge (represented by test scores) and financial behaviour (represented by participation in financial markets for example).

Two of the findings of the analysis Lusardi & Mitchell (2007) conducted were that the more educated are more likely to answer questions economic and political question correctly, and that Blacks and Hispanics are less likely to answer correctly than Whites. Mention was also made of the Colmar Brunton 2006 Financial Knowledge Survey, where “financial literacy was strongly positively correlated with socio-

economic status” (p. 39). Chen & Volpe (2002) state that previous research by Volpe, Chen & Pavklicko (1996); Goldsmith & Goldsmith (1997a,b) and Chen & Volpe (1998) found that women knew less about financial management than men. Chen & Volpe (2002) found that amongst college students, males scored better than females on survey responses on general personal finance knowledge, savings and borrowing, insurance and investments. These results were obtained however without controlling for other variables such as general education and income. Chen & Volpe (2002) go on to examine the relationships between personal financial literacy, and a respondent’s gender, education, work experience, income and other demographic factors. After running logistic regressions and ANOVA analysis, Chen & Volpe (2002) found that “male participants are more likely to be more knowledgeable about personal finance than female participants before and after controlling the effect of other variables” (p. 298). They also find that people’s financial literacy is related to education, work experience and age, but not to ethnicity or income. This may however be because college students were used as respondents to their survey. If certain ethnic groups are underrepresented at college, it may be that students of a certain ethnic minority attending college are not representative of the ethnic minority population in general. The same argument could also be applied on the basis of income.

Perry and Morris (2005) state that the “working belief in the fields of financial services and social marketing is that there is a relationship between race and financial behaviour....While this relationship between ethnicity and financial behaviour may exist, it is likely that these differences result not simply from racial or ethnic variations but from social, economic, and psychological factors” (p. 303). They then go on to quote Aizcorbe, Kennickell and Moore (2003), who found that incomes for African Americans and Hispanics in the United States are significantly lower than that for Whites. Perry and Morris (2005) conclude that their findings imply financial management behaviour may vary by race and ethnic background, and that one possible explanation for these results could be differences in beliefs.

Cole and Shastry (2007) found that greater cognitive ability and educational attainment lead to significant increases in financial market participation. They also acknowledged that correlations may not warrant casual interpretations, giving the example that those with low education levels and low financial literacy are also likely to have low levels of income and wealth. They go on to measure the casual effects of education, financial literacy and cognitive ability on financial market participation, finding that education increases financial market participation for whites and blacks. They also find that financial market participation increases with net worth and cognitive ability. Cole and Shastry (2007) mention other research which supports their findings, namely Bertuati and Starr-McCluer (2001) who demonstrated that participation in financial markets increases with income and education; Lusardi and Mitchell (2007) and Von Rooij, Lusardi and Alessie (2007) who state that financial market participation increases with measured levels of financial literacy; and Hong, Kubic and Stein (2005) who found that participation increased with social connections. Cole and Shastry (2007) concluded that “Persistently lower participation rates among blacks than whites, even when one controls for differences in education, income and financial literacy, have led some to explore whether culture, or other mediating factors depress participation”. Cole and Shastry (2007) did find that financial participation among blacks responds to education in similar ways to whites, the relationship is stronger for whites with the exception of retirement income, where more schooling has a larger effect for blacks than for whites.

Lusardi and Mitchell (2006) found that financial illiteracy is widespread among older Americans, and that women, ethnic minorities and those without a college degree were particularly at risk of displaying low financial knowledge. They found that “demographic differences remain statistically significant even when we perform a multivariate analysis of pattern of responses and include controls for race, sex, marital status, educational attainment, place of birth, Baby-boomer cohort, and age”. They go on to use the example of Blacks and Hispanics, who are less likely to answer compounding interest and inflation questions correctly, even accounting for educational attainment.

Lusardi and Mitchell (2011) describe findings consistent with previous research, that there is a difference in financial knowledge between Blacks, Whites and Hispanics; that women are generally less financially knowledgeable than men; and that financial literacy is highly and positively correlated with schooling.

However, specific to schooling, they found that financial literacy is most acute for those with less than a high school degree.

Given the body of literature described above, age, gender, income, educational qualification and ethnicity could be described as key determinants of financial literacy. The purpose of this paper is to focus on income and ethnicity (Europeans and Maori, the indigenous people of New Zealand) as determinants of financial literacy levels, using data collected by the Colmar Brunton 2009 Financial Knowledge Survey. Specifically, the question this paper sets out to answer is ‘is there a bias between European and Maori in financial literacy as measured by the 2009 Financial Knowledge Survey, once the variables of age, gender, income and highest educational qualification are held constant’? One contribution this paper will make to the general body of literature is further examination of the effects of ethnicity on financial literacy, but using an ethnic grouping that does not currently feature in the body of literature. If the results of this paper mirror the results from the majority of the literature which suggests that Blacks and Hispanics score lower than Whites on financial literacy test scores and financial market participation, this raises the question do financial literacy tests themselves bias against ethnic minorities by not recognising cultural differences which may impact on financial behaviour, and ‘correct’ financial knowledge.

Methods

The data used in this paper are the results from the 2009 Financial Knowledge Survey, a nationwide survey conducted in New Zealand. The data was collected by Colmar Brunton on behalf of the Retirement Commission, through face-to-face interviews with 850 people aged 18+, between 7 March and 28 April 2009. Three key objectives of the survey were:

1. To identify areas of low financial literacy (either by topic or by population) and therefore assist educators improve financial literacy in those areas.
2. To assist the financial services industry to identify where products or services are misunderstood or confusing to consumers and thus be able to improve design or communication.
3. To measure changes in financial knowledge levels since 2006 in order to adapt education programmes and the design or communication related to financial products and services.

The data was categorised into binary correct/incorrect or desirable/undesirable responses to allow for odds ratios to be calculated. The data is categorised according to the following headings in the survey (with the number of questions in each category):

Money Management (17 Questions)

Budgeting (3 Questions)

Goals and Planning (6 Questions)

Debt Management (4 Questions)

Home Loans and Mortgages (10 Questions)

Managing Risk (2 Questions)

Saving (10 Questions)

Retirement Planning (5 Questions)

Investing (12 Questions)

Consumer Rights and Responsibilities (7 Questions)

Attitudes and Behaviours (32 Questions)

Life Generally (3 Questions)

Life Expectancy (3 Questions)

Kiwisaver (4 Questions)

Due to the level of interaction that exists between variables such as ethnicity, level of education and income, the approach this paper makes is to use stratified random samples from the survey responses to

make two different samples as similar as possible on age, gender, level of schooling and income, but different in terms of ethnicity, with one Maori sample and one European sample. For level of schooling, respondents were categorised into two groups, those who had a school qualification or lower as their highest qualification, and those that had a higher than school level qualification. For income, the New Zealand Income Survey June Quarter administered by Statistics New Zealand calculates the medium income from those on wages or salaries to be \$800. Survey respondents were categorised according to their self-declared personal income level, using the weekly figure of \$800 as a guideline. Those earning more than \$40,000 annually were classified as 'high' income earners, while those earning \$40,000 or less annually were classified as 'low' income earners. This is not an unreasonable categorisation given that the medium weekly income from all sources (including beneficiaries) is \$550, however you may prefer to think of high as referring to above the median, and low as below the median income level for workers. The 761 respondents that disclosed their personal income were categorised into the high or low income groupings, with odds ratios calculated to establish if there were any differences in levels of financial literacy between the two groups. The odds ratios reported are the same as those calculated by a logit regression reporting odds ratios. Chi square tests were performed on the odds ratios to establish if any statistically significant differences in financial literacy levels existed between the two income groups, for any of the categories listed above. A similar approach was used to test for significant difference in financial literacy levels between high income Europeans and high income Maori ethnic samples, once age, gender and level of schooling were accounted for.

Results

Table one shows the odds ratios, chi square statistics and p values for participants in the survey who identified their levels of personal income. The sample size is 761, with 490 respondents classified as high income (>\$40,000) and 271 classified as low income (\$40,000 or less).

Table One: High Income and Low Income Comparison: Survey Categories.

| | Odds Ratios | Chi Square Statistic | P Value |
|--|--------------------|-----------------------------|----------------|
| Managing Risk | 2.36 | 22.24 | 0.00 |
| Home/Loans Mortgages | 2.24 | 209.65 | 0.00 |
| Saving | 2.07 | 123.91 | 0.00 |
| Debt Management | 2.05 | 58.66 | 0.00 |
| Investing | 1.92 | 157.30 | 0.00 |
| Money Management | 1.90 | 178.20 | 0.00 |
| KiwiSaver | 1.70 | 22.93 | 0.00 |
| Life Expectancy | 1.58 | 27.67 | 0.00 |
| Attitudes and Behaviours | 1.53 | 176.56 | 0.00 |
| Consumer Rights & Responsibilities | 1.52 | 28.15 | 0.00 |
| Budgeting | 1.47 | 13.79 | 0.00 |
| Goal Setting, Long Term Goals & Financial Planning | 1.42 | 25.90 | 0.00 |
| Retirement Planning | 1.39 | 22.42 | 0.00 |
| Life Generally | 1.11 | 1.26 | 0.26 |
| TOTAL | 1.67 | 934.03 | 0.00 |

The odds ratios show the odds of a high income respondent answering a question favourably compared to the odds of a low income respondent answering a question favourably. An odds ratio of 1 means high and low income respondents both have the same odds of answering a question favourably. The biggest disparity between high and low income respondents lies in the areas of managing risk, mortgages, saving

and debt management, where the odds of a high income respondent answering a question correctly are more than twice the odds of a low income respondent. The smallest difference is in the areas around planning, specifically retirement planning, goal setting and financial planning and budgeting. Apart from the life generally section in the survey, the p values all reflect a significant difference between the responses of high and low income respondents, at the 99% confidence interval. The life generally section is comprised of the following three statements:

59(a) My life is determined by my own actions.

59(b) My life is determined by things beyond my control.

59(c) My life is controlled by the actions of other people.

Each of the three questions required respondents to state whether they strongly agree, somewhat agree, neither agree nor disagree, somewhat disagree, or strongly disagree with the statement. For 59(a), a favourable answer was considered to be a strongly agree or somewhat agree response. For 59(b) & (c), a favourable answer was considered to be a somewhat disagree or strongly disagree response. The odds ratio of 1.11 coupled with the p value of 0.26 provide supporting evidence for the notion that there was no significant difference between high income and low income peoples responses to these statements.

To establish if there were any particular types of questions that were more likely to be answered correctly by high income respondents, the survey questions were placed into three categories, depending on the type of information the question elicited from the respondent. As table two shows, questions that required calculations to be completed resulted in the biggest disparity, with high income respondents twice as likely to answer a calculation question correctly. This is unsurprising given that higher incomes may be a function of higher education levels, and that high socioeconomic groups traditionally achieve better academically than low socioeconomic groups. The smallest disparity is in the questions on behaviour, however all three types of questions all still reflect a significant difference in answers between high and low income respondents at the 99% confidence interval.

Table Two: High Income and Low Income Comparison: Question Types.

| | Odds Ratios | Chi Square Statistic | P Value |
|--------------|--------------------|-----------------------------|----------------|
| Calculations | 2.09 | 141.73 | 0.00 |
| Knowledge | 1.84 | 632.51 | 0.00 |
| Behaviour | 1.45 | 213.22 | 0.00 |
| TOTAL | 1.67 | 934.03 | 0.00 |

As the research described in the introduction suggests, the financial literacy levels of people can be affected by variables such as age, education levels and ethnicity as well as socioeconomic status; with many of these variables suffering from colinearity, making measurement difficult. An important aspect of research into financial literacy is to ascertain whether certain groups of society are systemically displaying lower levels of financial literacy. In an attempt to separate out the effect of ethnicity on financial literacy levels, a sub sample of only those respondents who fell in the high income grouping, who identified their ethnicity as European or Maori was subjected to further analysis. Table three shows the odds ratios, chi square statistics and p values for European and Maori respondents with high levels of personal income. The sample size is 379, with 337 respondents classified as European and 42 classified as Maori.

Table Three: High Income European and High Income Maori Comparison

| | Odds Ratios | Chi Square Statistic | P Value |
|--|--------------------|-----------------------------|----------------|
| Retirement Planning | 3.41 | 66.02 | 0.00 |
| Saving | 3.09 | 95.69 | 0.00 |
| Managing Risk | 2.92 | 16.07 | 0.00 |
| Budgeting | 2.28 | 18.80 | 0.00 |
| Home/Loans Mortgages | 2.21 | 56.22 | 0.00 |
| Money Management | 2.21 | 86.75 | 0.00 |
| Investing | 1.95 | 49.46 | 0.00 |
| Attitudes and Behaviours | 1.87 | 107.71 | 0.00 |
| Life Expectancy | 1.28 | 1.64 | 0.20 |
| Consumer Rights & Responsibilities | 1.19 | 1.35 | 0.24 |
| Goal Setting, Long Term Goals & Financial Planning | 1.03 | 0.03 | 0.86 |
| Debt Management | 0.94 | 0.12 | 0.73 |
| KiwiSaver | 0.63 | 3.84 | 0.05 |
| Life Generally | 0.52 | 10.03 | 0.00 |
| TOTAL | 1.81 | 350.98 | 0.00 |

The first eight question categories in the table all show a significant difference between high income Maori and high income European responses at the 99% confidence interval, with the first three categories showing large odds ratios of close to 3 or greater. The category on kiwisaver showed a significant difference at the 95% confidence interval, with the life generally category significant at the 99% confidence interval. Interestingly, these two categories have odds ratios of less than one, which means that high income European respondents are less likely to give a favourable response than high income Maori. Given that Europeans outperform Maori in socioeconomic status and educational attainment, an intuitive argument for the positive attitude to life by high income Maori may be because Maori are more likely to have risen from previous generations of lower socioeconomic groupings, so have a greater sense of control over their own lives and financial position. There is no significant difference between high income European and Maori respondents for the sections on life expectancy, consumer rights, goal setting and financial planning and debt management.

Despite the table showing significant differences in financial literacy levels between high income Maori and Europeans for the majority of survey categories, we still need to be mindful that other variables such as age and level of education may be disproportionately affecting Maori, or that the Maori sample may have a gender bias which the European sample does not. It may be for example, that high income Maori as a group still have lower levels of schooling than high income Europeans, which is accounting for at least some of the lower levels of financial literacy in high income Maori. An examination of the sub sample of high income Europeans and Maori reveals that the European high income sample contains 73% of respondents aged 44 or less, while the high income Maori sample contains only 36% of respondents aged 44 or less. Further inspection reveals that while 34% of the high income European sample was aged 55 or older, 0% of the high income Maori sample are aged 55 or older. To rectify this imbalance, all of the high income European respondents aged 55 or older were removed from the sample, and a random stratified sample was selected from the high income European group aged less than 55, so that the high income European and Maori samples were similar in terms of age, gender and level of education. As a result, the high income European sample contained 67% female respondents,

54.7% of respondents who had a high school qualification or higher as their highest qualification, and 73% of respondents aged 44 or lower. The corresponding percentages for the high income Maori sample were 69% female respondents, 48% of respondents with a high school qualification or higher as their highest qualification, and 71% of the sample aged 44 or lower. On the dimensions of gender, age and levels of education, the high income Maori and European samples are now essentially the same. The question asking the age of the respondent required them to tick the appropriate box out of 12 choices (coded 1 to 12), with each box having a range of four years, apart from the first and last boxes. The European sample has an average of 6.03, and the Maori sample having an average of 5.70. Similarly for the question on personal income, out of thirteen possible categories (coded 1 to 13), the European sample had an average category of 5.14, with the Maori sample having an average category of 4.93. For highest qualification earned, out of eight possible categories to choose from, the average European score was 4.42, the category corresponding to senior high school as the highest qualification earned. For the Maori sample, the average score was 4.16, again corresponding to senior high school as the highest qualification earned. As table four shows, there is no significant difference between the European and Maori samples for the variables of highest qualification, gender and age.

Table Four: High Income European and High Income Maori Comparison on Demographic Variables.

| | Odds Ratios | Chi Square Statistic | P Value |
|-----------------------|--------------------|-----------------------------|----------------|
| Highest Qualification | 1.33 | 0.689 | 0.41 |
| Gender | 0.92 | 0.049 | 0.82 |
| Age | 1.09 | 0.054 | 0.82 |

Odds ratios and chi square analysis were then calculated on these two demographically similar samples. The results are shown in table five.

Table Five: High Income European and High Income Maori Comparison Accounting for Age, Gender and Highest Qualification: Survey Categories.

| | Odds Ratios | Chi Square Statistic | P Value |
|--|--------------------|-----------------------------|----------------|
| Managing Risk | 3.62 | 18.46 | 0.00 |
| Saving | 3.20 | 87.79 | 0.00 |
| Budgeting | 2.72 | 23.69 | 0.00 |
| Money Management | 2.51 | 101.40 | 0.00 |
| Home/Loans Mortgages | 2.35 | 57.90 | 0.00 |
| Retirement Planning | 2.27 | 25.47 | 0.00 |
| Investing | 2.16 | 57.45 | 0.00 |
| Attitudes and Behaviours | 1.80 | 83.13 | 0.00 |
| Life Generally | 0.52 | 8.93 | 0.00 |
| Life Expectancy | 1.52 | 4.00 | 0.05 |
| Consumer Rights & Responsibilities | 1.23 | 1.61 | 0.21 |
| Goal Setting, Long Term Goals & Financial Planning | 1.21 | 1.57 | 0.21 |
| Debt Management | 1.05 | 0.06 | 0.81 |
| KiwiSaver | 1.04 | 0.02 | 0.88 |
| TOTAL | 1.88 | 347.63 | 0.00 |

The first six question categories in the table all still have odds ratios greater than two, although there has been some shuffling of the order within the eight compared to table three. In terms of statistical significance, the life expectancy category is now statistically significant at the 95% confidence interval, while the kiwisaver category is now no longer statistically significant. Interestingly, for both tables three and four, there is a significant difference between the European and Maori samples on their attitude to life generally, but it is in favour of the Maori sample, with odds ratios of less than one indicating Maori are more likely to give favourable responses than Europeans in terms of their attitude to life generally.

Table six uses the same data as for table five, but splits the data according to question type as in table two above.

Table Six: High Income European and High Income Maori Comparison Accounting for Age, Gender and Highest Qualification: Question Types.

| | Odds Ratios | Chi Square Statistic | P Value |
|--------------|--------------------|-----------------------------|----------------|
| Calculations | 3.05 | 96.25 | 0.00 |
| Knowledge | 2.04 | 228.02 | 0.00 |
| Behaviour | 1.54 | 66.61 | 0.00 |
| TOTAL | 1.88 | 347.63 | 0.00 |

Europeans are three times more likely to correct answer a calculation question than Maori, which is surprising given education level and income have both been accounted for. With questions requiring financial literacy knowledge, Europeans are twice as likely to answer correctly, with the smallest (but still significant) difference recorded in questions examining behaviour. All three results are significant at the 99% confidence interval.

Conclusions

The findings of this paper support the previous literature which found that high income respondents on financial literacy tests/surveys recorded higher scores than low income respondents. The findings also support earlier conclusions that after accounting for other variables such as age, income, level of schooling and gender, ethnic minorities record lower scores on financial literacy tests/surveys. It also contributes to the body of literature by finding similar results in an ethnic minority which is in a different country, and thus a different cultural setting to previous studies on financial literacy and ethnicity. This is important as it allows for the comparison of results across different cultures and settings of ethnic minorities, rather than relying on just one or two ethnic minorities living in the same country.

The reasons for Maori scoring lower on the Financial Literacy Knowledge survey are beyond the scope of this paper, and certainly warrant further investigation. It could be that there are certain cultural factors in play where ethnic minorities value certain principles of financial literacy less than 'Western Society'. This is true in the Maori culture around the concept of reciprocity. In Maori culture it is seen as preferable to give at least an equal value to what you receive in an exchange, if not a greater value. This can be at odds with more westernised cultures where 'getting a good deal' may be emphasised. The extent that this cultural reason can be applied across many different cultures around the world however is debateable. Another possible reason for the difference in financial literacy levels of the different ethnic groupings is that in each of their countries, there is some systemic failure in the ethnic minorities accessing financial literacy information or education which is pertinent to them. One of the conclusions of Lusardi & Mitchell (2007) for example was that "education programs will be most effective if they are targeted to particular population subgroups" (p. 43). It may be that financial literacy information and programs are designed for the ethnic majority by the ethnic majority, and are thus less effective for, and seen as less relevant by ethnic minorities. The results of this paper do suggest that it may not simply be a case of making financial literacy education more readily available for ethnic minorities. There is however no intuitively obvious reason as to why Europeans are three times more likely to answer a

calculation question correctly than Maori. Further research into comparisons between ethnic groupings for types of financial literacy questions, for example calculations as opposed to knowledge recall is desirable, as would more qualitative research examining the differences in belief systems pertaining to principles of financial literacy across different cultures.

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Chapter Seven

Chapter Seven marks the start of a three chapter sequence examining the correlation between gender and financial literacy knowledge, attitudes and behavior. Although it is well documented in the literature that females tend to have a lower level of financial literacy relative to males, there has however been a less than compelling argument constructed as to why this discrepancy occurs. This has led some researchers such as Lusardi and Mitchell (2014) to state that “this debate is far from closed, and additional research will be required to better understand these observed gender differences in financial literacy” (Lusardi and Mitchell, 2014, p. 20). There is also some research such as the PISA Report (OECD, 2014) which suggests that financial literacy gender differences may be more significant in adults than in youth. Based on the literature in the introduction on social learning theory, and the role of parental discussion on socialization in the home, fifteen year old students were asked to report their age of first financial discussion in the home with a parent. This variable was then used in quantitative analysis in an attempt to tease out any possible evidence of family socialization in the home around financial literacy.

Two samples of 1,271 year ten students from 19 secondary schools in Christchurch and 317 first year microeconomics students from the University of Canterbury were analysed using ordinary least squares regressions and chi-square analysis in an attempt to answer two research questions: how does age of the first financial discussion in the home influence a child’s financial literacy?’ and how does the gender of a child and variables such as gender of the parent or parental education level correlate with financial discussions in the home?

The results from the school sample showed that males on average have their first financial discussion in the home at an earlier age than females. This was consistent across students from low, medium and high decile schools. The variables which were correlated with a higher financial literacy quiz score were students whose fathers attended university, students from a higher decile school, a student of Caucasian descent, and a student who had their first financial discussion at an earlier age. In the younger, school sample, gender was not significant. However, in the tertiary sample Males, Caucasian students and students who had their first financial discussion in the home at an earlier age were likely to score higher on the financial literacy quiz. These results mirror those discussed in the PISA Report (OECD, 2014).

The findings in this chapter suggest it is predominantly the male parent that engages with their child in financial discussions in the home, which may lead to fewer financial discussions between fathers and daughters in the direct tuition category of the social cognitive theory of gender development and differentiation. The findings also suggest the home environment may play a substantial part in developing financial literacy knowledge, attitudes and behaviours, with the age of first financial discussion in the home an important indicator of the general attitudes of parents to the necessity of their sons or daughters being financially literate.

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Keywords

Education, family, financial literacy, gender, home.

Abstract

The lower level of financial literacy amongst females relative to males has been well documented in the literature. There has however been a less than compelling argument constructed as to why this discrepancy occurs. This article introduces findings showing the influence the home, particularly financial discussions in the home, has on the financial literacy levels of children and young adults. A key finding is that males have their first financial discussion in the home at a younger age than females on average, with this differential statistically significant across students of differing socioeconomic status. For males, the age of the child when they have their first financial discussion in the home influences their financial literacy levels some years later at university, even accounting for other variables such as socioeconomic status. The findings of this article suggest that financial socialisation in the home may be subject to a gender bias, which over time contributes to differential financial literacy knowledge levels between the genders.

Introduction

The need for citizens to be financially literate is growing in importance, as consumers are tasked with making ever more complex financial decisions in the marketplace (Braunstein and Welch, 2002; Lusardi and Mitchell, 2014). Where in the past workers have been able to rely on employer sponsored pension plans, for example, there is now an increased need for workers to be able to save and invest their own retirement funds. Tertiary students in many countries around the world are now faced with the prospect of government student loans, a relatively recent development since the early 1980's. In the private debt sector, students are faced with financial institutions offering products such as credit cards unsolicited through the post. There has also been an increase in credit opportunities offered by nontraditional organisations to the general population. Where previously credit may have been obtained through a financial institution such as a bank, opportunities now exist to secure payday loans, pawn shop loans and tax refund loans from alternative sources.

With increasing levels of financial sophistication required, it is important that certain groups in society are not disproportionately disadvantaged by displaying lower levels of financial literacy. Researchers have in the past identified females as a group who display lower levels of financial literacy (Hung et al., 2009; Lusardi and Mitchell, 2009; Lusardi and Tufano, 2009a, b; Lusardi et al., 2010). This article focuses on the characteristic of gender, to establish if stereotypes or beliefs held in the home impact on levels of financial literacy, and could possibly explain the financial literacy differential evident in the literature between males and females.

Literature review

Gender differences in financial literacy levels

Current literature on the topic of gender discrepancy with regard to financial literacy is relatively plentiful, with an increasingly apparent greater awareness of monetary matters and financial knowledge among males than females, regardless of test question sophistication levels (Hung et al., 2009; Lusardi and Mitchell, 2009; Lusardi and Tufano, 2009a, 2009b; Lusardi et al., 2010). Other researchers have also presented support for the idea that the average male financial literacy level is generally greater than the average female's (Volpe et al., 1996; Chen and Volpe, 1998; Goldsmith and Goldsmith, 1997a, 1997b; Chen and Volpe, 2002). They found men to have greater knowledge when it came to managing money, than women. Male participants were also found to be likely to be more knowledgeable about personal finance than female participants before and after controlling the effect of other variables.

While some studies have referred to differences between the financial knowledge levels of males and females being evident amongst both college and high school students (Chen and Volpe, 2002; Mandell & Xiao, 2008), results from the PISA (Programme for International Student Assessment) 2012 Results: Students and Money report (OECD, 2014) suggest that this differential may in fact be less prevalent in younger citizens than in adults. The report showed that studies conducted in one third of the countries which took part in the PISA reported that adult men perform better than adult women on surveys measuring financial knowledge. However when using 15-year-old high school students as the subjects for the PISA study, only one of the 18 participating countries (Italy) showed a statistically significant difference between the performance of girls and boys on a financial literacy test. The study did find that boys tend to outperform girls in financial literacy when accounting for students' competencies in other subjects (mathematics and reading), and that boys perform better than girls at the top of the distribution, leading the report to conclude that girls may require targeted help to develop the skills necessary to reach the highest levels of financial literacy proficiency.

In attempting to explain the financial literacy gender gap, researchers have suggested that females may accumulate financial literacy in a different manner to males (Fonseca et al., 2012). Differing levels of confidence have been discussed by others who have written on the topic, which may play a part, although this is disputed with some research noting that even otherwise highly intelligent, educated women are not especially financially literate (Bucher-Koenen et al., 2012; Mahdavi and Horton, 2012, unpublished). The PISA report (OECD, 2014) touches on an alternative reason, one the report calls 'different socio-economic characteristics of women and men', which may also account for why the gender difference is more pronounced in the adult population, stating:

"For example, as boys and girls grow up, they may be exposed to different opportunities to learn and improve their financial competencies, such as different access to labour and financial markets, and therefore they may develop different levels of financial knowledge and different financial strategies in adulthood over time" (OECD, 2014, p. 81).

This article proposes that as well as different access to financial and labour markets between women and men, there may also be stereotypical societal expectations and perceptions around the necessity for males to be more financially literate than females, with these influences potentially starting in the home at a relatively young age. Included in the literature is a body of research which suggests that women, in particular, must ready themselves more adequately for financial survival in their later years, which seems to be rooted in traditional stereotypes around female dependence on men for financial resources (Anthes

and Most, 2000). An equally if not more important reason that women need to be financially prepared, is due to their longer life expectancy and subsequent reliance on retirement savings.

Financial socialisation based on gender may even start at an early age through the financial attitudes of parents toward their children. The *Westpac Money and Kids Report*, a nationwide survey in New Zealand commissioned to understand the money habits of children that surveyed 540 Westpac customers, all with children aged between 4 and 18 years old found that for those who get pocket money, boys get \$3 more a week on average than girls and chores to earn it are based on gender. Both spend 2.4 hours a week doing chores with girls being more likely to clean their bedroom and do the dishes and laundry, while boys are more likely to take out the rubbish, mow the lawns and clean the car (Wade, 2013).

The role of parents in influencing a child's financial literacy level

The notion that parents are majorly influential in the financial education of their children is well supported, as they are, of course, in many aspects of their lives. Home is where children first learn about money and what is learned is filtered through their parents (Danes and Haberman, 2007; Lusardi et al., 2010). If parents are seen as unable to manage money well, their children are likely to follow suit (Clarke et al., 2005). Research has identified parents as having an important responsibility with regard to ensuring they provide accurate information in order that children may be less likely to develop poor habits (Danes, 1994), while other studies have drawn attention to how children mainly obtain financial education from their parents. Just 10% were found to predominantly receive information about monetary issues in the school classroom (Bowen, 2002; Mandell & Xiao, 2008; Williams, 2010).

The magnitude of the influence that mothers and fathers can have as their children experience financial socialisation as a younger adult has also drawn attention, with it believed to be much greater than work or educational environments. The need for parents to take care when imparting financial instruction and knowledge has also been stressed, with parents being encouraged to not take this responsibility lightly as how they behave lays the foundation for sound young adult financial attitudes and behaviour (Shim et al., 2010).

The gender divide can be seen to be quite entrenched, and common understandings have become internalised norms. Traditional gender expectations and regularly observed female tendencies could each play a role in the development of these ongoing beliefs. Girls could possibly be trained to be financially dependent and to seek safety and security rather than become risk-takers (Danes and Haberman, 2007). In a recent publication, Lusardi and Mitchell have noted that 'although untested so far' it is possible that young women 'expect they will have someone later in life (a husband or companion) to take care of their finances' (2014, p. 19). This situation may be exacerbated by parents modelling what occurred when they were children. Bowen's (2002) study found that 77% of women did not participate in financial discussions in the home, when they were growing up.

The importance to females of being financially literate

As mentioned earlier, there is an increased requirement to be financially literate in today's world. There are some unflattering reports of female competency with regard to financial illiteracy, which is considered to be widespread among women (Fonseca et al., 2012). This same study noted that many women struggled with a lack of understanding of even very basic financial knowledge, when it came to savings or investment. Worthington (2006) grouped women with non-workers, those with a low educational level and those who are new to speaking the English language as having an increased chance of being financially illiterate.

Concern has been revealed by other researchers regarding the gender gap in relation to a growing range of monetary decisions to be made in today's society. These things can be confusing and even more so for those without the wherewithal to make informed, intelligent choices about how to best manage their income or retirement funds (Lusardi and Mitchell, 2007). Also, related issues have been commented on by others, stressing the need for females to ensure security in their old age by becoming better money managers, suggesting this is important for the greater good, as future public policy may have to accommodate the lack of skills if they are not addressed (Lown, 2010).

Further literature on the topic has contributed to this line of thought by also asserting the need for women to become more independent when it comes to financial management. They show concern that women may have trouble overcoming what are seen as traditional roles, as many are used to being taken care of financially by men (Anthes and Most, 2000; Lusardi and Mitchell, 2007; Von Rooij et al., 2007). The notion that in many cultures men are more likely than woman to interact daily with financially knowledgeable individuals was also noted by Lusardi and Mitchell (2014).

It is the observed gender difference in financial literacy levels, coupled with an increasing need for woman in particular to be financially sophisticated in an ever more complicated financial world, along with the recognised influence of parental attitudes and behaviours on the financial literacy levels of their children that provide the justification for this article. Specifically, are young females exposed to differing levels of financial discussions in the home relative to males?

Findings from this article will attempt to fill a gap in the literature that has been noted as recently as 2014 with statements such as '...this debate is far from closed, and additional research will be required to better understand these observed gender differences in financial literacy (Lusardi and Mitchell, 2014, p. 20).

Method and results

Research design

The research question this article attempts to answer is 'How does age of the first financial discussion in the home influence a child's financial literacy?' The following secondary research question is also examined:

How does the gender of a child and variables such as gender of the parent or parental education level correlate with financial discussions in the home?

For the purposes of this research, the notion of financial literacy was based on the definition of financial literacy that is used in the OECD document *Measuring Financial Literacy: Questionnaire and Guidance Notes for Conducting an Internationally Comparable Survey of Financial Literacy* (OECD, 2011). This document defines financial literacy as 'A combination of awareness, knowledge, skill, attitude and behaviour necessary to make sound financial decisions and ultimately achieve individual financial well-being'. This research focuses on a subset of what the OECD document describes as 'elements of financial literacy identified in the definition' (OECD, 2011), with the elements focused on being awareness, knowledge and skill. This is in line with the PISA 2012 Assessment and Analytical Framework (OECD, 2013) which defines financial literacy as 'knowledge and understanding of financial concepts and risks, and the skills, motivation and confidence to apply such knowledge and understanding in order to make effective decisions across a range of financial contexts to improve the financial well-being of individuals and society' (OECD, 2013, p. 5). The PISA framework describes the knowledge and understanding of financial concepts and risks as including key financial concepts, the purpose and basic

product features of financial products, and risks that may threaten financial well-being as well as insurance policies and pensions.

The questions included in the financial literacy quiz (shown in Appendix) are drawn from the general literature, such as Lusardi and Mitchell (2006), and directly from the University of Arizona (Shim & Serido, 2011). The University of Arizona questions were more pertinent than many of the tests found in the literature, as they were designed to evaluate secondary school financial literacy programs, so were pitched at an appropriate level for secondary school and first year tertiary students. Some of the questions were modified to reflect a New Zealand setting. An original pilot test of 17 questions was reduced to 10 in response to feedback from secondary school principals and teachers. Using the PISA framework categories mentioned above, the 10 questions could broadly be categorised into key financial concepts (questions 2, 3, 4, 7 and 9) and purpose and basic product features of financial products including insurance policies (questions 1, 5, 6, 8 and 10). See Appendix for the full questions.

The questionnaires were invigilated by classroom teachers using consistent instructions, methods and conditions as stipulated in instructions accompanying the questionnaire.

School sample

Year 10 (14 or 15 year old) students in 19 secondary schools took part in this study. With no decile 1 schools in Christ-church, the sample consisted of students from decile 2 to decile 10 schools. With higher decile schools being more common, all decile 2 to 6 schools in the city were included, with schools chosen at random from those in the decile 7 to decile 10 range. Within each school, the entire Year Ten cohort took part in the study. On the few occasions this was not logistically possible within a school, classes of year 10 students were chosen at random to participate in the study, with any streaming practices within the school accounted for. Of the 20 schools approached to take part in the study, 19 agreed. With the questionnaire completed in class under test conditions by students, the response rate was effectively 100%. This resulted in a sample size of 1 271 students. Decile 2 to 4 schools were categorised as ‘low’ decile, while decile 5 to 7 schools were considered ‘mid’ decile. The remaining schools were categorised as ‘high’ decile. The demographic make-up of the sample is shown in Table 1.

As can be seen from the table, the mean quiz score was low, with a mean of less than 40%. The mean age of the first financial discussion in the home varies by school decile—the higher the decile the earlier the financial discussion. School decile is calculated by the Ministry of Education, and indicates the extent to which the school draws its students from low socio-economic communities. Decile 1 schools are the 10% of schools with the highest proportion of students from low socioeconomic communities, whereas decile 10 schools are the 10% of schools with the lowest proportion of these students.

Table 1 Demographic variables by gender–school sample

| | <i>Female (n=614)</i> | <i>Male (n=657)</i> | <i>Total (n=1271)</i> |
|---|---------------------------|-------------------------|---------------------------|
| <i>Gender</i> | 48% | 52% | 100% |
| <i>Caucasian Ethnicity</i> | 74% | 71% | 73% |
| <i>Father Attended University</i> | 41% | 52% | 47% |
| <i>Mother Attended University</i> | 47% | 57% | 52% |
| <i>Quiz Score Mean (10)</i> | 3.64 | 3.93 | 3.79 |
| <i>Quiz Score Maximum</i> | 9 | 10 | 10 |
| <i>Quiz Score Minimum</i> | 0 | 0 | 0 |
| <i>Mean Age of First Discussion</i> | 10.99 | 10.29 | 10.63 |
| <i>Mean Age of First Discussion - Low Decile (Years)</i> | 12.04 | 11.11 | 11.56 |
| <i>Mean Age of First Discussion - Medium Decile (Years)</i> | 10.74 | 10.24 | 10.49 |
| <i>Mean Age of First Discussion - High Decile (Years)</i> | 10.96 | 9.97 | 10.42 |

Various demographic variables were run in an ordinary least squares multiple regression with a dependant variable of financial literacy quiz score (with ethnicity and parental education as binary variables). As the coefficients and t-statistics in Table 2 show, variables correlated with a higher financial literacy quiz score were a student whose father attended university, a student from a higher decile school, a student of Caucasian descent, and a student who had their first financial discussion at an earlier age. These same variables were significant for both females and males when the sample was split according to gender.

Table 2 OLS coefficients and t-statistics for variables correlated with a higher financial literacy quiz score–school sample

| n=1271 | Females | Males | Both Genders |
|---|-----------------------|-----------------------|-----------------------|
| Age of first financial discussion | -0.109*** (-3.361) | -0.106*** (-3.143) | -0.109*** (-4.713) |
| Decile | 0.187*** (4.456) | 0.208*** (4.679) | 0.199*** (6.503) |
| Caucasian ethnicity | 0.674*** (3.437) | 0.437** (2.079) | 0.542*** (3.767) |
| Father attended university | 0.514*** (3.147) | 0.518*** (2.678) | 0.521*** (4.147) |
| Completed a financial literacy course at school | 0.081 (0.372) | -0.076 (-0.347) | -0.012 (-0.080) |
| Has a part time job | -0.035 (-0.179) | -0.057 (-0.276) | -0.050 (-0.352) |
| Mother attended university | -0.096 (-0.535) | 0.113 (0.630) | 0.026 (0.202) |
| Parents own shares | -0.010 (-0.047) | 0.195 (0.937) | 0.103 (0.711) |
| Impulse spent in the last three months | 0.025 (0.118) | 0.039 (0.181) | 0.037 (0.242) |
| Gender | | | 0.118 (0.372) |

*, ** and *** denote statistical significance at the 10, 5 and 1% levels respectively.

The rationale for running the OLS separately for females and males in the secondary school sample is to establish if the same pattern found in the previously mentioned PISA (OECD, 2014) results of a gender differential in financial knowledge being less prevalent in younger people exists in this study.

When the sample was split according to school decile, a statistically significant difference between the age of first financial discussion in the home between males and females was observed, across low, medium and high decile school students. The coefficients and t-statistics from OLS regressions revealed that in all three decile groupings, males were found to have their first financial discussion at an earlier age than females. Although still statistically significant at the 95% confidence level (with a t-statistic of 22.448), and a coefficient of 6 months (0.494 of a year) the gap between females and males was smallest for medium decile school students. For students from low decile schools, the gap was almost a year (0.932) significant at the 95% confidence level (with a t-statistic of 22.311). A similar result was found for students from high decile schools (0.994 of a year, significant at the 99% confidence level with a t-statistic of 23.539). For the entire sample, the gender gap was 8.5 months (20.707 of a year) significant at the 99% confidence level (with a t-statistic of 24.619).

As Table 3 shows, the demographic variables for each school decile grouping show the expected disparities in ethnicity, parental education and mean quiz score from low to high decile schools. There is also a similar effect for the age of first financial discussion in the home variable, with students from higher decile schools having their financial discussions at an earlier age than lower decile schools.

Tertiary sample

To establish if the same relationships existed in a tertiary sample the same model containing the ethnicity, age of first financial discussion in the home, school decile, gender and father's education variables developed on the school sample was applied to a sample of 317 first year microeconomics students from the University of Canterbury, New Zealand. Table 4 shows the demographic characteristics of the tertiary sample, broken down by gender. (Note: 15 students came from schools without decile ratings, predominantly from overseas).

Table 3 Demographic variables by school decile—school sample

| | <i>Low Decile (n=189)</i> | <i>Medium Decile (n=703)</i> | <i>High Decile (n=379)</i> |
|---|-----------------------------------|--------------------------------------|------------------------------------|
| n=1271 | | | |
| <i>Female</i> | 48% | 50% | 45% |
| <i>Caucasian Ethnicity</i> | 54% | 70% | 86% |
| <i>Father Attended University</i> | 23% | 42% | 65% |
| <i>Mother Attended University</i> | 35% | 47% | 68% |
| <i>Quiz Score Mean (10)</i> | 2.72 | 3.65 | 4.59 |
| <i>Quiz Score Maximum</i> | 8 | 10 | 10 |
| <i>Quiz Score Minimum</i> | 0 | 0 | 0 |
| <i>Mean Age of First Discussion (Years)</i> | 11.56 | 10.49 | 10.42 |

Table 4 Demographic variables by gender– tertiary sample

| n=317 | <i>Female</i> | <i>Male</i> | <i>Total</i> |
|-----------------------------------|---------------|-------------|--------------|
| <i>Gender</i> | 138 | 179 | 317 |
| <i>Average Decile</i> | 7.21 | 7.64 | 7.46 |
| <i>Low Decile</i> | 13 | 9 | 22 |
| <i>Medium Decile</i> | 77 | 102 | 179 |
| <i>High Decile</i> | 38 | 63 | 101 |
| <i>Caucasian Ethnicity</i> | 84 | 127 | 211 |
| <i>Father Attended University</i> | 61 | 73 | 134 |
| <i>Mother Attended University</i> | 59 | 88 | 147 |
| <i>Quiz Score Mean</i> | 6.79 | 7.51 | 7.20 |
| <i>Quiz Score Maximum</i> | 10 | 10 | 10 |
| <i>Quiz Score Minimum</i> | 2 | 2 | 2 |
| <i>Age of First Discussion</i> | 11.60 | 10.73 | 11.11 |

When the same ordinary least squares model developed on the school sample was run on the tertiary sample, males, Caucasian students and students who had their first financial discussion in the home at an earlier age were likely to score higher on the financial literacy quiz. When the sample was split by gender, the Caucasian and age of first financial discussion in the home variables were significant for male students, with only the Caucasian variable being significant for female students, as shown in Table 5.

The same gender difference in age of first discussion in the home exists in the tertiary sample as in the school sample, with female students in the tertiary sample reporting having their first discussion in the home on average 10 and a half months (0.875 years) older than male students. This difference is statistically significant at the 95% confidence level. The gender variable was included in the model even though it was not significant in the school sample, due to the evidence from the aforementioned PISA report which suggested a gender differential in financial literacy test scores was more prevalent in adults than in 15 year olds.

In an attempt to establish some possible reasons for the gender difference in the age of first discussion in the home, the tertiary student sample were asked some additional questions.

Table 5 OLS coefficients and t-statistics for variables correlated with a higher financial literacy quiz score in the school sample applied to the tertiary sample, with the addition of gender

| n=317 | Male | Female | Both Genders |
|-----------------------------------|---------------------|---------------------|---------------------|
| Caucasian Ethnicity | 0.822*** (2.716) | 1.026*** (3.086) | 0.912*** (4.086) |
| Age of first financial discussion | -0.062* (-1.757) | -0.032 (-0.718) | -0.49* (-1.775) |
| Father Attended University | 0.383 (1.427) | -0.499 (-1.492) | 0.015 (0.071) |
| School | -0.075 (-1.001) | 0.122 (1.476) | 0.012 (0.211) |
| Male | ----- | ----- | 0.650*** (3.184) |

*, ** and *** denote statistical significance at the 10, 5 and 1% levels respectively.

Table 6 Chi square results comparing male and female samples

| n=317 | Odds Ratios | Chi-square Statistic | Level of Significance |
|--------------------|-------------|----------------------|-----------------------|
| Caucasian | 1.44 | 2.156 | P = 0.14 |
| Decile | 0.68 | 1.423 | P = 0.23 |
| Father's Education | 0.92 | 0.117 | P = 0.73 |
| Mother's Education | 1.24 | 0.836 | P = 0.36 |

As a precursor to analysis using these responses, chi-square analysis was used to test for independence between gender and each variable. The results showed there was no significant difference between the male and the female sample on ethnicity, school decile, whether or not the mother attended university, and whether or not the father attended university, as shown in Table 6. The female and male samples were compared to establish if the proportion of Caucasians, fathers who had attended university, or mothers who had attended university, varied significantly between the samples. For the decile variable, the number of students from decile 1 to 5 schools was compared to the number of students from decile 6 to 10 schools for each sample. As can be seen from the odds ratios, the male sample had slightly more Caucasians and students with mothers who had attended university compared to the female sample, but a slightly lower density of students from low decile schools, and students with fathers who had attended university. As mentioned early, none of the differences between the samples were statistically significant.

When the responses to the additional questions were analysed using odds ratios and chi-square analysis, students were more likely to answer father than mother to the following three questions:

- 1 In most homes which parent do you think knows the most about money? (An odds ratio of 1.61 significant at the 95% confidence level, with a chi square statistic of 4.186).
- 2 Growing up, which parent talked to you the most about money? (An odds ratio of 1.56 significant at the 90% confidence level, with a chi square statistic of 3.806).
- 3 Growing up, which parent most influenced how you spent your money? (An odds ratio of 2.16 significant at the 99% confidence level, with a chi square statistic of 10.81).

In an attempt to better understand the nuances between gender and the student responses to these three questions, logistic regressions were run for each of the three questions, with a binary mother/father as the dependant variable, and three independent variables of gender, whether the father attended university and whether the mother attended university. This analysis was then replicated using ordinary least squares regressions which yielded the same results as for the logistic regressions. For ease of reporting, the ordinary least squares regression coefficients and t-statistics are shown below in Table 7.

The results confirm that males are more likely to answer father than females are, the same result found in table nine. Interestingly, if a student's father attended university, the student is more likely to answer father to the questions 'In most homes which parent do you think knows the most about money?' and 'Growing up, which parent most influenced how you spent your money?' than a student whose father did not

Table 7 OLS coefficients and t-statistics showing the influence of gender and parental education on whether father rather than mother was given as an answer

| | In most homes which parent do you think knows the most about money? (Father=1) | Growing up, which parent talked to you the most about money? (Father=1) | Growing up, which parent most influenced how you spent your money? (Father=1) |
|----------------------------|--|---|---|
| Male | 0.116** (2.169) | 0.111* (1.962) | 0.189*** (3.415) |
| Father attended university | 0.215*** (3.564) | 0.087 (1.367) | 0.108* (1.740) |
| Mother attended university | 0.048 (0.804) | 0.037 (0.591) | -0.029 (-0.471) |

*, ** and *** denote statistical significance at the 10, 5 and 1% levels respectively.

attend university. However, there was no such correlation between a student's answer to any of the three questions and whether or not their mother attended university. A son is more likely to answer father than a daughter simply because they are a son, while a child is more likely to answer father if the father has a higher level of education.

Discussion

Results from the secondary school sample showed that males on average have their first financial discussion in the home at an earlier age than females. This was consistent across students from low, medium and high decile schools. Whilst still statistically significant, students from medium decile schools had the smallest difference between males and females of 6 months, almost half the difference between males and females in the age of first financial discussion in the home at low and high decile schools. Reasons for this disparity could include that the parents of students in middle decile schools, as a group, exhibit a less 'extreme' view of the disparity between male and female roles. Parents of students attending high decile schools are, for example, likely to contain a greater proportion of people working in commerce, where factors such as the 'glass ceiling', and 'old boys' networks' exist, reinforcing the idea that it is more important males are financially educated than females. There is a possibility that low socioeconomic families see the male being more likely to be the predominant breadwinner than medium decile families, where occupations such as teaching are likely to be more prevalent.

Across the entire sample, the variables which correlated with a higher financial literacy quiz score were students whose fathers attended university, students from a higher decile school, a student of Caucasian descent, and a student who had their first financial discussion at an earlier age. These same variables were significant for both females and males when the sample was split according to gender. Interestingly, the level of a mother's education did not have a significant influence on a student's financial literacy test score, which suggests that their father may be the provider of financial knowledge in the home. Other reasons may relate to the female parent possibly showing less interest in financial matters, or a male parent being more concerned with the financial situation of the household. Past studies have suggested that there appears to be some reflection of traditional gender-related norms when it comes to monetary issues in the home. Whether the, generally-speaking, innate nature of the genders or patriarchal constructs are responsible, is uncertain.

With the inclusion of decile (a variable explained in the Method and Results section) of the school attended by the student, along with other socioeconomic status variables in initial regressions that were not significant, such as parental ownership of shares, home ownership and so on, indications are that the

level of father's education is not merely picking up socioeconomic status. Rather, it appears to be an indicator of, possibly, the level of financial knowledge a student's father possesses which is able to be passed on to their children. The fact that the level of a father's education has a significant influence on a child's financial literacy quiz score (after accounting for socioeconomic status) suggests that financial discussions in the home may be the domain of the father.

The results in this article mirrored those found in the PISA study that gender did not significantly impact on the financial literacy test scores of 15-year-olds (OECD, 2014). Where the PISA report suggests this may be due to different access to labour and financial markets, this article suggests financial socialisation in the home may in fact have a major influence. With financial discussions in the home commencing on average at around 10 or 11 years of age (depending on demographic variables), it may be that while 15-year olds have been exposed to a period of socialisation in the home based on gender expectations, the exposure has been over an insufficient period of time to flow through to significant differences in financial literacy quiz scores. People in older cohorts who do exhibit a gender based difference in financial literacy test scores however, may have had a longer exposure to financial attitudes being verbalised in the home compared to the school samples 4 or 5 years exposure.

In an attempt to shed some light on the above discussion, the model developed in the school sample was applied to a cohort of tertiary students, a cohort who have had 7 or 8 years exposure to financial socialisation in the home, with some additional pertinent questions added.

Males, Caucasian students and students who had their first financial discussion in the home at an earlier age were likely to score higher on the financial literacy quiz. However, when the sample was split by gender, the Caucasian and age of first financial discussion in the home variables were significant for male students, with only the Caucasian variable being significant for female students. Gender was introduced into the tertiary sample model even though it did not have a significant impact on financial literacy test scores in the school sample, to establish if the trend of gender being significant in older samples was evident at the tertiary level. As it transpired, it was. Given the tertiary students would have had limited access to labour and financial markets to that point, this finding lends more weight to the financial culture in the home being a factor in the gender differential in financial literacy tests at the tertiary level than the alternatives suggested in the PISA report (OECD, 2014). With the average age of the first financial discussion falling between 10 and 12 years, depending on gender and socioeconomic status, it is intuitively reasonable to expect the effect of this differential on financial literacy test scores to be more prevalent at 18 or 19 years of age than 15 years of age.

When compared to the school sample, school decile and the level of fathers' education have dropped out as significant variables, as has the age of first discussion for females in the sample. One possible reason for these differences is that the tertiary sample has an average school decile score of 7.5, in the middle of the medium decile school range, with just over half of the students in the tertiary sample having attended a medium decile school. This appears to have nullified the effect of school decile by having a relatively homogenous sample by decile.

The medium decile grouping was also the group where the difference between males and females in terms of the age of the first financial discussion in the home was smallest. The same gender difference in age of first financial discussion in the home does exist in the tertiary sample as in the school sample, with female students in the tertiary sample reporting having their first discussion in the home on average 10 and a half months older than male students. The level of a father's education may not be significant for the tertiary sample, as students at university are more likely to have had parents who also attended university, once again, making the sample more homogenous.

What is interesting to note is that even for the more homogenous tertiary sample, the age of first discussion in the home for males endures through to adulthood. The fact that it does not for females suggests that not only are males having financial discussions in the home at an earlier age, but that the

effect of financial discussions in the home are more enduring for males than for females. The quality of the discussion with boys in the home could be somehow different than for females, perhaps because as Lusardi and Mitchell (2014) suggest, it may be felt that females will be financially supported later in life by a partner, so it is more important for males than females to be financially literate.

When testing the gender stereotypes that exist in the home around financial literacy, it was found that students in the tertiary sample were more likely to answer father than mother to the three questions, ‘in most homes which parent do you think knows the most about money?’, ‘growing up, which parent talked to you the most about money?’ and ‘growing up, which parent most influenced how you spent your money?’. The largest difference was in the last question, where students were more than twice as likely to answer that their father most influenced how they spent their money growing up rather than their mother. These findings emphasise traditional stereotypes around a child’s father being more knowledgeable than the mother, and playing a larger role in financial discussions than the mother, and having a larger influence on children’s behaviours than the mother.

Interestingly, if a student’s father attended university, the student is more likely to answer father to the questions ‘In most homes which parent do you think knows the most about money?’ and ‘Growing up, which parent most influenced how you spent your money?’ than a student whose father did not attend university. However, there was no such significant correlation between a student’s answer to any of the three questions and whether or not their mother attended university. This may suggest a more educated mother may not play a more significant role in the financial culture of a household than a less educated mother, where the more educated the father, the more likely they played a more dominant role. If true, this reinforces the stereotypes mentioned above. The mother’s education may not matter, if it is predominantly the father leading the financial culture of the household.

Given it is the father that is more likely to talk to a child about money, influence how they spend their money, and be perceived as knowing more about money than the mother, this raises the question, are fathers equally as likely to talk to sons about financial topics as they are to their daughters? Why is it that the father is the dominant figure? Does the mother ‘leave it’ to the father, due to traditional stereotypes? Are these stereotypes then further perpetuated by the father talking more (and possibly more in-depth) to sons than daughters, because one day he will need to be the financial ‘head of the household’? This would seem a reasonable explanation for why sons receive their financial discussion earlier than daughters, and could also explain why the effect of the age of first discussion endures for sons more than daughters in the tertiary cohort—because daughters are receiving a more superficial discussion, it has less impact later in life whether you had the discussion or not at an early age.

Conclusions

In response to the research questions ‘How does age of the first financial discussion in the home influence a child’s financial literacy?’ and ‘How does the gender of a child and variables such as gender of the parent or parental education level correlate with financial discussions in the home?’ a correlation exists between the age of first financial discussion in the home and scores on a financial literacy quiz for both genders in the school sample. The findings in this article suggest it is predominantly the male parent that engages with their child in financial discussions in the home. These results may say something about the quality of financial discussion males have relative to female. If the discussions are more superficial for females, it is likely they are less enduring, and of less benefit into adulthood than the less superficial discussions males have in the home.

This article makes an important addition to the somewhat limited debate on the gender differential between males and females on financial literacy quizzes. While literature has readily identified the gender difference, there has been a lack of findings examining the cause. The authors of this article suggest the home environment may play a substantial part, with the age of first financial discussion in the home an important indicator of the general attitudes of parents to the necessity of their sons or daughters

being financially literate. The fact that the influence of the age of first financial discussion on quiz results endures to the tertiary level for males shows the importance of these family discussions. The overall attitudes of the tertiary respondents reinforcing the notion that the male parental figure is seen as having a greater knowledge and influence than the female parental figure, regardless of the level of educational attainment of the female parental figure highlights these ingrained traditional attitudes. A further study investigating the prevalence of these attitudes across families with less traditional structures could be illuminating.

A limitation of this study is a lack of a student sample across educational institutions in several countries. Further research investigating the impact of different cultural norms in terms of gender roles on the financial socialisation of boys and girls in the home in different countries would add to the discussion.

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Appendix

1 Which of the following is true about New Zealand's goods and services tax (GST)?

- a. The GST percentage rate is 12.5%.
- b. The government will take it from your pay.
- c. You do not have to pay the tax if your income is very low.
- d. It makes things more expensive for you to buy.

2 If you went to university and earned a degree, how much more money could you expect to earn than if you only had a high school qualification?

- a. About 10 times as much.
- b. No more, I would make about the same either way.
- c. A little more, about 20% more.
- d. A lot more, about 70% more.

3 David just found a job with a take-home pay of \$2 000 per month. He has the following monthly expenses: \$900 for rent \$150 for groceries \$250 for transport \$100 for clothes \$200 for eating out \$250 for other expenses How long will it take him save \$600?

- a. 3 months.
- b. 4 months.
- c. 1 months.
- d. 2 months.

4 Rob and Mary are the same age. At age 25 Mary began saving \$2 000 a year while Rob saved nothing. At age 50, Rob started saving \$4 000 per year while Mary kept saving her \$2,000. Now they are both 75 years old. Who has the most money in their account?

- a. They would each have the same amount because they put away exactly the same.
- b. Rob, because he saved more each year.
- c. Mary, because she has put away more money.
- d. Mary, because her money has grown for a longer time at compound interest.

5 If a borrower chooses to pay back a car loan over a longer period of time, the monthly payment is generally

- a. lower and the total interest paid is lower.
- b. lower and the total interest paid is higher.
- c. higher and the total interest paid is lower.
- d. higher and the total interest paid is higher.

6 Suzy backs her car into a metal fence, causing \$500 of damage to her car. Suzy has an auto insurance policy with a \$200 excess. To get her car fixed, how much will her auto insurance company pay?

- a. \$0.
- b. \$200.
- c. \$300.
- d. \$500.

7 Charlie opens a savings account and deposits \$500 at an interest rate of 5%. What amount will Charlie have in his savings account at the end of two years?

- a. Exactly \$50.
- b. Exactly \$550.
- c. Less than \$550.
- d. More than \$550.

8 Which of the following credit card users will pay the most in interest?

- a. Jessica, who pays at least the minimum amount each month and more, when she has the money.
- b. Vera, who generally pays off her credit card in full but, occasionally, will pay the minimum when she is short of cash.
- c. Megan, who always pays off her credit card bill in full shortly after she receives it.
- d. Erin, who only pays the minimum amount each month.

9 What is the general relationship between financial risk and financial return?

- a. There is no relationship between risk and return.
- b. The lower the risk, the higher the return.
- c. The higher the risk, the lower the return.
- d. The higher the risk, the higher return.

10 Daylon's aunt agrees to co-sign a car loan for him. By doing so, she has agreed to

- a. pay the loan as a gift to Daylon.
- b. pay the loan if Daylon cannot pay.
- c. share the payments equally with Daylon.
- d. make the payments until Daylon can make them himself.

Chapter Eight

Chapter eight initially conducts a similar analysis to chapter seven, comparing low school decile students with high decile school students when identifying factors that influence financial literacy quiz scores. Further analysis is then carried out to establish the factors that influence the age of the first financial discussion in the home. Interaction variables are used in both analyses described above. Differences in attitudes towards financial matters between the genders are then examined. Finally, differences in impulse spending patterns between the genders are examined. This chapter builds on findings in the previous chapter, by examining the influences on the age of the first financial discussion with a parent in the home, along with the link between financial knowledge with financial attitudes and behaviours.

A sample of 568 students from low decile (189 students) and high decile (379 students) was analysed using ordinary least squares regressions, odds ratios and chi-square analysis.

The results were consistent with chapter seven, which included mid-decile school students in the analysis. Having a father who attended university, and being a student from a high decile school are correlated with a higher financial literacy quiz score, for both male and female students. Being of Caucasian ethnicity is correlated with a higher financial literacy quiz score for females, while having an earlier age of first discussion is correlated with a higher financial literacy quiz score for males. This reinforced the conclusions in chapter seven, that in the home, the father is leading the financial discussions, which is why the father's level of education is important, but that the father may be having better quality or more regular discussions with sons than daughters. This could also explain why age of the first financial discussion in the home with a parent is correlated with a higher financial literacy quiz score for boys only. A lower age of first parental financial discussion is correlated with being of Caucasian ethnicity; having completed a financial literacy course at school; and having a higher financial literacy quiz score for male school students. For female school students, a lower age of first parental financial discussion is correlated only with being of Caucasian ethnicity and having a father who attended university. The results of this study found that boys were more likely to save than girls, be less mystified by banks, believe that achieving a good job was something they had control over and that investing in stocks was not only for the wealthy. Girls, on the other hand, found their spending habits too often led them to make purchases they didn't need, often on impulse, despite the desire to start saving. In terms of actual behavior, girls are more likely to impulse spend than boys, along with students with a mother who did attend university. While it is the fathers who appear to be leading the financial discussions in the home, it may well be the mother who is present when spending patterns are developed. This may well be further evidence for the financial socialization occurring in the home, of fathers leading direct tuition, but mothers modelling actual spending.

Agnew, S. and Cameron-Agnew, T. (2015), The Influence of Gender and Household Culture on Financial Literacy Knowledge; Attitudes and Behaviour, *Journal of Financial Management, Markets and Institutions*, Forthcoming.

Introduction

The level of financial literacy amongst the public has become more and more important as the range of financial products available to consumers has grown, with recent work conducted by Lusardi and Mitchell (2014) finding that workers increasingly have the responsibility for saving, investing and managing wealth thrust upon them. With an ever increasing need for financial literacy competence, it is important that sections of society are not marginalised nor penalised due to a lack of financial sophistication. One group that does report lower levels of financial literacy is females.

This paper uses a sample of over 500 fifteen year old high school students to establish the effect of differences in demographic characteristics on financial literacy levels with respect to financial sophistication, attitudes and behaviours of females relative to males. The conceptual framework underlying this paper is that gender stereotypes in the home, along with general parental influence cause different financial attitudes and behaviours to develop in young girls than in boys. These differences in financial socialisation in the home may be a contributing factor to females having lower financial literacy levels in adulthood. Based on previous literature, the main variable used as a proxy for financial socialisation in the home is the age of the first financial discussion with a parent in the home. The education levels of parents are also analysed in the context of influencing the quality and quantity of financial discussions, rather than as a socioeconomic indicator.

Findings of this paper which support the conceptual framework are that a younger age of first financial discussion with a parent is correlated with a higher score in a financial literacy quiz for males but not females. Having a father who attended university is also correlated with an earlier age of first financial discussion while a mother's education level is correlated with a lesser propensity to impulse spend. Male students have an earlier age of first parental financial discussion, are less likely to impulse spend and have more positive attitudes toward spending and investment, relative to females.

Literature Review

A growing body of literature has identified that adult males on average are more financially literate than adult females (Chen and Volpe, 2002; Volpe, Chen and Pavklicko, 1996; Goldsmith and Goldsmith, 1997; Fonseca, 2012; Worthington, 2006; Braunstein and Welch, 2002), while other studies have attempted to connect conventional gender role beliefs and financial literacy, stating that "gendered financial role patterns that are experienced over time become internalized norms" (Danes and Haberman 2007, p. 48). Danes and Haberman (2007) also mention that what children expect and how they behave can be influenced by this behaviour. Perhaps alarmingly, they also state that "...girls are trained to be financially dependent and to seek safety and security rather than become risk-takers..." and that there may be a belief by some that "...if a woman is financially competent, she will end up alone." (Danes and Haberman 2007, p. 49). Lusardi and Mitchell hypothesised that woman (especially young women) may expect that they will have someone later in life (a husband for example) to take care of their finances! They also acknowledge that the

gender debate was “far from closed” and that more research was required to better understand observed gender differences in financial literacy (Lusardi and Mitchell 2014, p. 20).

The recognition in the literature that the financial socialisation of children may influence attitudes and behaviours later in life, was also discussed by John (1999) who described ages 7-11 as a period that contains ‘some of the most important developments in terms of consumer knowledge and skills’, when they develop a more adaptive approach ‘based on their new-found ability to think from the perspective of a parent or friend’ (p. 187). John (1999) also describes the 11-16 age-group as a time when consumers are shaping their own identity while conforming to group expectations. The home is an important part of this process, as some research indicates that within the family unit is where children generally learn about money matters and that the home is a filtering point from the outside world, suggesting that if parents are poor money managers this is likely to affect children as they model their parents’ behaviour (Lusardi, Mitchell and Curto 2010; Clarke, Heaton, Israelsen and Eggert 2005).

While these findings discuss the importance of the home environment on developing financial attitudes and knowledge, there are also findings that suggest mothers and fathers play different roles in the home when fostering financial skills. Danes (1994, 23) comments on the fact that while parents play a necessary role in the transfer of financial knowledge and skills “...parents seem to pass only their own feelings about money on to their children”. In terms of the influence of gender on parental behaviours, Danes and Haberman (2007) found that although mothers did demonstrate financial behaviour, fathers modelled financial tasks more frequently than mothers. This is supported by other findings such as men being more likely to be chosen in surveys as the financial representative of the house, the majority of women not being involved in family talks about money during formative years, and that gender differences are not due to differential interest in finance and financial matters between men and women. (Fonseca, Mullen, Zamarro and Zissimopoulos, 2012; Bowen, 2002; Brown and Graf, 2013).

These traditional views may reflect a status belief in accordance with *Status Characteristics Theory* (Berger, Fisek, Norman and Zelditch 1977; Wagner and Berger 1997; Ridgeway 2001; Ridgeway et al., 2009). According to this theory, gender inequalities are also due to status beliefs: “widely held cultural beliefs that link greater social significance and general competence, as well as specific positive and negative skills, with one category of a social distinction (e.g., men) compared to another (e.g., women)” (Ridgeway 2001, 638). With this line of reasoning, girls could feel less self-confident in managing money than boys since their (and their parents) evaluation is affected by a status belief. This could be expected given the traditional vision of gender and family roles characterising societies, where men have greater control over money within couples. Bussey and Bandura (1999) specifically examine the application of social cognitive theory of gender development and differentiation, stating ‘Children develop the stereotypic conceptions of gender from what they see and hear around them. Once they achieve gender constancy – the belief that their own gender is fixed and irreversible – they positively value their gender identity and seek to behave only in ways that are congruent with that conception’ (p. 677). They go on to describe direct tuition in an educational setting or in the home as potentially having a major influence on gender development. An example of this includes the work of Berti and Bombi, 1988 and Karsten, 1996

who suggest that children acquire a vast amount of experience as an observer or participant in the shopping process at very early ages.

While the above literature prompted this paper studying the impact of financial socialisation in the home with respect to gender, the decision to use parent-child financial discussions in the home as a measure of financial socialisation was informed by a body of literature in this field which looks specifically at conversations between parents and children, where it has been found that parental conversations are differentiated by gender (Dunn, Bretherton, & Munn, 1987). Mothers tend to talk more to daughters than sons, with both mothers and fathers talking differently to their sons compared to their daughters. Autonomy and independence tends to be stressed more for sons, using more directive speech and making more informative statements. (Pomerantz & Ruble, 1998; Leavell et al, 2012; Leaper, C., Anderson, K. J., & Sanders, P, 1998). Examining research specifically related to financial discussions, Newman, M. L., Groom, C. J., Handelman, L. D., & Pennebaker, J. W. (2008) found that men were more likely to discuss money than were women. Others have found the home environment to be more influential in gaining financial information than school (Williams, 2010; Mandell 2008; Shim et al, 2010). Shim and Serido (2011) quantified the influence of parents on a child's financial literacy, stating that parents' influence is 1.5 times greater than that of financial education and more than twice that of friends, going on to suggest that "Parental communications—discussions between parents and their children about financial matters—may be especially important in furthering financial capability among young adults" (2011, 21). This literature also informed the decision to include parental education levels alongside a socioeconomic variable in the belief that the quality of parental communications with children would be influenced by parental education levels.

One proposition in the recently published Programme for International Students Assessment (PISA) results for their 2012 *Students and Money: Financial Literacy* (OECD 2014) study was that "as boys and girls grow up, they may be exposed to different opportunities to learn and improve their financial competencies....and therefore they may develop different levels of financial knowledge and different financial strategies in adulthood over time" (2014, 81). Based on the research outlined above, this paper suggests a good deal of the different opportunities for the genders to learn and improve financial competencies occurs in the home, with financial discussions with parents playing a significant part. Of the 18 OECD countries which took part in the PISA study, six of them have reported that males outperforming females on surveys measuring financial knowledge, when adults were used as the subjects (OECD 2014). Interestingly, when 15 year olds were the subjects, only one of the 18 OECD countries (Italy) showed a statistically significant difference in financial literacy test scores between the genders. This finding led Agnew and Cameron-Agnew (2015) to suggest this could be due to 15 year olds having had less exposure to stereotypical norms in the home with regards to traditional financial literacy roles and expectations relative to adults. This paper aims to build on this work by examining gender differences in parental discussions in the home, and how variables such as parental education interact with gender, financial discussions, attitudes and behaviours along with the influences on financial literacy quiz scores.

Methodology

The model developed by Agnew and Cameron-Agnew (2015) mentioned in the literature above was tested using a pilot sample of tertiary students, using ordinary least squares regressions. Agnew and Cameron-Agnew (2015) suggest the significant influences on a student's score on a financial literacy quiz are ethnicity, whether the father attended university, school decile (a proxy for socioeconomic status) and the age of the first financial discussion in the home between parent and child. School decile is calculated by the ministry of education, and indicates the extent to which the school draws its students from low socio-economic communities. Decile 1 schools are the 10% of schools with the highest proportion of students from low socio-economic communities, whereas decile 10 schools are the 10% of schools with the lowest proportion of these students.

The pilot sample yielded similar results to Agnew and Cameron-Agnew (2015), with ethnicity and age of the first financial discussion in the home revealing the strongest correlation with the financial literacy quiz score. However, when ordinary least squares regressions were run on the male and female cohorts separately, all of the significant correlations were driven by male students. No variables were found to be significant for female students. Based on findings from the pilot study, and those identified in the literature, a study involving Year Ten (mostly 15 year old) students from nine secondary schools (five decile 2 to 4 schools and four decile 9 and 10 schools) was conducted. Year Ten was chosen as it is the last full year of compulsory education for most students (the school leaving age is 16). The surveys were completed in class time under the supervision of their teachers, with each teacher given the same set of instructions. The financial literacy questions and attitudinal statements included in the quiz were derived from across the literature, with some questions modified to reflect the young age (and potentially low reading age) of the participants in the school survey. On the recommendation of a principal in a low decile school, the financial literacy quiz section was reduced from 17 questions to 10, with the language of the remaining ten questions simplified. Some questions were also modified to reflect a New Zealand context. The ten financial literacy quiz questions are shown appendix one. The sample size was 568 Year Ten students.

The demographic details of the sample are shown in table 1 below. (Note: Some students did not complete the parental education variables).

Table 1: Demographic details of school sample.

| | Female | Male | TOTAL |
|---------------------------------|--------|------|-------|
| Gender | 262 | 306 | 568 |
| High School Decile | 171 | 208 | 379 |
| Low School Decile | 91 | 98 | 189 |
| Father Attended University | 116 | 161 | 277 |
| Father Didn't Attend University | 126 | 127 | 253 |
| Mother Attended University | 184 | 130 | 314 |
| Mother Didn't Attend University | 112 | 121 | 233 |
| Caucasian Ethnicity | 236 | 26 | 262 |
| Not Caucasian Ethnicity | 272 | 34 | 306 |

Ordinary least squares regressions were run on the school level data, using the model developed by Agnew and Cameron-Agnew (2015):

Independent Variables

Father Attended University: This variable was binary coded whether or not the father attended university (1 = attended university).

Caucasian Ethnicity: This variable was binary coded according to whether the student was of Caucasian descent or not (1 = Yes).

Age in years of the first financial discussion with a parent.

High Decile: This variable was binary coded into two categories, low decile schools (deciles 2 to 4) and high decile schools (deciles 9 and 10). (1 = high).

Alternative socio-economic status variables such as whether the family home was owned or rented, the mother attended university, parents owned shares or not were all tried in the model. None of these were significant when school decile was in the model. A stepwise regression also revealed that school decile and father's education were the only significant socioeconomic variables influencing financial literacy quiz score. An additional variable of whether a student had a part-time job was also tried in the model, but found to be not significant, therefore it was removed (confirmed by a stepwise regression). The age of the student when they had their first savings account, along with the age at which the student first started receiving pocket money were also found to not be significantly correlated with the financial literacy quiz score.

Results and Discussion

The four variable model as outlined above yielded the following coefficients and t-statistics as shown in table 2. A male Caucasian student from a high decile school with a father that attended university, who had their first financial discussion with parent(s) at a younger age had the best chance of scoring a high score on the financial literacy test. With the financial literacy quiz being out of a total of ten marks, having a father who attended university or being of Caucasian ethnicity are both correlated with approximately half a mark higher score on the quiz. Attending a high decile school rather than a low decile school has a large impact of almost one and a half mark higher quiz scores. The age of first financial discussion variable has a much smaller coefficient, but it must be remembered this variable is of a continuous nature rather than the binary nature of the other three variables. Having the first financial discussion with a parent 1 year later is correlated with a 0.079 lower financial literacy quiz mark. For the age of first financial discussion variable to have the same effect size as the ethnicity variable, it would require a student to have their first financial discussion with a parent approximately 6 years and 2 months later. The equivalent figure for the father's educational variable would be approximately 7 years and 1 month.

Table 2: Variables affecting financial literacy quiz score in Year Ten students.

| | |
|-----------------------------------|----------------------|
| Father Attended University | 0.560*** (2.853) |
| High Decile | 1.447*** (6.338) |
| Caucasian Ethnicity | 0.489** (2.183) |
| Age of First Financial Discussion | -0.079** (-2.404) |

Dependent Variable: Quiz Score

*, ** and *** denote statistical significance at the 10, 5 and 1% levels respectively. ($R^2 = 0.195$)

As an extension to the work of Agnew and Cameron-Agnew (2015), the model was then tested using a series of interaction variables. Some of the variables deemed not significant by the pilot sample in this study were also added back in to the model to establish if the addition of interaction variables had any influence on their significance. The results of these regressions are shown in appendix two. Being from a high decile school, of Caucasian ethnicity and having an earlier first parental financial discussion all continue to be correlated with a higher financial literacy quiz score, with similar effect sizes. The introduction of dummy interaction variables for gender and school decile supported those findings of the PISA report mentioned earlier that a significant gender differential in financial literacy quiz scores did not exist for 15 year olds in New Zealand, unlike many findings when an adult population was used. The gender-decile interaction variable found no significant difference between high decile male and female quiz scores. The low decile female and male variables were both significantly correlated with a lower quiz than a high decile female, with very similar coefficient sizes, suggesting socio-economic status was the driver of quiz score differences rather than gender.

Having a father that did not attend university for both male and female students is correlated with having a lower financial literacy quiz score of 0.8 of a mark compared to a male whose father attended university, while none of the interaction variables for gender with mothers' education or gender with having completed a financial literacy course at school are significant. Given that a measure for socioeconomic status was also included in the regressions, this is the first evidence in support of social influence as outlined in the theoretical model proposed in the introduction, that it is the fathers rather than mothers in a household that leads the financial discussions with children, which is why the level of fathers' education is significant where the mothers' is not.

In an effort to better understand the social dynamics in play in the home, the regressions containing interaction variables outlined above were repeated using the age of first financial discussion with a parent as the dependant variable, with financial literacy quiz score as an independent variable. The results also shown in appendix two reveal that a child having their first financial discussion with a parent at an earlier age is correlated with being of Caucasian ethnicity (10 months earlier), having done a financial literacy course at school (around seven months earlier), and having a higher financial literacy quiz score (approximately 1 and a half months earlier for every extra mark out of ten on the quiz) remain significant with very similar effect sizes across all of the regressions containing different interaction variables.

The interaction variables provide support for a gender bias in the age of the first financial discussion in the home, with a high decile female having their first parental financial discussion at an older age (eight months) than a high decile male. This is an important finding, as this paper suggests that while no gender differential on financial literacy test scores is prevalent in 15 year olds, the seeds for a gender differential at a later date have been sown through social influences in the home such as the age of first financial discussion in the home with a parent. The concerning aspect of this gender differential is that a younger age of first parental financial discussion was a significant variable in the regressions examining correlations with higher financial literacy quiz scores. The importance of parental education levels on financial discussions is also revealed, with a female student whose father did not attend university being correlated with having an older first parental financial discussion relative to a male whose father did attend university of just over 1 year and 1 month. A similar effect size was found for the same interaction with regards to mothers' education rather than fathers' education, the only regression where mothers' education level had a significant effect. These findings are suggestive of male children being exposed to earlier, better quality financial discussions than female children. Parental education levels seem to be interacting with gender to give older, possibly less quality financial discussions for females relative to males.

While the literature suggests the home environment has a stronger effect on financial socialisation than the school environment, the interaction of gender and completion of a financial literacy course at school shows a similar gender bias. Being a female who has not done a financial literacy course at school is correlated with an older age of first parental financial discussion relative to a male student who has not done a financial literacy course at school of 6 months. A male who has done a financial literacy course at school is correlated with a younger age of first parental financial discussion relative to a male student who has not done a financial literacy course at school, with an effect size of 9 months. However, there is no significant difference between a female who has or has not completed a financial literacy course at school. A male who has done a financial literacy course having an earlier age of first financial discussion with a parent than a male who has not done a financial literacy course is intuitively easy to comprehend, although causality may not be clear (did completing the course prompt the discussion or vice versa?). However, why the later age of first discussion for the female when neither had completed a financial literacy course?

To measure the gender bias in the age of first financial discussion variable, an ordinary least square regression was run with the dependent variable of age of first financial discussion and gender as the independent variable, the result of which was a t-statistic of -4.269*** and a coefficient of -1.028. On average, male students in the sample have their first financial discussion with their parents just over one year younger than female students. To establish whether the gender bias exists over both high and low decile schools, two ordinary least squares regression were run with age of first financial discussion the dependent variable and gender the independent variable. Both low (coefficient of -0.994, t-statistic of -3.539) and high (coefficient of -1.024, t-statistic of -2.319) school decile male students have their first parental financial discussion a year earlier than female students, significant at the 95% confidence level for high decile school students, and the 99% confidence level for low decile school students.

When examining the raw data, the average age of their first parental financial discussion is 10 years for a male from a high decile school, 11 years for a girl from a high decile school and a boy from a low decile school, and 12 years for a girl from a low decile school. Ordinary Least Square regressions were then run on the male and female cohorts separately, to establish if age of first financial discussion was equally as important for males as females in terms of the impact on their financial literacy quiz score. The results are shown in table 3.

Table 3: OLS results for variables affecting financial literacy quiz score in Year Ten students by gender.

| | Males | Females |
|-----------------------------------|----------------------|---------------------|
| Age of First Financial Discussion | -0.109** (-2.325) | -0.027 (-0.584) |
| High Decile | 1.559*** (4.634) | 1.305*** (4.291) |
| Caucasian Ethnicity | 0.324 (1.005) | 0.731** (2.397) |
| Father Attended University | 0.637** (2.207) | 0.454* (1.719) |

Dependent Variable: Quiz Score

** and *** denote statistical significance at the 5 and 1% levels respectively.

Interestingly, age of first discussion is significant for males, but not for females, while ethnicity is significant for females but not for males. This could be indicative of better quality financial discussions for males than for females, an earlier financial discussion for a female has less impact than for a male, because the discussion is at a more superficial level. For the two variables significant for both genders, both have larger effects sizes for males than females. When age of first financial discussion is treated as the dependant variable, and the same segregation by gender is applied, similar results are found, as shown in table 4.

Table 4: OLS results for variables affecting age of first parental financial discussion in Year Ten students by gender.

| | Males | Females | Both Genders |
|-------------------------------------|----------------------|----------------------|-----------------------|
| Did Financial Literacy Course | -0.797** (-2.233) | -0.259 (-0.626) | -0.544** (-2.040) |
| High Decile | -0.041 (-0.085) | 0.231 (0.476) | 0.083 (0.245) |
| Caucasian Ethnicity | -0.798* (-1.903) | -0.858* (-1.872) | -0.855*** (-2.777) |
| Father Attended University | 0.066 (0.151) | -0.968** (-2.248) | -0.442 (-1.451) |
| Mother Attended University | -0.357 (-0.812) | -0.434 (-1.008) | -0.339 (-1.109) |
| Total Financial Literacy Quiz Score | -0.178** (-2.266) | -0.033 (-0.320) | -0.124** (-1.991) |
| Male Gender | | | -0.662*** (-2.683) |

Caucasian ethnicity is significant for both genders, which may be indicative of cultural influences on financial attitudes and beliefs. Having completed a financial literacy course and financial literacy quiz score are only significantly correlated with age of first financial discussion for male students, while the father's education level variable is only significant for the female students, but with an effect size of almost 1 year. While a thorough investigation of the state of financial literacy courses in schools is beyond the scope of this paper, a differing quality in the provision of financial literacy courses does not explain a differential relationship with financial discussions in the home amongst the majority of the students in the sample who were from co-educational schools, and thus sitting in the same financial literacy course as each other. Additionally, why does a female with a university educated father have the first financial discussion a year earlier than a female with an uneducated father, when fathers' education is not significant for a male student? An intuitive explanation based on the theoretical framework of this paper is that fathers as a group understand the importance of their sons being financially literate, however only the more educated fathers recognise the importance of financially literate daughters, prompting more educated fathers to be more receptive to, and instigators of financial discussions with daughters.

The findings around socioeconomic status being correlated with higher financial literacy quiz scores are somewhat easier to intuitively comprehend, not least because higher socioeconomic students tend to outperform lower socioeconomic students on most tests, regardless of content. The gender discrepancy in the age of initial financial discussions irrespective of socioeconomic status is a little more thought provoking. Unlike the initial distribution of pocket money or opening of a savings account which tends to happen at a milestone such as a particular birthday, the impetus to discuss financial matters with a child as young as 10 may tend to occur on a more ad hoc basis, rather than as a right-of-passage. The age that children have their first financial discussion with parents is therefore more susceptible to an either conscious or subconscious gender bias than the opening of a savings account for example. The notion that it is more important for a male to be financially literate than a female due to the traditional "bread winning" status of the male may be one influence behind the earlier discussions between parents and boys. This idea of discrepancies in the financial attitudes of parents toward their children based on the child's gender has some support from the Westpac Money and Kids Report, a nationwide survey in New Zealand commissioned to understand the money habits of children. The research surveyed 540 Westpac customers all with children aged between 4 and 18 years old, and found that for those who get pocket money boys get \$3 more a week on average than girls with chores to earn it based on gender. Both spend 2.4 hours a week doing chores with girls being more likely to clean the bedroom and do the dishes and laundry; while boys are more likely to take out the rubbish, mow the lawns and clean the car. (Wade 2013).

It is difficult to believe that a household culture which results in girls, on average, having their first financial discussion a year later than boys would not also impact on the quality and content of those discussions. In fact, the age of first financial discussion may well be a proxy for a 'household financial attitudes and behaviour' variable. The fact that the age of first financial discussion variable had a statistically significant correlation with financial literacy quiz score for boys but not for girls, while the completion of a financial literacy course at school was not significant, supports the research mentioned in the introduction that parental financial influence can be stronger than the influence of school. However, what this paper adds to the literature is that there appears to be a gender bias in the household environment, which could be contributing to the lower performance by

females on financial literacy quiz scores. One explanation for the age of a child's first parental financial discussion not being significant for girls is that even when girls do have financial discussions with parents in the home they are not as rigorous, or are more superficial than those had between parents and boys. This is where the gender of parents can also have an influence, where fathers may be more willing (or able) to have financial discussions with sons than daughters. There are a number of feasible reasons for this. These include that today's fathers of young people are not old enough to have escaped the influence of a more traditionally patriarchal society, where boys grew up to be men; the expected chief 'breadwinners' of a conventional nuclear family. Perhaps another hangover from tradition may be for some to see financial education for daughters as not necessary. So, although it appears that girls are involved in financial discussions with their parents it may be that these are more superficial, more piecemeal, in content. It may also be that fathers and sons generally have more opportunity to talk (maybe on the way to sporting fixtures, for example) than fathers and daughters.

To establish whether the gender differences present in the age of first financial discussions in the home with parents is also present in financial attitudes and behaviours, odds ratios and chi square statistics were calculated for a series of attitudinal questions the students were asked to respond to using Likert scales. Table 5 shows the statements males were statistically significantly more likely to agree with, while table 6 shows the statements females were statistically significantly more likely to agree with.

Table 5: Statements Year Ten males are more likely to agree with than Year Ten females.

| | Odds Ratios |
|--|---------------------|
| My parent(s) are role models for me about how to manage financial matters. | 6.569** (2.25) |
| My parent(s) think that I should save money each month for the future. | 3.830* (1.68) |
| With today's unemployment rate, it really doesn't pay to get more education after high school. | 4.479** (1.71) |
| People with more formal education rarely earn more money than people with less formal education. | 3.209* (1.47) |
| I think it's easy to open a cheque account. | 3.420* (1.60) |
| I save at least 10% of the money I earn each month. | 13.659*** (2.18) |
| Without peeking, I know how much money is in my wallet or purse right now. | 3.302* (1.54) |

*, ** and *** denote statistical significance at the 10, 5 and 1% levels respectively.

Table 6: Statements Year Ten females are more likely to agree with than Year Ten males.

| | Odds Ratios |
|--|---------------------|
| My parent(s) think that I should spend within a budget. | 4.392** (1.73) |
| I'd like to start saving money, but my spending habits prevent it. | 14.585*** (2.13) |
| I spend money on things I don't really need, such as eating out. | 4.038** (1.51) |
| I think that banks are mysterious places. | 12.193*** (2.19) |
| Investing in stocks and bonds is for rich people. | 3.238* (1.54) |
| I think that finding a good job today is largely a matter of luck. | 3.208* (1.45) |

*, ** and *** denote statistical significance at the 10, 5 and 1% levels respectively.

Boys were more likely to save than girls, be less mystified by banks, believe that achieving a good job was something they had control over and that investing in stocks was not only for the wealthy. Girls, on the other hand, found their spending habits too often led them to make purchases they didn't need, often on impulse, despite the desire to start saving. These less desirable attitudes displayed by girls is further evidence of a potential catalyst for lower financial understanding and knowledge in the future, which may also be attributable to financial socialisation in their environment.

The financial behaviour of children as they mature into adulthood is important, with the financial knowledge gained, and financial attitudes developed, sure to be major influences on financial behaviour. In addition to the link between gender and financial attitudes, odds ratios and chi square statistics were also calculated to establish if there was a difference in financial behaviours between male and female students. The calculations revealed that females are 1.56 times more likely to impulse spend than males, a statistically significant difference at the 95% confidence level, with a chi square statistic of 4.733.

Given this gender difference in impulse spending behaviour, a logistic regression reporting odds ratios was run using a binary dependant variable of yes/no to having impulse spent in the past three months, with the independent variables as set out in table 7. A mother's level of education has a greater importance in shaping the behaviour relating to impulse spending, than we have seen with financial discussions in the home and financial literacy quiz scores. Males and students whose mother attended university are less likely to impulse spend while students with a part time job are more likely to impulse spend, possibly due to greater discretionary income. Interestingly, the effect size of having a mother who went to university is the same as the effect of being male. While it is the fathers who appear to be leading the financial discussions in the home, it may well be the mother who is present when spending patterns are developed.

Table 7: Coefficients and odds ratios for variables that significantly influence impulse spending by Year Ten students.

| | |
|-------------------------------------|---------------------|
| Caucasian Ethnicity | 0.177 (1.194) |
| High Decile | 0.164 (1.178) |
| Mother Attended University | -0.503* (0.605) |
| Male Gender | -0.589** (0.555) |
| Age of First Discussion | -0.020 (0.980) |
| Completed Financial Literacy Course | 0.325 (1.384) |
| Father Attended University | 0.238 (1.268) |
| Financial Literacy Quiz Score | 0.018 (1.019) |
| Has Part Time Job | 1.424** (4.152) |

** and *** denote statistical significance at the 10 and 5% levels.

Conclusions, Implications and Limitations

The findings of this paper suggest that financial discussions in the home are important in terms of improving financial knowledge, influencing financial attitudes, and ultimately influencing financial behaviours such as impulse spending. This process occurring in the home appears to contain a gender bias. In the introduction to this article, Shim et al (2010) expressed the need for action; in particular the belief that parents need to understand the effect of how the way they behave financially can impact on their children, and that consequently they need to provide more specific instruction about money management.

This need to act appears to be even more important for girls. For many years now the shackles of tradition have not overtly restricted women to work and earn, or live independently if they wish. The apparently enduring traditional attitudes of perhaps the majority of parents and children may be out of line with the needs and expectations of an increasingly complex society. People, regardless of gender, should not feel restricted when it comes to achieving financial security. Certainly no-one is immune to financial misfortune, but no person need fall victim to their own financial ineptitude, provided appropriate and robust financial information is imparted and modelled, preferably from an early age.

The authors of this paper suggest that parents need to be made more aware of how gender stereotypes, and the ‘financial culture’ in the home ultimately impacts on the financial knowledge, attitudes and behaviours of their children. Specifically, the role that personal relationships and discussions with parents of different genders play is crucial. Educational institutions need to be

aware that females may be presenting with different attitudes and knowledge than boys as a result of their home environment, that these differences are pervasive across all socioeconomic status levels, and that they directly influence the financial behaviour of girls relative to boys, such as impulse spending.

One limitation of this study is that the age of first financial discussion is self-reported. Initially, this raised the prospect of a potential gender bias in the self-reporting of some data. The fact that there was no gender difference in the self-reporting of the age of first opening a savings account, and first receiving pocket money, two variables for which responses were collected but not used due to a lack of significance does give confidence that the gender difference in the age of first discussion is not an error of self-reporting, and is in fact a real difference.

Further research into the differences and similarities in the quality and quantity of financial discussions in the home between parents and their sons and daughters would be insightful, as would research into the dynamics mentioned above in single parent families. Comparing the household financial environments of families with differing ethnicities may also yield some interesting results.

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Appendix One

1. Which of the following is true about New Zealand's goods and services tax (GST)?
 - a. The GST percentage rate is 12.5%.
 - b. The government will take it from your pay.
 - c. You don't have to pay the tax if your income is very low.
 - d. It makes things more expensive for you to buy.

2. If you went to university and earned a degree, how much more money could you expect to earn than if you only had a high school qualification?
 - a. About 10 times as much.
 - b. No more; I would make about the same either way.
 - c. A little more; about 20% more.
 - d. A lot more; about 70% more.

3. David just found a job with a take-home pay of \$2,000 per month. He has the following monthly expenses:
 - \$900 for rent
 - \$150 for groceries
 - \$250 for transport
 - \$100 for clothes
 - \$200 for eating out
 - \$250 for other expensesHow long will it take him save \$600?
 - a. 3 months.
 - b. 4 months.
 - c. 1 months.
 - d. 2 months.

4. Rob and Mary are the same age. At age 25 Mary began saving \$2,000 a year while Rob saved nothing. At age 50, Rob started saving \$4,000 per year while Mary kept saving her \$2,000. Now they are both 75 years old. Who has the most money in their account?
- a. They would each have the same amount because they put away exactly the same.
 - b. Rob, because he saved more each year.
 - c. Mary, because she has put away more money.
 - d. Mary, because her money has grown for a longer time at compound interest.
5. If a borrower chooses to pay back a car loan over a longer period of time, the monthly payment is generally
- a. lower and the total interest paid is lower.
 - b. lower and the total interest paid is higher.
 - c. higher and the total interest paid is lower.
 - d. higher and the total interest paid is higher.
6. Suzy backs her car into a metal fence, causing \$500 of damage to her car. Suzy has an auto insurance policy with a \$200 excess. To get her car fixed, how much will her auto insurance company pay?
- a. \$0.
 - b. \$200.
 - c. \$300.
 - d. \$500.
7. Charlie opens a savings account and deposits \$500 at an interest rate of 5%. What amount will Charlie have in his savings account at the end of two years?
- a. Exactly \$50.
 - b. Exactly \$550.
 - c. Less than \$550.
 - d. More than \$550.

8. Which of the following credit card users will pay the most in interest?
- a. Jessica, who pays at least the minimum amount each month and more, when she has the money.
 - b. Vera, who generally pays off her credit card in full but, occasionally, will pay the minimum when she is short of cash.
 - c. Megan, who always pays off her credit card bill in full shortly after she receives it.
 - d. Erin, who only pays the minimum amount each month.
9. What is the general relationship between financial risk and financial return?
- a. There is no relationship between risk and return.
 - b. The lower the risk, the higher the return.
 - c. The higher the risk, the lower the return.
 - d. The higher the risk, the higher return.
10. Daylon's aunt agrees to co-sign a car loan for him. By doing so, she has agreed to
- a. pay the loan as a gift to Daylon.
 - b. pay the loan if Daylon cannot pay.
 - c. share the payments equally with Daylon.
 - d. make the payments until Daylon can make them himself.

Appendix Two

OLS results for variables correlated with financial literacy quiz scores and the age of first parental financial discussion.

(a) Gender-decile interaction variables

| | Total Quiz | Age of First Discussion |
|-----------------------------------|-----------------------|-------------------------|
| Father Attended University | 0.693*** (3.089) | -0.442 (-1.449) |
| Mother Attended University | -0.220 (-0.966) | -0.339 (-1.106) |
| Age of First Financial Discussion | -0.068** (-1.984) | |
| Caucasian Ethnicity | 0.499* (1.954) | -0.855*** (-2.772) |
| Done Financial Literacy Course | 0.116 (0.584) | -0.543** (-2.028) |
| Low Decile Female | -1.360*** (-4.180) | 0.567 (1.253) |
| Low Decile Male | -1.425*** (-4.667) | -0.062 (-0.146) |
| High Decile Male | 0.233 (1.075) | |
| High Decile Female | | 0.675** (2.316) |
| Financial Literacy Quiz Score | | -0.123** (-1.984) |

(b) Gender-father's education interaction variables

| | Total Quiz | Age of First Discussion |
|-----------------------------------|-----------------------|-------------------------|
| Mother Attended University | -0.225 (-0.988) | -0.362 (-1.182) |
| High Decile | 1.518*** (6.271) | 0.079 (0.232) |
| Age of First Financial Discussion | -0.070** (-2.033) | |
| Caucasian Ethnicity | 0.458** (1.995) | -0.829*** (-2.693) |
| Done Financial Literacy Course | 0.115 (0.576) | -0.577** (-2.161) |
| Father No Uni Male | -0.810*** (-2.873) | 0.074 (0.193) |
| Father No Uni Female | -0.829*** (-2.893) | 1.138*** (2.954) |
| Father Yes Uni Female | -0.268 (-1.054) | 0.285 (0.834) |
| Financial Literacy Quiz Score | | -0.126** (-2.033) |

(c) Gender-mother's education interaction variables

| | Total Quiz | Age of First Discussion |
|-----------------------------------|----------------------|-------------------------|
| Father Attended University | 0.690*** (3.070) | -0.454 (-1.487) |
| High Decile | 1.519*** (6.273) | -0.078 (-0.230) |
| Age of First Financial Discussion | -0.068** (-2.000) | |
| Caucasian Ethnicity | 0.454** (1.976) | -0.847*** (-2.747) |
| Done Financial Literacy Course | 0.128 (0.646) | -0.536** (-2.010) |
| Mother No Uni Male | 0.161 (0.561) | 0.139 (0.360) |
| Mother No Uni Female | -0.078 (-0.275) | 1.032*** (2.733) |
| Mother Yes Uni Female | -0.202 (-0.818) | 0.472 (1.421) |
| Financial Literacy Quiz Score | | -0.124** (-2.000) |

(d) Gender-completed a financial literacy course at school interaction variables

| | Total Quiz | Age of First Discussion |
|-----------------------------------|----------------------|-------------------------|
| Father Attended University | 0.709*** (3.151) | -0.414 (-1.354) |
| High Decile | 1.530*** (6.318) | 0.102 (0.300) |
| Age of First Financial Discussion | -0.069** (-2.021) | |
| Caucasian Ethnicity | 0.457** (1.990) | -0.845** (-2.741) |
| Mother Attended University | -0.235 (-1.031) | -0.368 (-1.197) |
| Female Did Course | 0.320 (1.028) | 0.277 (0.669) |
| Female No Course | | 0.511* (1.748) |
| Male Did Course | 0.234 (0.883) | -0.757** (-2.180) |
| Male No Course | 0.242 (1.112) | |
| Financial Literacy Quiz Score | | -0.126** (-2.021) |

Chapter Nine

The final chapter introduces an international comparison between university students in New Zealand and England. Financial literacy levels are examined using a combination of ordinary least squares regressions, logistics regressions and odds ratios, with age; area of study; gender and country all correlated with higher scores on a financial literacy quiz score. When examining the New Zealand and England samples separately, gender is the only variables correlated with financial literacy quiz score in both countries. In both countries males significantly outperformed females on a simple compound interest questions, while both male and female students in New Zealand outperformed their counterparts from England on questions about credit card interest, sales tax and a more complex compound interest question. When ordinary least squares regressions are used to examine attitudinal statements around students debt, England females have more negative attitudes relative to males around the future benefit of education, being more likely to disagree that they expect to earn more in the future because they went to university; educational loan debt is a good investment for the future; and they have a greater chance of getting a job if they have a degree. Females in England are also more likely to agree that they minimise their spending to minimise their debt relative to males in England. The NZ sample does not show the same results. The only statement where females in NZ showed a significant difference from their male counterparts was that females were more likely to agree that they would deal with their student debt once they leave university and get a job.

The results of this chapter confirm that the gender differential in financial literacy quiz scores exists in an older sample of university students, where it did not in the sample of 15 year olds used in previous chapters. This is in line with the findings of the PISA (Programme for International Student Assessment) (OECD, 2014). The fact that the gender differential in financial literacy levels was also present in England supports a different financial socialisation experience for females in the home than for males, especially given that an analysis of the quiz results did not reveal standard gender differences by question between each country. On only one question did males score higher than females in both countries. Rather, the reasons for the gender difference were different in each country in terms of the specific questions in the quiz. This socialisation cause rather than an endemic difference in knowledge in a particular area.

While previous chapters found a difference in attitudes around money between genders, this chapter did not find a gender based difference in attitudes toward student debt in New Zealand. The gender differences in student debt attitudes found in England may well be the result of socialisation unique to England.

Agnew, S. and Cameron-Agnew, T. (2015). Financial Literacy and Student Attitudes to Debt: A cross national study examining the influence of gender on personal finance concepts. *Journal of Retailing and Consumer Services*, (25): 122-129.

Introduction

As noted by Lusardi & Mitchell (2014) an increasing deregulation of the financial sector in recent times has resulted in a greater range of financial products and services available for consumers. Services such as payday loans, pawn shop loans and tax refund loans have become prevalent as alternatives to traditional loans from financial institutions such as banks (Lusardi & Mitchell 2011). The late 1980's also saw a growing level of financial complexity for those attending tertiary institutions, with the emergence of government loans for undergraduate tertiary students in countries such as England and New Zealand. Students now have the ability to take out student loans from the government to pay for not only tertiary fees, but also for general living expenses, as well as other course related costs such as text books. The introduction of tertiary fees also placed a greater importance on the future value of a tertiary qualification. Students now have to consider not only the opportunity cost of their time when earning a tertiary qualification, but also the expected future return on the financial outlay incurred through tertiary fees.

With a greater level of financial literacy required to negotiate increased access to both government and commercial debt, it is important to identify groups in society that are prone to lower levels of financial literacy. Several studies have identified females as one such group who have lower levels of financial literacy than their male counterparts (Lusardi & Mitchell 2014). There has however, been little research on understanding the relationship between financial literacy levels, and attitudes to student debt. This paper attempts to lessen the information void through a cross-national study, with data collected from corresponding samples of students from England and New Zealand (NZ). The financial literacy levels of the samples of students are initially examined to establish if a gender difference in knowledge levels exists in both countries. Attitudes to student debt are then examined using Likert scales to establish if there are gender based differences in attitudes to student debt in either country.

Literature Review

Research on gender differences in the financial sector has been noticeable since the end of the 20th century, with Burton (1995) publishing her paper *Women and Financial Services: Some directions for future research* suggesting it was “in the best interest of financial institutions to investigate the needs of women more closely” (p. 21). Burton (1995) chose to focus on the consumption of financial services by women because of the changes in consumer behaviour among women due to wider societal changes, significant differences in financial behaviour between the genders “which need explaining” (p. 21) and an increasing interest in the female market segment by financial institutions. The interest in female market segments in financial services was also discussed by Philp, Haynes & Helms (1992) in their paper ‘Financial Service Strategies: Neglected Niches’, with Kover (1999) continuing Burton’s work by examining the increasing role of women in financial tasks such as budgeting and planning finances. With references to consuming financial services, Burton (1995) theorised that a plausible explanation of the differences in consumption patterns

between men and women was because the purchase of financial services had been ‘designated by some groups of women as a ‘masculine’ activity’ (p. 22). Support for this idea was also lent by Spathis, Petridou & Glaveli (2004) who found support for the hypothesis that “gender affects service quality perceptions and the relative importance attached to various banking service quality dimensions” (p. 90).

Further research has also uncovered differing attitudes across genders to investing, particular investing for retirement purposes (Martenson (2008), Faff, Hallahan & McKenzie (2011)). While Faff et al (2011) emphasised the increasing role of women in handling finances due to greater longevity and increasing divorce rates, Aguilar (2001) quoted a 1997 Bank of America report that the average age of widowhood for an American female was 56. In their 2013 study, Dwyer, Hodson & McCloud examined the relationship between gender, debt and dropping out of college, finding that trade-offs between attending college and full time employment were influenced by the “different labour market opportunities women and men face that affect the value of a college degree and future difficulties they may face in repaying college debt) (p. 30).

Current literature on the topic of gender discrepancy with regard to financial literacy is relatively extensive, with the general finding that males have higher levels of financial literacy than females (Lusardi, Mitchell, and Curto, 2010; Lusardi and Mitchell 2009; Lusardi and Tufano 2009a, 2009b). This appears to be the case across differing age groups (Chen & Volpe 2002; Mandell 2008), and regardless of test question sophistication levels. (Lusardi, Mitchell and Curto (2010); Hung, Parker and Yoong (2009); (Fonseca, Mullen, Zamarro and Zissimopoulos, 2012). The reasons for this gender differential are less well examined. Lusardi and Mitchell (2014) found the gender differential to be present in The United States of America, Germany, Switzerland and the Netherlands. They cite Hsu (2011) who proposed that some of the gender differences may be rational, with married woman only building up financial knowledge later in life when close to widowhood, as a result of specialisation of labour within the household. If Hsu’s (2011) proposition is correct, this would suggest that countries with differing cultural norms and stereotypes around the world may have differing degrees of gender bias in financial literacy levels. The Programme for International Students Assessment (PISA) results for their 2012 *Students and Money: Financial Literacy* (OECD 2014) study stated that of the 13 OECD countries which took part, six of them have reported males outperforming females on surveys measuring financial knowledge, when adults were used as the subjects. However, when 15 year olds were the subjects, only one of the 13 countries (Italy) showed a statistically significant difference in financial literacy between males and females (with Italian 15 year old males outperforming their female counterparts). However, when students’ competencies in other subjects (namely reading performance and mathematics) were accounted for, boys did perform better than girls on the topic of financial knowledge, and when looking at the performance distribution, among the high achievers, boys tend to outperform girls. The report went on to suggest “girls may need targeted help to develop the skills to reach the highest levels of proficiency in financial literacy” (2014, p. 79). In an attempt to explain why the gender difference in financial literacy level is not as prevalent for 15 year olds as it is for adults, the report supposes that “as boys and girls grow up, they may be exposed to different opportunities to learn and improve their financial competencies....and therefore they may develop different levels of financial knowledge and different financial strategies in adulthood over time” (2014, p. 81). Given that university students have achieved to a sufficiently high level in reading performance and

mathematics to gain entry to university, admission to university should act as a 'control' for other subjects to a certain extent.

The idea of 'different learning opportunities' mentioned in the PISA report supports Hsu's (2011) suggestion that specialisation within the household between males and females may be a possible cause of gender differences in the financial literacy knowledge of adults. In a summary of the literature on gender differences in financial literacy levels, Lusardi and Mitchell (2014) reference Bucher-Koenen, Tabea, Lusardi, Alessie, and van Rooij (2012) pointing to a potentially important role for self-confidence that may differ by gender. Lusardi and Mitchell also mention Brown and Graf (2013) who showed that gender differences are not due to differential levels of interest in finance and financial matters between men and women. This body of literature led Lusardi and Mitchell (2014) to surmise the gender debate was "far from closed" (p. 20) and that more research was required to better understand observed gender differences in financial literacy. They went on to note that financial literacy may be more easily acquired via interactions with others, in the workplace or in the community as a possible reason why the literature suggests those living in city communities generally do better than their rural counterparts, and as a possible explanation for the previously mentioned gender differences. They give the example that in many cultures, men are more likely than woman to interact daily with financially knowledgeable individuals. In addition, Lusardi and Mitchell (2014) hypothesised that woman (especially young women) may expect they will have someone later in life (a husband for example) to take care of their finances.

Given the body of literature on the gender difference in financial literacy levels, this paper seeks to establish if the same differential exists in the NZ and England samples used in this study; and to what extent gender differences are prevalent in attitudes to debt. If the suppositions above are correct, that societal factors are contributing to the gender differential in financial literacy levels, then a reasonable hypothesis is that the same societal factors may be contributing to differing attitudes to debt between the genders. This reasoning is discussed by researchers in the field of social cognitive theory such as Bussey and Bandura (1999) who presented the social cognitive theory of gender-role development and functioning, including 'how gender conceptions are constructed from the complex mix of experiences' (p. 676). Bussey and Bandura (1999) surmise that 'gender conceptions and roles are the product of a broad network of social influences operating independently in a variety of societal subsystems' (p. 676), a view supported by previous research such as Bandura (1986), Beall and Sternberg (1993) and Epstein (1997). They also briefly outline psychological, biological and sociological perspectives on gender differentiation, quoting Kohlberg (1966) when stating that according to Cognitive Development Theory, 'gender identity is postulated as the basic organizer and regulator of children's gender learning (Kohlberg, 1966). Bussey and Bandura (1999) go on to state that 'Children develop the stereotypic conceptions of gender from what they see and hear around them. Once they achieve gender constancy – the belief that their own gender is fixed and irreversible – they positively value their gender identity and seek to behave only in ways that are congruent with that conception' (p. 677).

In addition, Bussey and Bandura (1999) summarise sociological theories, stating that 'In sociological theories, gender is a social construction rather than a biological given. The sources of gender differentiation lie more in social and institutional practices than in fixed properties of the individual' (p. 683). They also reference Geis (1993) when saying 'Gender stereotypes shape the

perception, evaluation, and treatment of males and females in selectively gendered ways that beget the very patterns of behaviour that confirm the initial stereotypes' (p. 683). Given that females on average earn less than males, sociological theories would suggest that females may value the future worth of tertiary education lower than males, and thus influence their willingness to incur debt to earn a tertiary qualification.

From a students' perspective, borrowing to fund extended education is generally seen as a good investment, with long-term rates of return that exceed the cost of borrowing for most (Walker and Zhu, 2011). There has been a strong (and growing) perception that a degree is essential for entry into lucrative non-manual careers, with expected return becoming a component within the cost/benefit analysis that those considering university make. (Harrison, Agnew and Serido, 2015). This is consistent with human capital theory (Becker, 1994), which predicts that individuals will make economically rational decisions about their investment in education. However, Brynin (2013) questions the extent to which prospective students are in a position to make this assessment. Often students do not know the inner workings of the labour market until after graduation, with Brynin (2013) suggesting graduates now face a blurring of the lines between graduate and non-graduate work, with many graduates competing with non-graduates when applying for a job. This paper questions if there is a different attitude to student debt between males and females, given that females traditionally have lower levels of financial literacy, and lower expected earnings than males. The paper then goes on to discuss the implications for the provision of personal finance services for tertiary students.

Methodology

This paper uses data collected from two groups of students, from a mid-ranking university in England and an equivalent university in New Zealand, with both universities being located in medium sized cities; with a mixed profile consistent with the national demographic profile for higher education students. The samples in both countries comprised full-time domestic (i.e. not international) undergraduates in their first year of business (including management, marketing, accountancy, commerce, economics and applied statistics) or social science (including sociology, psychology, politics and education) programmes.

The questionnaire used was developed from interview data results reported in Harrison, Chudry, Waller, & Hatt (2015). The original questionnaire was piloted in England in December 2012, with a number of subsequent refinements made. The final version of the questionnaire contained 20 items measuring student attitudes to debt using Likert scales running from 1 (Strongly agree) to 5 (Strongly disagree); demographic questions, a financial literacy test; and a personality inventory. The data were collected during a period spanning October 2013 and January 2014, corresponding roughly to halfway through the students' first year of study in both hemispheres. Minor changes to the questionnaire were made to reflect local vocabulary in each country.

The financial literacy quiz (Appendix 1) was informed by the literature, with question one being one of three questions used by Lusardi & Mitchell (2007), albeit with the dollar amount changed, to measure understanding of compound interest. Question five was a slightly more complicated compound interest question, taken from the Jump\$Start 2008 survey of Personal Financial Literacy Among College Students (Mandell, 2008). Question two is an altered version of a question from the

Jump\$tart 2008 Survey (Mandell, 2008). Where the Jump\$tart question examined which groups were more affected in times of inflation, the question in this paper examined why the Consumer Price Index was important for students. Questions three and four were knowledge based questions on sales tax rates and interest charges on credit cards. As a package, the five questions were designed to examine knowledge, and the ability to use concepts, without relying on the ability to make complicated calculations.

The questionnaire was rendered online using Moodle in NZ and Survey Monkey in England, with e-mail and in-person reminders being provided over the course of one month. Courses were chosen at the 100 level in subject areas which were common to both universities and provided a spread of subjects across different faculties, such as Management, Psychology, Sociology, Statistics and Education, with ‘all class’ emails sent inviting students to participate. Responses from students outside the sampling frame (such as international students) and those without debt were subsequently removed by hand. In both countries a prize draw incentive was used to increase response rates. This approach helped to reduce self-selection bias by encouraging responses from groups who might not typically respond to an unsolicited survey invitation. The responses rates of 16 percent in England and 17 percent in NZ were almost identical between the two samples. While the response rates were a little on the low side, the questionnaire provided sufficiently large samples which were both found to be representative of the populations from which they were drawn by demographic variables. The resulting total of 439 valid responses comprised 240 from NZ and 199 from England. Table 1 provides descriptive statistics of the two national samples.

Table 1: Sample descriptive statistics

| | England | | NZ | | ALL | |
|------------------------------|---------|----|-----|----|-----|----|
| | n | % | n | % | N | % |
| Social science degree | 75 | 38 | 114 | 48 | 189 | 42 |
| Business degree | 124 | 62 | 126 | 52 | 250 | 64 |
| Male | 66 | 33 | 92 | 38 | 158 | 36 |
| Female | 133 | 67 | 148 | 62 | 281 | 64 |
| Majority ethnic group | 178 | 89 | 208 | 88 | 386 | 88 |
| Minority ethnic group | 21 | 11 | 32 | 12 | 53 | 12 |
| Mother has degree | 43 | 22 | 91 | 38 | 134 | 31 |
| Mother has no degree | 156 | 78 | 149 | 62 | 305 | 69 |
| Father has degree | 54 | 27 | 94 | 39 | 148 | 34 |
| Father has no degree | 145 | 73 | 156 | 61 | 301 | 69 |

An ordinary least squares regression was run on the total sample, as well as on the England and NZ samples individually, to establish which variables significantly affected the students’ financial literacy quiz score. The following binary variables were included in the multiple regressions:

Country (England = 1); Gender (Female = 1); Age (21 or under = 1); Ethnicity (Minority Ethnicity = 1); Mother’s Education (University Graduate = 1); Father’s Education (University Graduate = 1); Department (Business = 1). The five personality variables of extraversion, neuroticism, conscientiousness, agreeableness and openness-to-experience from The Big Five Inventory (BFI-

10) were also included in the multiple regressions (John, Donahue & Kentle, 1991; Rammstedt & John, 2007).

A combination of z-statistics, odds ratios and logistic regressions were also used to examine correlations between the responses to each of the questions in the financial literacy quiz and the gender and country variables.

Finally, ordinary least squares multiple regressions were also run for each of 20 attitudinal statements mentioned earlier, developed by Harrison, Agnew and Serido (2015), focussing on correlations between the attitudinal statements and the ethnicity, gender and country variables.

Results

As shown in table 2, four variables are correlated with a higher financial literacy quiz score: Aged 21 or younger, male, studying business and coming from NZ. (The five financial literacy questions were developed from the literature, and are shown in Appendix 1).

Table 2. OLS coefficients and t-statistics for variables correlated with a higher financial literacy quiz score.

| | Total | NZ | England |
|----------------------------|-------------------------------------|------------------------------------|------------------------------------|
| Extraversion | 0.696 (0.022) | -0.783 (-0.031) | 1.782 (0.096) |
| Neuroticism | 0.203 (0.006) | -0.252 (-0.011) | 0.652 (0.031) |
| Conscientious | 0.320 (0.011) | -0.904 (-0.041) | 1.776 (0.100) |
| Agreeableness | -1.054 (-0.040) | -0.420 (-0.021) | -1.072 (-0.062) |
| Openness | 0.932 (-0.029) | -0.331 (-0.013) | -1.763 (-0.094) |
| England | -7.697*** (-0.819) | | |
| Female | -3.528*** (-0.430) | -2.525** (-0.398) | -2.542** (-0.482) |
| 21 Years old or younger | 3.036*** (0.486) | 1.267 (0.238) | 3.482*** (1.001) |
| Minority Ethnicity | -1.634 (-0.256) | -0.925 (-0.176) | -1.208 (-0.326) |
| Mother University Graduate | -1.153 (-0.143) | -0.499 (-0.073) | -1.023 (-0.220) |
| Father University Graduate | 0.059 (0.007) | 0.525 (0.077) | -0.574 (-0.114) |
| Studying Business | 2.405** (0.274) | 2.777*** (0.399) | 0.292 (0.055) |

** and *** denote statistical significance at the 5 and 1% levels respectively.

When the data is split by country, the gender variable is significant across both samples, with studying business being significant in the NZ sample, and aged 21 or younger being significant in the England sample.

Given gender was the only variable that showed a statistically significant difference both overall and within each country, the scores for each individual question on the financial literacy quiz were compared by gender within each country, to see if similar patterns emerged between England and NZ. The Odds ratios and Z-statistics shown in table 3 reveal that in both countries, males scored significantly higher than females on question one; a simple compound interest question (NZ 85% v 58%; England 80% v 53%). In England, the only other significant difference was for question four, where males scored significantly higher than females on a question about indirect tax rates. In NZ, the only other significant difference was for question three, where males scored significantly higher than females on a question about credit card debt.

Table 3. Mean differences, odds ratios and z-statistics by gender and country for each financial literacy quiz question.

| | England | | | NZ | | |
|--|---------------|-------------|--------------------------------------|---------------|-------------|--------------------------------------|
| | <i>Female</i> | <i>Male</i> | <i>Z-statistic & odds ratios</i> | <i>Female</i> | <i>Male</i> | <i>Z-statistic & odds ratios</i> |
| Question One (Compound Interest) | 53% | 80% | 3.663 (0.27)*** | 57% | 86% | 4.396 (0.22)*** |
| Question Two (CPI) | 52% | 45% | 0.853 (1.29) | 55% | 55% | 0.004 (1.00) |
| Question Three (Credit Card Debt) | 52% | 56% | 0.556 (0.85) | 64% | 87% | 3.798 (0.26)*** |
| Question Four (Indirect Tax Rates) | 58% | 89% | 4.153 (0.16)*** | 96% | 98% | 0.777 (0.53) |
| Question Five (Compound Interest) | 53% | 42% | 1.452 (1.55) | 66% | 76% | 1.616 (0.62) |
| TOTAL MEAN | 2.68 | 3.13 | | 3.39 | 4.02 | |

** and *** denote statistical significance at the 5 and 1% levels respectively.

It is interesting to note that while males scored significantly higher than females in terms of total quiz score in both countries, in NZ males were more likely to answer correctly than females on every question apart from question two, where 55% of both genders were correct. In England however, females were actually slightly more likely to answer correctly on two of the five individual questions, but still scored significantly lower than males overall.

Logistic multiple regressions were also run on the same data, to calculate odds ratios given the effect of the other variables in the earlier regressions. For brevity, only the results for the gender variable by country are shown. As table 4 shows, the same questions as in table 2 showed significant differences between males and females, however the odds ratios did change slightly once the effect of variables other than gender were accounted for.

Table 4. Odds ratios by gender for financial literacy quiz question in each country, accounting for additional variables.

| | NZ Male v Female | England Male v Female |
|--------------------------------|----------------------------------|----------------------------------|
| Q1 – Compound Interest | 0.42** | 0.31*** |
| Q2 - CPI | 0.94 | 0.78 |
| Q3 – Credit Card Debt | 0.31*** | 0.71 |
| Q4 – Indirect Tax Rates | 0.96 | 0.21*** |
| Q5 – Compound Interest | 0.82 | 1.40 |
| Total (OLS) | -2.53** (-0.40) | -2.54** (-0.48) |

** and *** denote statistical significance at the 5 and 1% levels respectively.

In tables 2 and 3 above, comparisons were made between males and females within each country. In table 5 below, a comparison is made between countries for each gender. As the z-statistic and odds ratios (confirmed by logistic multiple regressions including all variables) show, both males and females from England were less likely to answer questions three (credit card debt), four (indirect tax rates) and five (calculating compound interest) correctly than their counterparts in NZ (For question three (credit card debt), logistic odds ratios for male were only significant at the 90% confidence level).

Table 5. Odds ratios comparing quiz results between countries by gender .

| | Female England v NZ | Female England v NZ | Male England v NZ | Male England v NZ |
|---|----------------------------------|----------------------|----------------------------------|----------------------|
| | Z-statistic & odds ratios | Logistic Odds Ratios | Z-statistic & odds ratios | Logistic Odds Ratios |
| Question One (Compound Interest) | 1.007 (0.79) | 0.79 | 0.927 (0.67) | 0.46 |
| Question Two (CPI) | 0.592 (0.87) | 0.98 | 1.236 (0.67) | 0.59 |
| Question Three (Credit Card Debt) | 1.968 (0.62)*** | 0.63*** | 4.168 (0.19)*** | 0.16 |
| Question Four (Indirect Tax Rates) | 6.292 (0.06)*** | 0.03** | 2.045 (0.19)** | 0.05*** |
| Question Five (Compound Interest) | 2.186 (0.58)** | 0.54*** | 4.192 (0.23)*** | 0.27** |

** and *** denote statistical significance at the 5 and 1% levels respectively.

Given that both the England and NZ samples supported findings from the general literature that males outperform females on financial literacy tests (from table 2, gender was the only variable which was statistically significant in both countries), and that country was also significantly correlated to financial literacy quiz score, responses to the attitudinal statements were analysed by gender for each country separately. Appendix 2 shows the 20 attitudinal questions for which students were asked to respond on a five point Likert scale from 1 = Strongly Agree to 5 = Strongly Disagree.

Table 6 shows the results of ordinary least squares multiple regressions being applied to each attitudinal statement. For space considerations, although the personality variables of extraversion, neuroticism, conscientious, agreeableness and openness from The Big Five Inventory along with the age, parental education levels, financial literacy quiz score and department of study variables were included in the multiple regressions, the results for these variables are omitted from table 6. The variable of gender was focused on as the literature and results discussed earlier pinpointed this variable as being significantly correlated with financial literacy knowledge.

Table 6. Significant OLS coefficients and t-statistics associated with attitudinal statements for England and NZ data.

| | England (Female = 1) | NZ (Female = 1) |
|---|--------------------------------|---------------------------|
| I expect to earn more in the future because I went to university | 0.243** (1.976) | 0.184 (1.607) |
| Educational loan debt is a good investment for the future | 0.435*** (2.758) | -0.094 (-0.653) |
| I have a greater chance of getting a job if I have a degree | 0.256** (2.149) | 0.008 (0.069) |
| I will start to deal with my student debt once I leave university and get a job | 0.242 (1.626) | 0.365** (2.214) |
| I minimise my spending to minimise my debt | -0.514*** (-2.735) | -0.077 (-0.480) |

** and *** denote statistical significance at the 5 and 1% levels respectively.

In England females have more negative attitudes relative to males around the future benefit of education, being more likely to disagree that they expect to earn more in the future because they went to university (OLS coefficient 0.243); educational loan debt is a good investment for the future (0.435) and they have a greater chance of getting a job if they have a degree (0.256). Females in England are also more likely to agree that they minimise their spending to minimise their debt relative to males in England. The NZ sample does not show the same results, with no significant difference between male and female responses for the same statements. The only statement where females in NZ showed a significant difference from their male counterparts was that females were more likely agree that they would deal with their student debt once they leave university and get a job. A summary of the statements where there was a significant difference between male and female response on the five point Likert scale are shown in table 7 for both countries.

Table 7. Statements females are more likely to agree or disagree with than their male peers.

| | England | NZ |
|--|---------------------------------|---------------------------------|
| I will start to deal with my student debt once I leave university and get a job | | Females more likely to disagree |
| I expect to earn more in the future because I went to university | Females more likely to disagree | |
| Educational loan debt is a good investment for the future | Females more likely to disagree | |
| I have a greater chance of getting a job if I have a degree | Females more likely to disagree | |
| I minimise my spending to minimise my debt | Females more likely to agree | |

Discussion

The results outlined in the previous section confirm the gender bias that has been reported in the general literature, that males score higher than females on financial literacy tests. In fact, gender is the only variable consistent across both the England and the NZ sample as having a significant correlation with financial literacy test score. When examining each of the specific questions in the quiz, NZ males consistently outperformed NZ females on the different topics; however the performance of England males relative to England females, whilst still superior overall, was less comprehensive. One area where males significantly outperformed females in both countries was on the simple compound interest question. This is consistent with Lusardi and Mitchell (2008) who found that 74.70 per cent of males answered a similar question on compound interest, while only 61.90 per cent of females answered correctly. However, where Lusardi and Mitchell (2008) found a similar differential with their question on inflation, in this study 55% of NZ males and females both answered the inflation question correctly, while more females answered the question correctly than males in the England, although in neither country was the difference statistically significant. The reasons for a differential between genders on the simple compound interest question in both countries, along with similar findings by Lusardi & Mitchell (2008) are difficult to fathom. The question did not require a compound interest calculation, just an understanding of the concept of compound interest. The compound interest question (question five) that did require an element of calculation was more likely to be answered correctly, by females than the simple compound interest question, with no significant difference between the genders.

One interesting consistent difference between the countries was for the questions on credit card interest, sales tax rates and a more complicated compound interest question, where both female and male NZ students outperformed their respective counterparts from England. This may suggest a more systemic weakness in the financial knowledge of students in England relative to NZ with regards to these topics.

The statistical analysis carried out on the attitudinal statements suggests there is also a difference in attitudes toward student debt between males and females. Where the difference in the NZ sample was minor, a worrying difference between the genders was identified in the England sample; where females were less likely to see the future benefits of higher education than males. As noted in the introduction, Brynin (2013) questioned the extent to which prospective students are in a position to make economically rational decisions about their education consistent with *human capital theory* (Becker, 1994). It appears that in England, female students may be aware of the projected lower earnings they receive relative to males, with the Office for National Statistics (ONS) reporting a 'gender wage gap' of 9.4% in April 2014 in the mainstream media (BBC News, 2014). However, this may be clouding their perception of how valuable a degree is relative to not having a degree, regardless of gender. While it is true that a gender wage gap exists in terms of salaries in England, it is also true that a female with a degree earns more on average than a female without a degree. It is also interesting to note that according to the Ministry for Women a similar gender wage gap of 9.9% also exists in NZ (Ministry for Women, 2014), but the differences in female attitudes to student debt relative to males are far less prevalent than in England. If females who actually attend university in England harbour these pessimistic views relative to males regarding the worth of a degree, one wonders if some female students do not attend university due to this perception.

Implications and Further Research

The results above show that in England, female students have lower expectations around the future value of tertiary education. Whether or not these lower expectations are sufficient to dissuade some students from attending university is beyond the scope of this study, but provides an opportunity for further research, especially examining people who chose not to engage in tertiary education. For those providing personal finance services and courses, it is important to understand preconceived notions participants may hold that can inhibit both attendance at and engagement in such programs. The differing attitudes females in England on average hold around the future benefit of investment in education for example could act as a real barrier toward making appropriate and correct decisions in terms of the financing of their education. The underperformance of females on financial literacy quizzes in both England and New Zealand, both generally and when dealing specifically with questions on compound interest concepts also needs to be recognised by those involved in the personal finance sector. For such an important concept as compound interest, it is of concern to see only just over half of female university student samples in both England and New Zealand answer a simple compound interest question correctly. This does not instil a great deal of confidence in their ability to successfully manage their personal finances involving debt and investment in the future.

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Appendix 1 - Financial Literacy Questions (New Zealand Version)

Question One.

Suppose you had \$100 in a savings account where the interest rate is 10% per year and you never withdraw money or interest payments. After 5 years, how much would you have in this account in total?

1. Less than \$150.
2. Exactly \$150.
3. More than \$150.

Question Two.

(The Consumer Price Index (CPI) is important for students as it

1. shows by how much in general a student loan is decreasing in real terms.
2. shows how prices in general are increasing over time.
3. gives an idea of by how much money is losing value over time.
4. all of the above.

Question Three

If John pays off the full amount on his credit card each month he won't be charged any interest on the amount borrowed.

1. True.
2. False.

Question Four

What is the current rate of Goods and Services Tax (GST) payable in New Zealand?

1. 15%
2. 20%
3. 25%
4. 30%

Question Five

Rob and Mary are the same age. At age 25 Mary began saving \$2,000 a year while Rob saved nothing. At age 50, Rob started saving \$4,000 per year while Mary kept saving her \$2,000. Who has the most money at age 75?

1. They would each have the same amount because they put away exactly the same
2. Rob, because he saved more each year
3. Mary, because her money has grown for a longer time at compound interest

Appendix 2 - Attitudinal statements responded to using a five point Likert scale.

| | |
|-------------|---|
| Question 1 | I expect to earn more in the future because I went to university |
| Question 2 | Educational loan debt is a good investment for the future |
| Question 3 | I have a greater chance of getting a job if I have a degree |
| Question 4 | I worry that the repayments on my debt will become unaffordable |
| Question 5 | I have a good idea about how much student loan debt I am incurring |
| Question 6 | I will start to deal with my student debt once I leave university and get a job |
| Question 7 | Debt is an expected outcome of attending university |
| Question 8 | I use debt to pay for a good social life |
| Question 9 | I use debt so I don't miss out on 'normal' student experiences |
| Question 10 | The debt I create as a student is an unfair start to my working life |
| Question 11 | I use debt to pay for luxuries |
| Question 12 | I sometimes can't sleep because I worry about how much debt I am in |
| Question 13 | I worry about debt to the point where it affects my grades |
| Question 14 | I feel I have a good understanding of how student loans work |
| Question 15 | I minimise my spending to minimise my debt |
| Question 16 | I know about the repayment terms for my student loan |
| Question 17 | I have a good idea about how much credit card and overdraft debt I am incurring |
| Question 18 | The best use of my student debt is to pay for my university expenses |
| Question 19 | Even though I am incurring debt now, it will be worth it in the future |
| Question 20 | I feel isolated by my student debt |

Concluding Statement

There exists a gender bias in terms of academic attainment in the NCEA in the subjects of economics and accounting that does not exist in aggregated results for all subjects. This is supporting evidence for some research that suggests economics is viewed as a 'masculine' subject. While for all subjects aggregated, male rates of non-achievement are higher than for females, in the subjects of economics and accounting females experience higher rates of non-achievement than males. This effect was magnified for students in low decile schools, with significant interaction occurring between school decile, gender and ethnicity.

With the introduction of the NCEA, the number of economics and accounting NCEA standards entered fell for students from low decile schools. The level of academic achievement for students from low decile schools has also fallen for both economics and accounting. For students studying economics both the number of standards entered by students of Maori or Pacific Island ethnicity and the level of educational achievement of Maori and Pacific Island students rose with the implementation of the NCEA. There was however a significant school decile effect. In the subject of economics, the academic achievement of Pacific Island students from low decile schools has remained stable, while for Maori students in low decile schools it has fallen. In the subject of accounting, Pacific Island students are entering more standards, but their academic achievement has fallen, while Maori students are entering fewer standards, with their academic achievement remaining constant.

Relating these findings back to research question number one, the findings suggest that gender, school decile and ethnicity are interacting for the 'business' subjects of economics and accounting that is suggestive of some form of socialization which is not unique to all subjects. Females, students from low socioeconomic backgrounds, Maori students and Pacific Island students all achieve academically at lower rates than their peers in economics and accounting at secondary school in New Zealand. When examining the results of a national financial literacy survey amongst adults, after accounting for all other variables such as age, education and socioeconomic status, simply being of Maori ethnicity was correlated with a lower financial literacy test score.

When students of university age and above are tested on their financial literacy knowledge, males score significantly higher than females. This relationship existed in samples from both New Zealand and England. However, when 15 year olds are tested, there is no significant gender difference. This is indicative of results found by the PISA (Programme for International Student Assessment) (OECD, 2014) research. The age a student has their first financial discussion with a parent was found to be significantly correlated with a higher financial literacy quiz score, especially for male students. Other variables correlated with a higher financial literacy quiz score included being of European ethnicity, being from a higher decile school, and having a father who attended university. Having completed a financial literacy course at school was not correlated with financial literacy quiz score.

When considering the second research question of 'how are influences consistent with social learning and social cognitive theory such as ethnicity, gender, socioeconomic status, parental education and parental discussions in the home correlated with financial literacy knowledge, attitudes and behaviours', students from low decile schools have their first financial discussion in the home at an older age than high decile students, but there is interaction with variables such as ethnicity. Father's education and gender influence the age of the first financial discussion in the home, as does having completed a financial literacy course at school for male students only.

With father's education having a significant correlation with financial literacy quiz score, along with age of first financial discussion with a parent, but mother's education not displaying the same relationships, this is suggestive of financial socialization in the home being gender specific. This is emphasised by a gender differential in terms of the age of first financial discussion with a parent, and the emergence of a gender differential on financial literacy quiz scores as children age into adulthood. These findings support the social learning theory influence of direct tuition being undertaken predominantly by the father, explaining why the father's level of education is correlated with financial literacy quiz score – a more educated father can offer better financial discussions. The later age of first financial discussions for females relative to males also provides further evidence for social learning theory which suggests parents spend more time with same sex children, as well as offering support for overall financial socialization through modelling and enactive experience being gender biased.

The 15 year old samples revealed that females had more negative attitudes toward money than males, and that females impulse spent more than males, with the level of mother's education significantly correlated with impulse spending. This suggests that while fathers provide direct tuition on financial matters, mothers may be present more often with children when spending occurs, resulting in a more female perspective in terms of social learning theory's enactive experience influence. Thus father's level of education matters for financial knowledge, while mother's level of education matters for spending. This could also be explained by social cognitive theory's zone of proximal development. The father plays the role of the financial expert, who spends more time with sons than daughters, through direct tuition, modelling and enactive experience providing better quality financial discussions more often with sons rather than daughters, with the cumulative effect being lower financial knowledge for females later in life.

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Appendix A

Agnew, S. (2011). **The Impact of School Socioeconomic Status on Student Generated Teacher Ratings.** *Journal of College Teaching & Learning* 8(1) p. 39-46.

ABSTRACT

This paper uses ordinary least squares, logit and probit regressions, along with chi square analysis applied to nationwide data from the New Zealand ratemyteacherwebsite to establish if there is any correlation between student ratings of their teachers and the socioeconomic status of the school the students attend. The results show that students from mid socioeconomic status schools score their teachers significantly higher than students from other socioeconomic status schools. This has implications for the national measurement of teacher performance, as well as implications for individual teachers working in different socioeconomic status schools.

KEYWORDS: *Teacher Ratings, Socioeconomic Status, Teacher Quality, Teacher Effectiveness*

1.1 INTRODUCTION

The objective of this work is to establish if there is a correlation between the socio-economic status (SES) of the school a student attends, and student ratings of their teachers. In New Zealand, the measurement used to represent the socio-economic status (SES) of a school is the school's decile, which is calculated by the Ministry of Education. All state schools in New Zealand are given a decile rating which represents the SES of the school's catchment area. According to the New Zealand Ministry of Education website (Ministry of Education, 2010), in order to assess a school's decile rating five factors are used to measure the socio-economic standing of its community: household income, occupation, household crowding, educational qualifications and income support (the percentage of parents who receive a benefit). Decile 1 schools are the 10% of schools with the highest proportion of students from low socio-economic communities, whereas decile 10 schools are the 10% of schools with the lowest proportion of these students. A low decile school would therefore draw on communities where there is a greater density of households that have low incomes, manual occupations, greater household crowding, lower educational qualifications and greater dependence on income support.

Ali, McWhirter and Chronister (2005) state that socioeconomic status influences the educational and occupational opportunities available to individuals, and the attainment they achieve. They base this assertion on research carried out by Brown (2000), Fouad & Brown (2000), Gilbert & Kahl (1993) and Turner & Lapan (2003). Ali et al (2005) go on to state that socioeconomic status (SES) "influences the way individuals perceive their opportunities and affects their access to educational and vocational resources" (p. 41 & 42). They also continue that

"Social Cognitive Career Theory (SCCT) outlines the ways in which personal factors such as SES interact with contextual factors (e.g. social support) to influence the development of career interests, the selection of career goals, and career behaviours....For example, an adolescent from a lower SES background is more likely to have poorer quality schooling,

fewer career role models, and less financial support for postsecondary options than higher SES adolescents”. (p. 41 & 42).

Based on the findings of Ali, McWhirter and Chronister (2005), we would expect lower socio-economic (SES) students to have poorer schooling, and thus give their teachers lower ratings. There is certainly evidence to suggest that lower decile schools in New Zealand are harder to staff, and have a greater proportion of inexperienced teachers teaching in them. The document *Monitoring Teacher Supply* (Ministry of Education, 2006) found that based on a survey of principals at the start of 2006:

“In 2006, there was again a clear pattern evident by school decile, as in previous years. The proportion of vacancies and re-advertised positions to staffing entitlement was highest in low decile schools (deciles 1 – 3) and lowest in high decile schools (8 – 10)” (p. 13).

In 2006, 15% of low decile (1-3) schools had a vacancy compared to 13.5% of medium decile (4-6) schools and 11.8% of high decile (8-10) schools. (Ministry of Education, 2006). When the same comparison is made for re-advertised positions (any position which has been advertised nationally more than once with no appointment being made after the first time advertised), there is a similar result, with 6.1% of low decile schools re-advertising compared with 4.7 & 2.8% for medium and high decile school respectively. This equated to 47.8 positions in low decile school, 45.7 positions in medium decile school, and 22.2 positions in high decile schools (Ministry of Education, 2006). For the period 2003 to 2006, schools covered 43% of their vacancies through trained relief staff, and 11.9% of vacancies with staff that had limited authority to teach. (Ministry of Education, 2006). This suggests that students in low decile schools have a higher chance of being taught by a relief teacher or a teacher with a limited authority to teach. Low decile schools also had a greater proportion of beginning teachers in 2006, with 5.8% of their teachers being beginning teachers, compared to 4.9% in medium decile schools and 4.5% in high decile schools (Ministry of Education, 2006).

However, McKeachie (1979) makes a pertinent point when he states that “Probably the single most important student variable affecting satisfaction is student expectations. Students who expect a course or teacher to be good generally find it to be so” (p. 390). Further studies which support the notion of student expectations having an impact on teacher evaluations include Perry, Niemi & Jones (1974), who found that prior student expectations of teaching performance based on instructor reputation had an influence on student ratings. A similar study by Leventhal, Abrami and Perry (1976) found that students who chose a class section based on the reputation of the instructor gave higher ratings to their teachers than did their classmates. Using multilevel regression, Griffin (2001) found that students who heard positive information regarding the instructor’s reputation rated the instructor higher than students who heard negative information about the instructor. Gigliotti (1987) found that negative expectancy violations resulted in unfavourable course evaluations. Gigliotti and Buchtel (1988) found that student evaluations of college courses and instructors are significantly determined by whether outcomes correspond to expectancy. They also found that students’ feelings of satisfaction with a course and with themselves are influenced by the same process.

Relating this to SES, Chapman & Lawes (1984) report that “studies of low achieving or failure-prone individuals have reported the tendency for success to be seen as externally caused and failure as internally caused” (p. 177). According to New Zealand Qualifications Authority (NZQA) released data from 2005 to 2007, at levels one, two and three, students at high decile schools acquire NCEA at a much higher rate than students at mid-decile schools, who acquire it at a much higher rate than students at low decile schools (NZQA, 2009). Students from low decile schools have lower rates of success in obtaining NCEA, and if the findings of Chapman & Lawes (1984) are correct, are more likely to attribute less than expected performance to themselves as opposed to the teacher. Conversely, students from high decile schools may have higher expectations that their education will be of a higher quality, but be more likely to attribute less than expected academic performance to their teacher. This raises the interesting question of is there a common correlation between the SES of a school, and how the students attending that school rate their teachers? The statistics from the Ministry of Education referred to earlier in the introduction suggest that students from high SES schools are less likely to experience a lower quality of teaching due to the lower number of relief teachers and teachers with a limited authority to teach, when compared to schools of lower SES. The existing research also suggests that if the students from high SES schools expect their education to be of a good quality, they will rate their teachers accordingly. Both of these factors suggest that students from high decile schools will rate their teachers higher than students from low decile schools. However, there is also some literature that suggests high SES students are more likely to attribute failure to the teacher, where low SES students are more likely to internalize failure. To ascertain if there is a correlation between the SES of the school a student attends, and student ratings of their teachers, the materials and methods outlined in section 1.2 were used.

1.2 MATERIAL AND METHODS

Data was collected from the ratemyteacher.co.nz website between December the 15th and December the 22nd 2006. This was timed to be after the school year had finished and examinations had been completed, but before examination results were released in mid January. The ratemyteachers.co.nz website was introduced into New Zealand in 2006, and is an expansion of the www.ratemyteachers.com site based in the USA. This study concentrates on the NZ site.

People logging onto the site are able to rate a teacher on three characteristics: Easiness of the subject, clarity of the teacher, and helpfulness of the teacher. Each characteristic is rated on a scale of 1 to 5, with one being the lowest, and 5 the highest. These three numbers are averaged to give the teacher an average quality rating out of 5. As at January the 7th, 2007, there had been 142,404 ratings. Some 26,345 teachers have been rated (although this figure is slightly overstated as some teachers are listed twice in some schools, and some teachers have been listed, but not rated), and 1,896 schools were listed on the site (although some schools had no teachers rated).

This study focuses on composite, year 7 to 13, and year 9 to 13 schools. The mean teacher rating was recorded for each school from the [ratemyteacher](http://ratemyteacher.co.nz) website. The number of ratings was compared to the official school roll for each school, and schools for which the number of ratings was less than 10% of their school roll were removed from the study. The purpose of this was to remove schools which had few responses, where the average teacher rating may have been unduly affected by “rogue” ratings, whilst at the same time not discriminating against small schools. The average

teacher rating for each school also had to be adjusted where a teacher had been listed, but no rating had been given. This was recorded as a zero rating on the Rate My Teacher site, and thus brought the average quality rating down. These zero ratings were removed, and the averages adjusted accordingly for the purpose of this study. In some schools, the same teacher was listed and rated more than once. This will have had a very minor effect on some of the average teacher quality ratings for certain teachers, however there is no reason to believe they are dominant in any particular decile group, and thus should not have distorted the relative rankings.

To ensure there were a sufficient number of samples in each region, schools have been grouped into one of four groupings, according to their decile rating. The four groupings are:

- Deciles 1, 2 and 3
- Deciles 4, 5 and 6
- Deciles 7, 8 and 9
- Decile 10 and private schools

The smallest sample size of any decile grouping was 28 schools, which represents many hundreds of individual teacher ratings. The overall sample size was 269 schools. Decile 10 and private schools were given their own grouping, as they represented the highest SES school grouping, and schools which caregivers and parents have been required to pay fees to attend. The majority of private schools are likely to have been categorized as decile 10 had they been state schools. They are also likely to have similar expectations by students of the quality of education they will receive as decile 10 school students.

The mean teacher ratings by school that were calculated for each decile grouping allowed for comparison across several different regions. Ordinary Least Squares (OLS) regressions were run to establish if any differences in the means between decile groupings were statistically significant. The regression model had the following form:

$$\text{Mean School Teacher Rating} = \alpha + \beta_1 \text{ High Decile} + \beta_2 \text{ Urban} + \beta_3 \text{ North Island} + \varepsilon$$

Where:

α = intercept

High Decile = the dummy variable for the highest decile grouping in that regression

City = the dummy variable for schools identified by the Ministry of Education as having a city local territorial authority (1=City; 0=Districts)

North Island = the dummy variable for the island each school was located in (1=North Island; 0=South Island)

ε = the error term

The city and North Island variables were included to see if the geographic location of the school had a significant impact on the mean school teacher rating.

To enable the use of contingency tables, and the calculation of odds ratios, the data was then recoded. Rather than using the mean teacher rating for each school, the national mean teacher rating was calculated. Schools were then given a dummy variable of 1 or 0, depending on whether their mean school teacher rating was above or below the national mean. Logit and probit regressions were then run, with the probit regressions reporting changes in probabilities, and the logit regressions reporting odds ratios. The changes in probabilities reported by the probit regressions were the same as the OLS coefficients, and represented the risk differences when calculating effect size. A chi-square analysis was also performed on the data to confirm levels of significance.

1.3 RESULTS AND DISCUSSION

The national mean and median teacher rating by school were both 3.67(2dp). Table one shows the mean school teacher rating calculated across various geographic regions.

Table 1: Mean teacher ratings by decile grouping and region.

| Decile Grouping | NZ | NZ City | NZ Districts | North Island | South Island | Nth Island Districts | Nth Island City | Sth Island Districts | Sth Island City |
|------------------------|-----------|----------------|---------------------|---------------------|---------------------|-----------------------------|------------------------|-----------------------------|------------------------|
| 1, 2 & 3 | 3.618 | 3.522 | 3.681 | 3.630 | 3.584 | 3.723 | 3.442 | 3.481 | 3.662 |
| 4, 5 & 6 | 3.739 | 3.795 | 3.695 | 3.739 | 3.738 | 3.694 | 3.806 | 3.698 | 3.777 |
| 7, 8 & 9 | 3.651 | 3.671 | 3.631 | 3.688 | 3.585 | 3.675 | 3.702 | 3.552 | 3.617 |
| 10 & 99 | 3.628 | 3.653 | 3.446 | 3.642 | 3.574 | 3.482 | 3.659 | 3.376 | 3.624 |

Column one shows the mean school teacher rating for the entire sample. It is this data that is used in the statistical analysis to test for significant correlations. The difference in the mean scores for the different decile groupings is not large. There are larger differences between decile groupings in some of the subsamples, however smaller sample sizes in some of these groupings means that tests of significance are not appropriate. An interesting pattern to emerge is the decile 4, 5 & 6 grouping scoring the highest rating, and the decile 10 and private schools scoring the lowest or second lowest rating, which is consistent across most of the data set. This is highlighted in table two, where the rank order of each decile groupings means teacher rating is shown.

Table 2: Relative rankings of teacher ratings.

| Decile Grouping | NZ | NZ City | NZ Districts | North Island | South Island | Nth Island Districts | Nth Island City | Sth Island Districts | Sth Island City |
|------------------------|-----------|----------------|---------------------|---------------------|---------------------|-----------------------------|------------------------|-----------------------------|------------------------|
| 1, 2 & 3 | 4 | 4 | 2 | 4 | 3 | 1 | 4 | 3 | 2 |
| 4, 5 & 6 | 1 | 1 | 1 | 1 | 1 | 2 | 1 | 1 | 1 |
| 7, 8 & 9 | 2 | 2 | 3 | 2 | 2 | 3 | 2 | 2 | 4 |
| 10 & 99 | 3 | 3 | 4 | 3 | 4 | 4 | 3 | 4 | 3 |

With the exception of some payments paid to teachers working in hard to staff schools (traditionally low decile and/or remote rural schools), the teacher salary scale is the same across all deciles in the state sector. Given that many private schools also pay a premium above the state scale to attract “quality” teachers, it could be expected that “better” teachers would be attracted to higher decile and private schools, where teaching conditions are perceived to be easier, and in some private schools, the pay is higher. Therefore, if rate my teacher ratings are indicative of teacher quality, we could expect higher ratings in higher decile schools. Higher decile schools have certainly traditionally found it easier to fill staff vacancies than lower decile schools. A wider pool of applicants should theoretically increase the chances of hiring a “higher quality” teacher. The fact that the mean teacher rating for the decile 10 and private schools was consistently the lowest or third lowest is therefore somewhat surprising. Based on the information from the Ministry of Education provided earlier in section 1.1 which stated that high decile schools had fewer re-advertised positions, and so were less likely to need to employ relief staff, beginning teachers or teachers with limited authority to teach, the premise that the decile 10 and private schools find it easier to attract quality teachers, and so should receive higher ratings would be expected. However, the rate my teacher site ratings do not reflect this. Not only does the decile 4, 5 & 6 group consistently receive the highest rating, it does so across every subset of the sample apart from one. The decile 4, 5 & 6 group teacher ratings also tend to fluctuate less than the other groups, from region to region.

Decile groups 4, 5 & 6; and 7, 8 & 9 are consistently ranked 1st and 2nd respectively, across the different samples. Rather than representing actual teacher quality, it is conceivable these teacher ratings are a reflection of where the student expectations of their teachers and the quality of teaching are most closely matched, although it must be noted that the decile 4, 5 & 6 grouping was the only one that displayed a significantly different mean rating. Despite the decile 1, 2 & 3 group performing better in the South Island, and scoring the highest ranking in the North Island Districts sample, when the North Island City scores are added, their nationwide rating comes out the lowest. Even though as low decile school students, their expectations are lower, these lower expectations appear to be still not being met as well as students in mid-decile schools. This is supported by the lower rates of school achievement, and higher rates of exposure to relief teachers, beginning teachers and limited authority to teach teachers. The fact that despite high rates of student achievement, the decile 10 and private schools group consistently received the lowest or second

lowest ratings suggests that the high expectations of the students may not be being met to the same extent as mid-decile schools students.

To establish if there were any significant differences between the mean teacher rating for each of the decile groupings, OLS regressions were run, with the results shown in table three.

Table 3: OLS regression coefficients showing the importance of decile and location on mean teacher ratings.

| | 1 to 3 Dropped | 4 to 6 Dropped | 7 to 9 Dropped | 10 and 99 Dropped |
|----------------------------|-----------------------|-----------------------|-----------------------|--------------------------|
| Deciles 1 to 3 | | -0.12** (-2.01) | -0.03 (-0.54) | 0.02 (0.31) |
| Deciles 4 to 6 | 0.12** (2.01) | | 0.09** (2.19) | 0.14*** (2.74) |
| Deciles 7 to 9 | 0.03 (0.54) | -0.09** (-2.19) | | 0.05 (1.06) |
| Deciles 10 & 99 | -0.02 (-0.31) | -0.14*** (-2.72) | -0.05 (-1.06) | |
| North Island | 0.06 (1.57) | 0.06 (1.57) | 0.06 (1.57) | 0.06 (1.57) |
| City | 0.06 (1.58) | 0.06 (1.58) | 0.06 (1.58) | 0.06 (1.58) |

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.10$

Column one shows the regression coefficients when the decile 1, 2 & 3 grouping is dropped. This means that the ratings of the other decile groupings are compared back to the decile 1, 2 & 3 grouping. The decile 4, 5 & 6 grouping is the only one to show a significantly different rating when compared to the decile 1, 2 & 3 grouping. It is significant at the 95% confidence interval. The coefficient of 0.12 represents the difference between decile 4, 5 & 6 grouping rating of 3.739 and the decile 1, 2 & 3 decile grouping rating of 3.618 (allowing for rounding). Because the coefficient is positive, the decile 4, 5 & 6 grouping had a higher mean than the decile 1, 2 & 3 grouping it is being compared against. Column three shows the results when the decile 7, 8 & 9 grouping is dropped (compared against). Once again, the decile 4, 5 & 6 grouping was the only one to have a significantly different rating; and again it was positive, meaning the decile 4, 5 & 6 grouping had a statistically significant higher rating. Column four shows the results when the decile 10 and private schools are dropped. The same pattern emerges, with the decile 4, 5 & 6 grouping having a positive, statistically significant coefficient, meaning a statistically significant higher rating. Column two effectively shows a summary of the statistically significant results from the other columns. Ratings for the decile 4, 5 & 6 group are significantly higher than all other decile groupings. The biggest difference is the comparison with the decile 10 and private schools, followed by decile 1, 2 & 3 schools. Decile 7, 8 & 9 has the smallest difference when compared with the decile 4, 5 & 6 grouping. There are no significant differences in ratings when any decile groupings other than the decile 4, 5 & 6 grouping are compared against each other. It should be noted, that the coefficients in table two on several occasions do not exactly match the differences in ratings shown in table one. This is because the coefficients in table two are calculated given the effect of island and territorial local authority. Although the effect of which island and territorial local authority the school was in

was not found to have a statistically significant effect, those two factors were still responsible for some effect on ratings.

After the dependant variable was recoded into a binary 1 or 0 depending on whether the mean school rating was above or below the national mean; ordinary least squares regressions, probit regressions reporting changes in probability and logit regressions reporting odds ratios were run. A Chi square statistic was also calculated to test for levels of significance. The results are shown in table four.

Table 4: Regression and chi-square analysis outputs.

| Ethnicity | OLS | χ^2 | Logit | Probit |
|--------------------|--------------------|----------------------------|-------------------|--------------------|
| 1-3 v 4-6 | 0.07 (0.68) | (0.47) (1,N=120) | 1.35 (0.69) | 0.07 (0.69) |
| 1-3 v 7-9 | -0.07 (-0.66) | (0.44) (1,N=127) | 0.75 (-0.66) | -0.07 (-0.66) |
| 1-3 v 10-99 | -0.14 (-1.15) | (1.34) (1,N=78) | 0.58 (-1.15) | -0.14 (-1.15) |
| 4-6 v 7-9 | -0.14** (-2.00) | (3.98)** (1,N=191) | 0.56** (-1.99) | -0.14** (-1.99) |
| 4-6 v 10-99 | -0.21** (-2.41) | (5.67)** (1,N=142) | 0.43** (-2.36) | -0.21** (-2.37) |
| 7-9 v 10-99 | -0.06 (-0.75) | (0.56) (1,N=149) | 0.77 (-0.75) | -0.06 (-0.75) |

There is now no significant difference between the decile 1-3 and decile 4-7 groupings. However the difference between how students from the decile 4-6 school grouping rate their teachers is still significantly different from both the decile 7-9 grouping and the 10-99 grouping. For the 4-6 and 7-9 decile groupings comparison, the probit and OLS regressions show that 14% fewer decile 7-9 schools were ranked above the national mean for teacher ratings than schools from the decile 4-6 grouping. The odds ratio calculated using a logit regression shows that the odds of a school in the decile 7-9 grouping having a mean teacher rating above the national mean are 56% of the odds of a decile 4-6 school having a mean teacher rating above the national mean. For the comparison between the 4-6 and 10-99 groupings, there were 21% fewer decile 10-99 schools ranked above the national mean compared with schools from the decile 4-6 grouping. The odds of a decile 10-99 school being ranked above the national mean for teacher ratings are 43% of the odds of a decile 4-6 school having a mean teacher rating above the national mean. All of these results are significant at the 05% confidence level, which is confirmed by the calculation of the chi square statistic.

There appears to be two possible reasons for this. The first is that the best teachers do teach in decile 4, 5 and 6 schools. Measuring this is beyond the scope of this study. However, intuitively there is no obvious reason as to why this would be the case in almost every region in NZ, especially when some private schools offer higher rates of pay, and high decile schools have lower rates of re-advertised positions, suggesting they are easier to staff. The second possible reason is that rather than measuring teacher quality, the rate my teacher ratings are measuring teacher performance relative to student expectations of their teachers. Although students from high decile schools have the highest rates of NCEA achievement according to the NZQA data mentioned earlier in section 1.1, they are also more likely to have higher expectations of their teachers, as hypothesised by Ali et

al (2005). This hypothesis is further substantiated by Chapman & Lawes (1984) as mentioned in section 1.1, when they suggest that low achieving or failure-prone individuals have reported the tendency for success to be seen as externally caused and failure as internally caused (1984). High decile students may therefore, be more likely see success as being internally caused, and failure to be externally caused.

1.4 CONCLUSIONS

There is a significant difference in how students from mid decile schools rate their teachers, when compared to students from low and high decile schools when comparing mean student ratings of their teachers, aggregated at the school level. Although the actual difference in mean teacher ratings between schools in different decile groupings is small, 2.4% less for the decile 7-9 grouping and 2.9% less for the 10-99 decile grouping when compared to decile 4-6 schools, they are significant at the 95% confidence level. When phrased in terms of the odds of a school gaining a mean teacher rating greater than the national mean, there are large and significant differences between decile 4-6 schools and schools from both the decile 7-9 grouping and the 10-99 grouping. The purpose of this paper is to establish if a correlation exists between the SES of a school, and the teacher ratings of that school. This has been proven. An opportunity also exists for further research which attempts to establish the reasons why the established correlations exist. This paper is unique in New Zealand in that it is based on nationwide data, not data within an institution. This has allowed for comparison between deciles, which previous research on teachers within an institution has not been able to do.

The implications of the findings of this paper for the teaching profession are two-fold. Firstly, when teacher effectiveness is being measured, SES differences in student ratings which are not due to teaching ability need to be considered. Teacher evaluations need to be recognised as being a test of perceived teacher, rather than a reflection of teacher quality. It may be for instance, that a teacher currently working in a high SES school, may in fact score a higher rating in a mid SES school, where student expectations may be lower. Secondly,

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Appendix B

Agnew, S. and Hickson, S. (2012). Using online assessment to replace invigilated assessment in times of a natural disaster: Are some online assessment conditions better than others? *Journal of Open, Flexible and Distance Learning* 16(1) p. 1-13.

ABSTRACT

As the result of the September 4th 2010 Canterbury earthquake and associated aftershocks on February 22nd 2011 and June 13th 2011, final examinations in the two 100 level economics papers at Canterbury University were cancelled at short notice in semester one 2011. The final examination weightings were spread over the remaining assessments to obtain a final grade for students. This paper attempts to establish how different online assessment conditions affect final grade distributions when online assessments are substituted for an invigilated final examination. Pearson correlation coefficients and Spearman rank order correlation coefficients are used to show that there is a greater correlation between online quizzes and invigilated assessments when those quizzes are only available for a restricted period of time, compared to the whole semester. We find that online quizzes are more closely correlated with invigilated assessments when the first attempt at a quiz is recorded, as opposed to the highest of two attempts. We also find that using the first attempt leads to less grade disruption when compared to a “normal” semester that includes a final examination. Finally, the actual impact on student grades when online quizzes are substituted for a final examination is discussed.

JEL Categories: A22

Keywords: Principles of Economics, Online Assessment, Student Grades, Disruption to Assessment, Earthquake, Online Assessment.

INTRODUCTION

On September 4th, 2010 an earthquake measuring 7.1 on the Richter scale struck Canterbury. As a result, the region was subjected to thousands of aftershocks, the most significant of which struck on February the 22nd 2011 and June the 13th 2011, both measuring 6.3 on the Richter scale. The September earthquake and February aftershock resulted in closures of two weeks each for the University of Canterbury campus. The June aftershock struck just prior to the semester one examination period, and resulted in the cancelation of final examinations for many papers, at short notice.

The cancelation of final examinations at short notice raises questions about how best to calculate final grades. This paper will focus on assessment of the first year economics papers at Canterbury University, (Introduction to Macroeconomics (ECON 105) and Introduction to Microeconomics (ECON 104)) and how well they allocate appropriate grades to students in an earthquake affected semester. Specifically, this paper will examine the effect of different conditions under which students take online multiple choice quizzes, such as limiting the time they are available for students to complete, or limiting the number of attempts a student has at a particular quiz. The first part of this paper will examine the effect of limiting the availability of online quizzes on the correlation between those quizzes and invigilated assessments such as term tests and final examinations. The second part of this paper will examine the effect of using the quiz “first attempt” vs. the “highest of two attempts” on correlations with invigilated assessments and the impact on grade allocations. The correlations and grade distributions should provide an insight into how substitutable online quizzes and invigilated assessments are. In simple terms can we gain some

insight into the conditions under which online assessments provide the most robust grade allocations, compared to an uninterrupted semester, when a final exam or similar is cancelled?

During the earthquake interrupted semesters at the University of Canterbury, online assessments proved to be invaluable. They could be completed by students without the need to come onto campus (although those with no internet access at home could still use the computer labs on campus), and removed the need to use markers who themselves were earthquake disrupted to meet for moderation meetings, and mark assignments for example.

LITERATURE REVIEW

Hickson and Agnew (2011) cite Benton (2009), Meyer & Wilson (2011), e-campus news (2009), Omar, Liu & Koong, (2008), Foster & Young (2005), Danielson (2009) and SchWeber (2008) who all discuss courses moving to an online format in response to hurricanes, war, or virus outbreaks. The above literature however focuses on a shift of predominantly teaching resources to an online environment, rather than assessment becoming predominantly online. There is also no examination of the effect on grade distributions of moving to online assessment in a semester disrupted at short notice by a natural disaster.

In the general literature on online delivery methods, there is some discussion on the strengths and weaknesses of the online assessment of material. Graff (2003) stated “There are many potential advantages of online assessment to learners. For example, tests are available on demand and at any time. Furthermore, computerised assessment systems give immediate feedback to the user; therefore users learn by taking the test”. (p. 22). Robles & Braathen (2002) find that “many different online components and assessment criteria and tools are needed to accurately and thoroughly assess student learning” (p. 47). They conclude by stating that “assessment should be ongoing and carried out through each chapter throughout the semester, to allow students to determine their own learning outcomes through self-testing” (p. 47). This is less costly to carry out in an online environment compared to running periodic physical tests. Running periodic online tests also provides a greater level of control for the instructor, and a greater incentive for student completion than leaving students to be responsible for their own independent self testing. Gaytan & McEwen (2007) found that “Effective assessment techniques include....weekly assignments with immediate feedback. The role of meaningful feedback cannot be overemphasized” (p. 117). They go on to state that “using effective assessment techniques is an essential part of effective teaching and learning in the electronic environment” (p. 118). This concurs with earlier research from Corocoran, Dersheimer & Tichenor (2004) and Stiggins & Chappuis (2005) who stated that monitoring student learning and enhancing teaching were two main purposes of assessment. Gaytan & McEwen (2007) state that several researchers such as Bartlett, Reynolds & Alexander (2000); and Farmer (2005) have found that an online environment assessment fosters a student centered learning environment and allows for more accurate measurement of learning. Gaytan & McEwen (2007) also reference Russell, Elton, Swinglehurst & Greenhalgh (2006) who stress the importance of continuous assessment as it allows instructors to monitor and be familiar with students’ understanding.

Perrin & Mayhew (2000) raised some concerns around the validity of online testing based on the ability of students to cheat, giving the example of students printing online tests and sharing them. Robles & Braathen (2002) explain that this undesirable behaviour can be mitigated by restricting the number of times the student can sit an online quiz, how long they have to complete the quiz, and by making the questions unable to be seen once the quiz has been submitted. They suggest distinguishing between online quizzes which are summative assessment items, and having formative online assessment items which have fewer restrictions on access, and can be used as learning tools rather than assessment tools. Olt (2002) researched strategies for minimizing

academic dishonesty in online assessment. She cited a survey of American high school students which reported that 80% admitted cheating on an exam (Bushweller, 1999). Kleiner & Lord (1999) using the same survey data found that 50% of the students did not believe cheating was necessarily wrong. They also found that 95% of those that said they cheated had never been caught. Heberling (2002) suggested that it may actually be easier to detect cheating online, however Olt (2002) does suggest some disadvantages to online assessment. This includes “an instructor’s inability to control a student’s unauthorized use of resources in completing an assessment”. (p. 3). She does go on to suggest having open-book assessment as a possible solution. Another disadvantage Olt (2002) suggests is students collaborating with each other on an assessment. One possible remedy she suggests is to have a question pool which questions are randomly selected from, so the chances of two students receiving the same assessment are minimal. Collusion can also be reduced by having restrictions on assessment availability, and setting time limits. Rowe suggests it is often easier to cheat online, and asks the question “When a student scores well for an online assessment, does that mean they know the material?” (p. 1). He cites Bork (2001) when stating that it is less cost-effective for students to cheat when assessment is continuous. If the concerns raised in the literature around student cheating in online assessments are legitimate, this raises concerns around the reliability of student grades as a greater weighting is applied to online assessments. Hickson & Agnew (2011) certainly found a greater level of grade disruption from a non-earthquake affected semester when a greater weighting was placed on online quizzes.

The contribution this paper aims to make is not to debate the relative merits of online assessment. Rather, the paper will aim to establish the ability of online assessment to deliver a grade distribution consistent with a ‘normal’ semester, in the event of the cancellation of a final exam at short notice.

ASSESSMENTS, DATA AND METHODS

From 2005 to 2010 assessment in both ECON 104 and 105 consisted of an invigilated three hour final examination (60%)¹, an invigilated 90 minute term test (20%), a take home assignment (10%), and online quizzes (10%). The online quizzes each consisted of 10 multiple choice questions, drawn from a test bank of hundreds of questions provided by the publisher of the textbook. In ECON 105 in 2011, 10% was also introduced for tutorials, with the weighting on the final examination being reduced from 60% to 50%. The effect of the earthquake disruption in semester one 2011 was the cancellation of the final examination and take home assignment, with the weighting redistributed across other assessments.

A crucial change was made to the online quizzes in ECON 105 for 2009 semester 2 onwards. From 2005 to 2009 semester 1, the quizzes were all available for the duration of the semester and could be completed multiple times. The highest mark was the counting mark for each quiz. The quiz availability was changed from semester 2 of 2009, when each of the ten quizzes was open only for a short window around the time the topic was being covered rather than open for the whole semester. With the cancellation of assessments in semester one 2011, a greater weighting was placed onto the online quizzes when final grades were calculated. We are able to use this break in the online quiz conditions to examine how correlations between online quizzes and invigilated assessments is affected. There are 2440 observations for the pre 2009 semester 2 period and 618 for 2009 semester 2 onwards.

Assessment in ECON 104 in 2011 also changed. In ECON 104 2011 semester two, assessment in ECON 104 consisted of an invigilated three hour final examination (55%), an invigilated 90 minute term test (25%), an online progress test (5%), online multiple choice quizzes provided by the

¹ Note that prior to 2007 the term test was worth 35% and the final exam was worth 45%.

publisher (5%) and weekly online tutorial quizzes tailored to the course (10%). The ten weekly online tutorial quizzes, consisting of 15 multiple choice questions drawn from a test-bank of questions used in previous term tests and examinations. Each quiz was worth 1%, and was open for on average one week. Students were allowed two attempts on each of the tutorial quizzes, with their highest score recorded. For the purpose of this paper, the tutorial quizzes were also remarked, taking the students' first attempt rather than their highest of two attempts. To establish the impact on the level of correlation between the invigilated term test and final examination, and the tutorials quizzes under the two marking scenarios, both the Pearson correlation coefficient and the Spearman rank order correlation coefficient were calculated. Hypothetical final grades for ECON 104 2011 semester two were also calculated under each tutorial quiz marking scenario, under the scenario the final examination is cancelled and the weighting it carries redistributed across the term test and tutorial quizzes. The sample size for these correlations was 320.

RESULTS

In the four semesters since ECON 105 quizzes went to limited windows of availability (2009 S2, 2010 S1, 2010 S2 & 2011 S2), the Pearson correlation coefficients for the online MC quizzes and final exam have been at the top, or exceeding the top of the range of Pearson correlation coefficients for the period when the quizzes did not have limited windows of availability (2005 S1 to 2009 S1). The Pearson correlation coefficients for the online MC quizzes and term test for the five semesters since the ECON 105 quizzes went to limited windows of availability (2009 S2, 2010 S1, 2010 S2, 2011 S1 & 2011 S2), have all exceeded the Pearson correlation coefficients for the period when the quizzes did not have limited windows of availability (2005 S1 to 2009 S1). The spearman rank order correlation coefficients for the online quizzes and both the exam and the term test for the period 2009 S2 to 2011 S2 have all exceeded the Spearman rank order correlation coefficients for the period 2005 S1 to 2009 S2 when the quizzes did not have limited windows of availability. This is shown in table one below. All coefficients are significant at the 1% level of significance.

| | <i>Term Test</i> | <i>Exam</i> |
|-------------------------------------|------------------|-------------|
| 2005-S1 to 2009-S1 ECON 105 MC Quiz | 0.27 – 0.47 | 0.48 – 0.66 |
| 2009 S2 ECON 105 MC Quiz | 0.55 | 0.65 |
| 2010 S1 ECON 105 MC Quiz | 0.55 | 0.66 |
| 2010 S2 ECON 105 MC Quiz | 0.49 | 0.67 |
| 2011 S1 ECON 105 MC Quiz | 0.57 | N/A |
| 2011 S2 ECON 105 MC Quiz | 0.66 | 0.77 |

TABLE 1 Range of Correlation Coefficients for Assessment Items (2005-S1 to 2009-S1)
Table 1(a) Pearson Correlation Coefficients

| | <i>Term Test</i> | <i>Exam</i> |
|-------------------------------------|------------------|-------------|
| 2005-S1 to 2009-S1 ECON 105 MC Quiz | 0.24 – 0.41 | 0.35 – 0.50 |
| 2009 S2 ECON 105 MC Quiz | 0.51 | 0.52 |
| 2010 S1 ECON 105 MC Quiz | 0.55 | 0.61 |
| 2010 S2 ECON 105 MC Quiz | 0.45 | 0.55 |
| 2011 S1 ECON 105 MC Quiz | 0.46 | N/A |
| 2011 S2 ECON 105 MC Quiz | 0.63 | 0.74 |

Table 1(b) Spearman Rank Order Correlation Coefficients

Table two shows that for the period 2009 S2 to 2011 S2 (excluding 2011 S1, when an examination was not held), both the Pearson correlation coefficients and the Spearman Rank Order coefficients

for the term test and the examination have shown no discernable change between the semesters with unlimited windows of availability for the quizzes, and the semesters of limited windows of availability. This suggests that the standard of invigilated assessment is staying relatively constant, as it is unlikely both would change by the same amount. We can therefore be confident that the improved correlation coefficients for the MC quizzes is due to them becoming more closely correlated to the invigilated assessments, rather than both the invigilated assessments becoming more closely correlated to the MC quizzes. Note that the both the Pearson correlation coefficients and the Spearman Rank Order coefficients are higher for the term test and the examination, compared to the quizzes and the term test, and the quizzes and the examination. This is an intuitively obvious result, that the invigilated term test and exam are more closely correlated to each other, than to the non-invigilated MC quizzes.

| | <i>Exam</i> |
|---------------------------------------|-------------|
| 2005-S1 to 2009-S1 ECON 105 Term Test | 0.73 – 0.81 |
| 2009 S2 ECON 105 Term Test | 0.79 |
| 2010 S1 ECON 105 Term Test | 0.80 |
| 2010 S2 ECON 105 Term Test | 0.69 |
| 2011 S1 ECON 105 Term Test | N/A |
| 2011 S2 ECON 105 Term Test | 0.83 |

TABLE 2 Range of Correlation Coefficients for Assessment Items (2009-S2 to 2011-S2)

Table 2(a) Pearson Correlation Coefficients

| | <i>Exam</i> |
|---------------------------------------|-------------|
| 2005-S1 to 2009-S1 ECON 105 Term Test | 0.76 – 0.83 |
| 2009 S2 ECON 105 Term Test | 0.80 |
| 2010 S1 ECON 105 Term Test | 0.82 |
| 2010 S2 ECON 105 Term Test | 0.73 |
| 2011 S1 ECON 105 Term Test | N/A |
| 2011 S2 ECON 105 Term Test | 0.84 |

Table 2(b) Spearman Rank Order Correlation Coefficients

These results suggest that in the event of assessment disruption, the quizzes that have limited windows of availability are more closely correlated to, and thus potentially better predictors of, both the term test and the examination and therefore produce more robust grades.

To examine the impact of different online assessment conditions on student grades, ECON 104 data from 2011 semester two is used. As mentioned in the methods section, students had two attempts at the online tutorial quizzes, with their highest mark recorded. Their responses were then remarked using their first attempt only. Table three below shows the Pearson correlation coefficients and Spearman rank order correlation coefficients for the online tutorial quizzes correlated against the term test and exam, for both the highest attempt and their first attempt.

| | <i>Tutorial Quiz</i> | <i>Term Test</i> | <i>Final Exam</i> |
|----------------------|---|---|-------------------|
| | | Pearson Correlation Coefficients | |
| <i>Tutorial Quiz</i> | 1.00 | 0.65 | 0.68 |
| <i>Term Test</i> | 0.62 | 1.00 | 0.83 |
| <i>Final Exam</i> | 0.65 | 0.85 | 1.00 |
| | Spearman Rank Order Correlation Coefficients | | |

TABLE 3 ECON 104 (Microeconomics) 2011-S2

Table 3(a) Online Tutorial Quiz - First Attempt Recorded

| | <i>Tutorial Quiz</i> | <i>Term Test</i> | <i>Final Exam</i> |
|----------------------|---|---|-------------------|
| | | Pearson Correlation Coefficients | |
| <i>Tutorial Quiz</i> | 1.00 | 0.63 | 0.64 |
| <i>Term Test</i> | 0.59 | 1.00 | 0.83 |
| <i>Final Exam</i> | 0.60 | 0.85 | 1.00 |
| | Spearman Rank Order Correlation Coefficients | | |

Table 3(b) Online Tutorial Quiz – Highest of Two Attempts Recorded

In ECON 104 2011 semester 2, the Pearson correlation coefficients for the online tutorial quizzes compared to both the term test and examination were slightly higher when the first of two attempts was recorded as the student's quiz mark compared to when the highest of their two attempts were recorded. The Spearman rank order correlation coefficients also found a higher correlation on the first attempt. Table four shows the impact on student grades of using the highest compared to the first attempt. The shaded cells represent the number of students who received the same grade as they would have in an uninterrupted semester which included a final exam.

| | | Alternative Grade | | | | | | | | | | |
|------------|----|-------------------|----|----|----|---|----|----|----|----|---|----|
| | | A+ | A | A- | B+ | B | B- | C+ | C | C- | D | E |
| True Grade | A+ | 39 | 1 | | | | | | | | | |
| | A | 16 | 5 | 3 | | | | | | | | |
| | A- | 9 | 11 | 7 | 1 | | | | | | | |
| | B+ | | 11 | 7 | 3 | 1 | | | | | | |
| | B | 1 | 1 | 8 | 7 | 9 | 3 | | | | | |
| | B- | | 2 | 5 | 2 | 8 | 3 | 3 | | | | |
| | C+ | | 1 | 2 | 4 | 5 | 8 | 6 | 1 | 1 | | |
| | C | | | | 2 | 2 | 3 | 7 | 10 | 2 | 1 | |
| | C- | | | | | 1 | 3 | 8 | 2 | 6 | 2 | |
| | D | | | | | | 3 | 3 | 1 | 5 | 2 | 4 |
| | E | | | | | 2 | 1 | 2 | 2 | 9 | 4 | 39 |

TABLE 4 Percent of Students – Using Raw Scores Highest Tutorial Quiz Mark Used

Table 4(a) Weighting: (Term Test 80%)

Table 4(a) shows the grade distribution if the final exam had been cancelled at short notice, and the 55% weighting from the final exam were placed onto the term test. The calculation of the students' grade under both scenarios includes 10% on the online tutorial quizzes, using the highest of two attempts as the student mark. Of the 320 students in the course, 70.3% of them received a grade within +/- 1 GPA² number of their grade including a final exam, and 88.4% received a grade within +/- 2 GPA numbers. These percentages reflect the high correlation between the term test and the examination, both of which were invigilated.

² GPA is awarded as follows: A+=9, A=8 etc down to E=-1.

| | Alternative Grade | | | | | | | | | | | |
|------------|-------------------|----|---|----|----|---|----|----|---|----|---|----|
| | | A+ | A | A- | B+ | B | B- | C+ | C | C- | D | E |
| True Grade | A+ | 39 | 1 | | | | | | | | | |
| | A | 21 | 3 | | | | | | | | | |
| | A- | 17 | 5 | 3 | 1 | 2 | | | | | | |
| | B+ | 5 | 4 | 5 | 4 | 2 | 2 | | | | | |
| | B | 6 | 7 | 8 | 5 | 1 | | 1 | 1 | | | |
| | B- | 4 | 5 | 2 | 5 | 1 | 4 | 1 | | | 1 | |
| | C+ | 5 | 5 | 9 | 1 | 2 | 2 | 1 | 1 | 1 | 1 | |
| | C | 2 | 5 | 2 | 4 | 4 | 2 | 1 | 1 | | 1 | 5 |
| | C- | 1 | 3 | 2 | 1 | 3 | 3 | | 1 | 5 | | 3 |
| | D | | | 3 | 1 | 2 | 1 | 4 | 2 | 3 | 1 | 1 |
| | E | | 2 | 1 | | 2 | 2 | 4 | 2 | 8 | 5 | 33 |

Table 4(b) Weighting: (Tutorial Quizzes (Highest Attempt) 65%)

Table 4(b) shows the grade distribution if the exam hadn't run, and the 55% weighting was put onto the online tutorial quizzes rather than the term test, using the students' highest of two attempts. Using this approach, only 47.2% of students received a grade within +/- 1 GPA number of their grade if a final exam were included, with 65.3% receiving a grade within +/- 2 GPA numbers.

| | Alternative Grade | | | | | | | | | | | |
|------------|-------------------|----|----|----|----|---|----|----|---|----|----|----|
| | | A+ | A | A- | B+ | B | B- | C+ | C | C- | D | E |
| True Grade | A+ | 32 | 1 | | | | | | | | | |
| | A | 17 | 6 | 3 | | | | | | | | |
| | A- | 9 | 9 | 4 | 1 | | | | | | | |
| | B+ | 2 | 11 | 5 | 8 | 1 | | | | | | |
| | B | | 1 | 6 | 7 | 5 | 2 | | | | | |
| | B- | | 2 | 3 | 6 | 9 | 4 | 3 | 1 | | | |
| | C+ | | 2 | 2 | 3 | 7 | 5 | 6 | 1 | | | |
| | C | | | | 3 | 3 | 6 | 9 | 5 | 2 | 1 | 1 |
| | C- | | | | | | 21 | 5 | 6 | 6 | 2 | |
| | D | | | | | | 4 | 1 | 4 | 5 | 3 | 3 |
| | E | | | | | 1 | 2 | 3 | 2 | 7 | 10 | 40 |

Percent of Students – Using Raw Scores First Tutorial Quiz Mark Used

Table 4(c) Weighting: (Term Test 80%)

Table 4(c) shows the grade distribution if the exam hadn't run, and the 55% weighting was put onto the term test, with 10% weighting still on the online tutorial quizzes, using the students' first attempt at the tutorial quizzes as their mark. This approach, yielded similar results to table 4(a), with 68.8% of students received a grade within +/- 1 GPA number of their grade if a final exam were included, and 88.4% receiving a grade within +/- 2 GPA numbers.

| | Alternative Grade | | | | | | | | | | | |
|------------|-------------------|----|---|----|----|---|----|----|---|----|---|----|
| | | A+ | A | A- | B+ | B | B- | C+ | C | C- | D | E |
| True Grade | A+ | 24 | 7 | 2 | | | | | | | | |
| | A | 12 | 5 | 6 | 2 | 1 | | | | | | |
| | A- | 4 | 4 | 6 | 5 | 3 | | 1 | | | | |
| | B+ | 3 | | 6 | 4 | 4 | 7 | 3 | | | | |
| | B | | 2 | 4 | 5 | 6 | 2 | 2 | | | | |
| | B- | | | 2 | 2 | 5 | 10 | 3 | 4 | 1 | 1 | |
| | C+ | | | 1 | 5 | 7 | 5 | 4 | 1 | | 2 | 1 |
| | C | | 1 | 2 | 5 | 3 | 5 | 2 | 3 | 1 | | 8 |
| | C- | | | 1 | 1 | 1 | 3 | 1 | 2 | 3 | 4 | 5 |
| | D | | | | 2 | 3 | 1 | 2 | 2 | 2 | 2 | 6 |
| | E | | 1 | | | 2 | | 2 | 1 | 5 | 8 | 46 |

Table 4(d) Weighting: (Tutorial Quizzes (First Attempt) 65%)

Table 4(d) shows the grade distribution if the exam hadn't run, and the 55% weighting was put onto the online tutorial quizzes rather than the term test, using the students' first of two attempts. Using this approach, 63.4% of students receive a grade within +/- 1 GPA number of their grade if a final exam were included, with 79.1% receiving a grade within +/- 2 GPA numbers. This is an improvement on when the highest of two attempts was used, where the corresponding percentages were 47.2% and 65.3%. Table five shows that in the absence of a final exam, as more weighting is put onto online tutorial quizzes, the more grade disruption there is when the highest of two tutorial quiz attempts is used relative to when the first of two tutorial quiz attempts is used. This confirms the earlier results in table three, which showed that online tutorial quiz marks are more closely correlated to both the term test and final exam, when the first of two attempts is used rather than the highest of two attempts. Table five can also be used to show the level of grade inflation under each of the different assessment scenarios. This information is summarized in table five below.

| Highest Attempt Tutorial Quiz Mark | Higher | Same | Lower |
|---|---------------|-------------|--------------|
| 80% Term Test | 52.5% | 40.3% | 7.2% |
| Tutorial Quizzes 65% | 62.5% | 29.7% | 7.8% |
| First Attempt Tutorial Quiz Mark | | | |
| 80% Term Test | 55.9% | 37.2% | 6.9% |
| Tutorial Quizzes 65% | 39.1% | 35.3% | 25.6% |

TABLE 5 Percent of Students Receiving a Grade Higher, Lower or the Same as their Grade When an Examination Does run

All approaches result in grade inflation, which reflects the fact that the mean for the final exam in ECON 104 semester two 2011 was lower than all the other assessments. It is clear from the table that using the first of two attempts on the online tutorial quizzes results in less grade inflation than using the highest of two attempts, as more weighting is put onto the online tutorial quizzes.

CONCLUSIONS

The data from ECON 105 suggests that online quizzes will provide a greater correlation to invigilated assessments if they are available for a shorter time period of around a week rather than the whole semester a course runs. The result will be less grade disruption if weightings are increased on online quizzes in the event of a cancelled examination or term test.

In ECON 104, online quizzes that record a student's first attempt rather than their highest of two attempts also show a closer correlation to invigilated assessments, and result in less grade disruption when weightings on online quizzes are increased. Had the entire examination weighting of 55%

been placed onto the online quizzes using the highest of two attempts, only 47% of students would have received a grade within plus or minus one GPA point of the grade they would receive with a final examination. This compares to a corresponding figure of 63% for the first attempt when the quizzes are marked using the first attempt. The respective percentages of students that get the same grade as they would have in a normal semester with all assessment completed are 29.7% and 37.2% respectively. It is important to note that this isn't just a case of students getting higher than usual grades if online quizzes are substituted for invigilated assessments. The Spearman coefficient is measuring the rank order of students under different assessment regimes. In ECON 104 2011 semester two the final examination was harder than the other assessments, meaning grades were inflated when the alternative assessments were used to substitute for the final examination. This may not be the case in every semester however. In ECON 104, the term test often has a lower mean than the final examination.

Online quizzes that were marked using the first attempt yielded a better correlation to invigilated assessments, and therefore less grade disruption when compared to a normal semester of assessment. Interestingly, if the weighting from a cancelled final exam had been put solely onto the online quizzes, 25.6% of students would have received a lower grade than in a normal semester, compared to only 7.8% if the highest of two quiz attempts had been recorded. Using the first attempt results in less disruption to grades, and maintains the rank ordering of students more effectively, but any grade disruption that does exist is more likely to result in a lower grade for some students compared to using the higher of two attempts.

We cannot state the reasons for the differing correlations when the window of availability or the number of attempts are varied. However, as mentioned in the introduction, Robles & Braathen (2002), Olt (2002) and Burke (2001) suggest that the undesirable behaviour of cheating can be mitigated by restricting the number of times the student can sit an online quiz, how long they have to complete the quiz.

The goal of this paper is not to suggest that one type of assessment is 'better' than another. What this paper does find however is that online assessments are more substitutable for invigilated assessments in the event of invigilated assessments having to be cancelled at short notice, if certain restrictions are placed on them such as period of availability and number of attempts. This should inform the decision making of course instructors when assessment is being designed for a course, especially if there is an increased risk of some future disruption to assessment items at short notice.

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APPENDIX ONE

| | <i>Online MC</i> | <i>Term Test</i> | <i>Final Exam</i> |
|-------------------|---|------------------|-------------------|
| | Pearson Correlation Coefficients | | |
| <i>Online MC</i> | 1.00 | 0.27 – 0.47 | 0.48 – 0.66 |
| <i>Term Test</i> | 0.24 – 0.41 | 1.00 | 0.73 – 0.81 |
| <i>Final Exam</i> | 0.35 – 0.50 | 0.76 – 0.83 | 1.00 |
| | Spearman Rank Order Correlation Coefficients | | |

Table 1(a) ECON 105 (Macroeconomics) 2005-S1 to 2009-S1

| | <i>Online MC</i> | <i>Term Test</i> | <i>Final Exam</i> |
|-------------------|---|------------------|-------------------|
| | Pearson Correlation Coefficients | | |
| <i>Online MC</i> | 1.00 | 0.55 – 0.55 | 0.65 – 0.66 |
| <i>Term Test</i> | 0.51 – 0.55 | 1.00 | 0.79 – 0.80 |
| <i>Final Exam</i> | 0.52 – 0.61 | 0.80 – 0.82 | 1.00 |
| | Spearman Rank Order Correlation Coefficients | | |

Table 1(b) ECON 105 (Macroeconomics) 2009-S2 and 2010-S1

| | <i>Online MC</i> | <i>Term Test</i> | <i>Final Exam</i> |
|-------------------|---|------------------|-------------------|
| | Pearson Correlation Coefficients | | |
| <i>Online MC</i> | 1.00 | 0.48 | 0.67 |
| <i>Term Test</i> | 0.45 | 1.00 | 0.69 |
| <i>Final Exam</i> | 0.55 | 0.73 | 1.00 |
| | Spearman Rank Order Correlation Coefficients | | |

Table 1(c) ECON 105 (Macroeconomics) 2010-S2

| | <i>Online MC</i> | <i>Term Test</i> | <i>Final Exam</i> |
|------------------|---|------------------|-------------------|
| | Pearson Correlation Coefficients | | |
| <i>Online MC</i> | 1.00 | 0.57 | n.a. |
| <i>Term Test</i> | 0.46 | 1.00 | n.a. |
| | Spearman Rank Order Correlation Coefficients | | |

Table 1(d) ECON 105 (Macroeconomics) 2011-S1

| | <i>Online MC</i> | <i>Term Test</i> | <i>Final Exam</i> |
|-------------------|---|------------------|-------------------|
| | Pearson Correlation Coefficients | | |
| <i>Online MC</i> | 1.00 | 0.66 | 0.77 |
| <i>Term Test</i> | 0.63 | 1.00 | 0.83 |
| <i>Final Exam</i> | 0.74 | 0.84 | 1.00 |
| | Spearman Rank Order Correlation Coefficients | | |

Table 1(e) ECON 105 (Macroeconomics) 2011-S2

Appendix C

Hickson, S. and Agnew, S. (2013). Assigning grades during an earthquake - shaken or stirred? *New Zealand Economic Papers* 47(3) p. 288-303.

Abstract

In the event of an unanticipated disruption to normal life, universities tend to shift to an online environment in both delivery and assessment. Course instructors still need to assign grades despite not having the full set of planned assessments. This paper examines how grades are disrupted when an increased reliance is placed on online assessments. We find substantial grade disruption and grade inflation as the weighting on online assessments rises relative to invigilated assessments. Grade inflation can be moderated by scaling to an historical distribution of grades; however such scaling can lead to substantial grade disruption where the quality of the cohort is different than the historical average.

I. INTRODUCTION

When all goes well assessments in university courses occur as planned. Students know at the start of a course what the assessment items are and what weight they have. The structure of the assessment influences the behaviour of students as they attempt to balance the work in that particular course, their work in other courses and interests outside study.

The experience of the University of Canterbury during the second semester of 2010 (2010-S2) and the first semester of 2011 (2011-S1) following significant earthquakes has been that unanticipated disruptions to assessment certainly can occur. That the disruption is unanticipated is important as students have made choices (e.g. time allocation) given the notified assessment schedule. Under a different schedule they are likely to have made different choices. The June 13 2011 Christchurch earthquake, which resulted in the final exam being cancelled, occurred during study week when all lectures and assessment other than the final exam had been completed. Right up until almost the day of the exam itself, the students believed they would be sitting a final exam. Hence there was no opportunity for students to modify their behaviour or choices when it came to study.

When a substantial disruption of this type occurs, the most likely items of assessment to be cancelled completely are invigilated tests and exams as they require physical facilities and staff to be available as well as the ability of students to travel to campus. Online assessments are more likely to continue as students can complete these remotely. However course lecturers are still required to assign grades and must use the assessment that does take place to do so. As it transpired, online assessments proved to be invaluable in an earthquake disrupted semester. They could be completed by students without the need to come onto campus (although those with no internet access at home could still use the computer labs on campus). It also reduced the need to use markers who themselves were earthquake disrupted.

There is a body of general literature on the shift to online assessment and teaching as technology improves. This includes researchers such as Robles and Braathen (2002) who suggest that in the new online learning world, more responsibility for their learning is now placed on the learner. They also state that online assessment has the potential for greater levels of immediate feedback. This is supported by Graff (2003), who states “There are many potential advantages of online assessment to learners. For example, tests are available on demand and at any time. Furthermore, computerised assessment systems give immediate feedback to the user; therefore users learn by taking the test”. (p. 22). There has also been some discussion around the validity of online testing. Perrin & Mayhew

(2000) raised some concerns based on the ability of students to cheat, giving the example of students printing online tests and sharing them.

Moving to a more online format is common in times of natural disasters. As a result of a norovirus outbreak which closed the Hope College campus for four days, Benton (2009) describes the college now being able to “come close to sustaining the experience of the traditional classroom from dispersed locations” (p. 4). Further examples of a natural event leading to a greater online focus include George Washington University, which uses e-learning as a central part of their plan for educational continuity, prompted by the H1N1 flu. According to George Washington’s Yordanos Baharu, “Part of what we’re doing in training is getting faculty to think about plan B. With this plan, we’re confident that we can mitigate potential disruptions and provide students and faculty the support they need to continue teaching with Blackboard’s system” (eCampus News, 2009, p. 1). When Hurricane Ike shut down the Clear Creek Independent school district for nearly two weeks, “teachers and students leveraged online learning to avoid missing academic targets for the year thanks to the ability to communicate and complete assignments even while school buildings were closed” (eCampus News, 2009, p. 1).

In response to SARS and Avian flu outbreaks in 2005, Singapore’s Nanyang Technological University (NTU) launched a preparedness program which closes segments of its campus for one week at a time. Students are able to receive lesson plans, watch lecture videos, and complete assignments and tests online. According to Daniel Tan from NTU, “What we’re trying to achieve is learning continuity. Our plan allows university officials to close the campus with a high level of confidence that education operations can continue successfully online”. (eCampus News, 2009, p. 2). Meyer & Wilson (2011) mention that the use of online learning as a response to disasters is new, and there are few studies looking into this issue. They do however cite Omar, Liu & Koong, (2008) describing The Southern University at New Orleans becoming an online learning campus after being struck by hurricanes. In particular they discuss continuous education being provided to displaced students through the use of mobile devices. Foster & Young (2005) are also referenced describing the University of New Orleans offering a significant number of additional online courses than in previous semesters. Meyer & Wilson (2011) also refer to Hartman and Lundberg (2009) who promoted online education as the “vehicle for meeting both sets of needs” (p. 593) when referring to the need to support individuals through a disaster but to also “sustain academic work” (p. 3). Finally Danielson (2009) is mentioned as reporting online classes and Skype being used at the University of South Florida in the event of an emergency.

The purpose of this paper is to establish how grade distributions are disrupted when an increased reliance is placed on online assessments. This paper seeks to fill the void in the literature by examining how effective different forms of assessment are in assigning grades in an earthquake or otherwise affected semester.

In particular the contribution that this paper will make is in examining how well online assessments perform in the task of assigning grades in our Principles of Microeconomics (ECON104) and Principles of Macroeconomics (ECON105) courses when the assessment schedule faces a substantial unanticipated disruption. We focus particularly on 2011-S1³ due to the extent of the disruption that occurred. We model a similar disruption in our historical data (pre 2010-S2) with similar assessment items and replicate the disruption to 2011-S1 with the 2011-S2 student data where the assessment items are identical.

³ Throughout this paper we will use the naming convention YYYY-Sn to denote the year and semester of a course occurrence where YYYY is the year and Sn is the semester (either S1 or S2).

We define the term “non-disrupted grade” to mean the grade that a student receives when all assessment items occur as planned (i.e. all assessments are completed). Determining what assessment is “optimal” in some sense is beyond the scope of this paper. We simply take as given the assessment regime that is in place at any particular time. We are then able to compare this “non-disrupted grade” to a “disrupted grade”. We define the “disrupted grade” as the one that is assigned when the notified assessment schedule is disrupted due to an unanticipated shock. By converting grades to the University of Canterbury GPA⁴ scale we are then able to quantify the extent of the change that would occur. Of course when a disruption occurs it is not possible to observe the “non-disrupted grade” but we are able to take advantage of the data we have from other semesters to model such disruptions.

Section 2 describes the assessments, data and methods, section 3 is the discussion of results and section 4 concludes.

II. ASSESSMENTS, DATA AND METHODS

The following table summarises how assessment in both principles courses has changed over time.

TABLE 1
Summary of Assessment Items

ECON 104 – Principles of Microeconomics

| Year and semester | Assignment | Online MC tests | Progress test | Tutorial marks | Term test | Final Exam |
|--------------------|------------|-----------------|---------------|----------------|-----------|------------|
| 2005-S1 to 2006-S2 | 10%. | 10%. | | | 35% | 45% |
| 2007-S1 to 2010-S2 | 10%. | 10%. | | | 20% | 60% |
| 2011-S1 onwards | None | 5% | 5% | 10% | 20% | 60% |

ECON 105 – Principles of Macroeconomics

| Year and semester | Assignment | Online MC tests | Tutorial marks | Term test | Final Exam |
|--------------------|------------|------------------------|----------------|-----------|------------|
| 2005-S1 to 2006-S2 | 10%. | 10%. | | 35% | 45% |
| 2007-S1 to 2009-S1 | 10%. | 10%. | | 20% | 60% |
| 2009-S2 to 2010-S2 | 10%. | 10%. (time limited) | | 20% | 60% |
| 2011-S1 onwards | 10%. | 10%. (time limited) | 10% | 20% | 50% |

From 2007-S1 a minimum mark was required in the final exam in order to receive a continuing pass (C or better) in the course.⁵

There were 10 online multiple choice tests each worth 1%. Students could attempt each test as many times as they wished and their highest mark was the one that counted. Questions were drawn randomly from a large bank of questions sourced from the text book supplier. For most course occurrences these tests were open for the entire semester rather than being time limited. However, this was changed in ECON 105 for 2009-S2 onwards and the online MC tests were only open for a short window around the time the material was covered in class. Students could still have as many attempts as they wished during this period.

The September 4 2010 quake did cause some disruption to 2010-S2 courses although it was relatively minor resulting in the loss of one week of classes.

From 2011-S1 assessment in both ECON 104 and 105 was modified though this was in a response to a regular review of assessment rather than as a result of the earthquakes. In ECON 104 the assignment was dropped while online tutorial quizzes and an online progress test were introduced. The progress test is a 30 question MC test completed in week six. Students have one week to complete the test but once started it must be completed in 90 minutes. The questions for each student are randomly drawn from a test bank. Tutorial quizzes were introduced where students complete weekly mini tests with the questions being drawn from the same test bank as the progress test. The number of text book based online MC quizzes was reduced to five.

In ECON 105 five online tutorials each worth two percent were introduced. Students could make one attempt at each tutorial but the window of opportunity was usually about two weeks. In response to the February 22 2011 quake, which occurred on the second day of the semester, the assignment in ECON 105 was cancelled due to uncertainty over the availability of on-campus computer resources. There was no other disruption to assessment at that point though there was some discussion on whether or not term tests should be held. Ultimately term tests did go ahead. The June 13 2011 quake occurred on the eve of final exams and as a result the ECON 105 exam was cancelled. The ECON 104 exam was cancelled for those students who would receive a passing grade if their final exam weight was simply transferred to their term test. Those who did not receive a passing grade based on their re-weighted term test and their other course work were eligible to sit a special exam.⁶

Hence the grades allocated in 2011-S1 are “disrupted grades” rather than “non-disrupted grades” as we have defined it. While it is not possible to know “non-disrupted grades” for 2011-S1, it is possible to construct disrupted grades for students in other occurrences of the same course. We take advantage of having student data from 2005 to 2010 to examine different scenarios that allow us to understand the impact that removing the final exam would have had historically and thereby calculate “disrupted grades”. We also replicate the semester 2011-S1 assessment with 2011-S2 students who undertook the full range of assessment identical to 2011-S1.

In the historical data (2005-S1 to 2010-S1) we exclude 2010-S2 as it was impacted by the September 4 2010 quake. For the whole sample we delete students who did not attempt any

⁵ Students who scored more than 50% in the course overall but did not meet the minimum requirement in the final exam received a restricted (C-) pass meaning they passed the course but could not use it as a pre-requisite for future courses.

⁶ Of the 155 students eligible to sit the special exam, only 103 actually did sit. Of those only 21 managed to improve their grade and eight of these were students who had not been able to attend the term test but were clearly good students. For those who had actually sat the term test, the highest grade they could be awarded was a C.

assessment at all and those students who received “aegrotat” grades⁷. That gives a large dataset of 8752 observations. For each student we know their assignment, online multiple-choice test, term test and final exam scores.

For the historical data our interest is in how the online multiple-choice performs the task of assigning grades in conjunction with the term test since this most closely replicates what occurred for 2011-S1 where the final exam was cancelled. The more highly correlated the online assessment items are with the final exam, the better they will proxy for the final exam. To identify the level of correlation we calculate both the Pearson and the rank order Spearman correlation coefficients. The rank order correlation is particularly important when considering the possible use of scaling. However, correlation coefficients are not sufficient. Even though, as expected, all the assessment items are positively correlated with each other it is not clear what the impact is on *grades* given the correlation is not perfect. Ultimately what students are interested in are grades. We therefore calculate disrupted grades based on different sets of weights for the online multiple-choice quizzes and the term test. We are then able to calculate the change in the GPA from the non-disrupted grade if a student is awarded a disrupted grade. A higher disrupted grade than the non-disrupted grade results in a positive difference.

A clear issue that arises is that online assessments typically have higher means than invigilated assessments. Hence the greater the weight that is given to online assessments the more the average value of the disrupted grades will rise compared to the average value of the non-disrupted grades. This can be avoided by scaling to a pre-determined distribution.

We calculate average historical distributions for each of the 4 different occurrences – 104 S1 and S2 and 105 S1 and S2 – and apply these to the disrupted grades rank ordering of students. The reason that each set of occurrences must be handled separately is that the four course occurrences within a year actually have different distributions. This is most marked between 104-S1 and 104-S2 where students who have failed the S1 occurrence re-take 104 in S2. Hence a different distribution was applied to each of the four different types of occurrences.

I. DISCUSSION OF RESULTS

2005 to 2010 Semester 1

The mean score for the online multiple-choice tests (75.8) and assignment (64.4) are higher than the invigilated term test (50.9) and final exam (53.7).

Pearson and Spearman correlation coefficients for the four assessment items across all years were calculated. All are positive and significant at the 0.01 level.⁸

However, as previously mentioned, correlation measures are not sufficient. What matters to students is the impact on grades when a “disrupted grade” is required as compared to a “non-disrupted grade” when all assessment takes place.

Table 2 shows the percentage of students that would experience a particular change in GPA over the whole dataset when grades are recalculated using different weighting schemes for the online MC tests and the term test. Table 3 shows the same impact on GPA when the same weightings are applied but the resulting grade distributions are scaled to the historical average.

⁷ An aegrotat grade is awarded when a student misses a test or exam due to illness or other critical circumstance or when a student’s performance in the test or exam is directly impacted by such circumstances. Hence performance in tests and exams may not be truly reflective of ability or final grade.

⁸ Correlation coefficients are available from the authors on request.

II. TABLE 2

Percent of Students and the Change in GPA Under Different Weighting Schemes Using Raw Scores.

The first number shown in the brackets is the weight applied to the online multiple-choice and the second is the weight for the term test.

| Change in GPA | Weighting Scheme | | | | | |
|--------------------------------------|------------------|------------|------------|------------|------------|------------|
| | (0.0, 1.0) | (0.2, 0.8) | (0.4, 0.6) | (0.6, 0.4) | (0.8, 0.2) | (1.0, 0.0) |
| +10 | | | | | 0.2 | 1.6 |
| +9 | | | | | 0.9 | 2.0 |
| +8 | | | | | 2.4 | 4.5 |
| +7 | | | | 0.7 | 4.2 | 6.6 |
| +6 | 0.1 | 0.1 | 0.1 | 2.5 | 6.3 | 8.6 |
| +5 | 0.2 | 0.2 | 0.9 | 5.8 | 9.5 | 11.4 |
| +4 | 0.6 | 0.7 | 3.2 | 10.3 | 13.0 | 12.6 |
| +3 | 1.5 | 2.6 | 8.8 | 16.0 | 14.7 | 12.6 |
| +2 | 4.2 | 8.1 | 18.0 | 19.0 | 14.9 | 11.8 |
| +1 | 10.0 | 17.9 | 24.3 | 18.2 | 12.4 | 9.0 |
| 0 | 31.9 | 37.6 | 32.2 | 22.5 | 18.0 | 16.1 |
| -1 | 19.1 | 18.2 | 8.4 | 3.4 | 2.0 | 1.5 |
| -2 | 15.7 | 9.7 | 2.8 | 1.0 | 0.7 | 0.7 |
| -3 | 9.7 | 3.8 | 0.7 | 0.4 | 0.4 | 0.4 |
| -4 | 4.8 | 1.0 | 0.1 | 0.2 | 0.2 | 0.2 |
| -5 | 1.6 | 0.2 | 0.1 | 0.1 | 0.1 | 0.1 |
| -6 | 0.4 | | | 0.1 | 0.1 | 0.1 |
| -7 | 0.1 | | | | | |
| -8 | | | | | | |
| -9 | | | | | | |
| -10 | | | | | | |
| Overall Change in GPA | -0.8 | 0.0 | +0.9 | +1.9 | +2.8 | +3.4 |
| | | | | | | |
| Percent of students in range (-1,+1) | 61.0 | 73.7 | 64.9 | 44.1 | 32.4 | 26.6 |
| Percent of students in range (-2,+2) | 80.9 | 91.5 | 85.7 | 64.1 | 48.0 | 39.1 |
| N | 8752 | 8752 | 8752 | 8752 | 8752 | 8752 |

TABLE 3**Percent of Students and the Change in GPA Under Different Weighting Schemes Using the Historical Grade Distributions.**

The first number shown in the brackets is the weight applied to the online multiple-choice and the second is the weight for the term test.

| Change in GPA | (0.0, 1.0) | (0.2, 0.8) | (0.4, 0.6) | (0.6, 0.4) | (0.8, 0.2) | (1.0, 0.0) |
|--------------------------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|
| +10 | | | | | | |
| +9 | | | | | | 0.1 |
| +8 | | | | | | 0.3 |
| +7 | | | | | 0.1 | 0.8 |
| +6 | 0.2 | 0.1 | | | 0.5 | 1.2 |
| +5 | 0.4 | 0.1 | 0.1 | 0.4 | 1.5 | 2.4 |
| +4 | 1.1 | 0.7 | 0.7 | 1.6 | 3.1 | 4.1 |
| +3 | 3.9 | 2.8 | 2.9 | 4.6 | 6.0 | 6.1 |
| +2 | 9.4 | 8.9 | 8.9 | 9.5 | 9.5 | 8.9 |
| +1 | 17.6 | 19.1 | 19.1 | 17.2 | 14.0 | 11.8 |
| 0 | 34.7 | 37.8 | 38.1 | 34.4 | 29.5 | 26.1 |
| -1 | 17.4 | 18.0 | 17.3 | 16.1 | 14.4 | 12.1 |
| -2 | 10.0 | 8.8 | 8.5 | 9.6 | 10.4 | 11.0 |
| -3 | 4.0 | 3.1 | 3.3 | 4.6 | 6.8 | 7.8 |
| -4 | 1.0 | 0.7 | 0.6 | 1.4 | 2.7 | 4.4 |
| -5 | 0.2 | 0.1 | 0.1 | 0.3 | 1.0 | 2.0 |
| -6 | | | 0.1 | 0.1 | 0.3 | 0.7 |
| -7 | | | | | 0.1 | 0.1 |
| -8 | | | | | | 0.1 |
| -9 | | | | | | |
| -10 | | | | | | |
| Overall Change in GPA | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| | | | | | | |
| Percent of students in range (-1,+1) | 69.7 | 74.9 | 74.5 | 67.7 | 57.9 | 50.0 |
| Percent of students in range (-2,+2) | 89.1 | 92.6 | 91.9 | 86.8 | 77.8 | 69.9 |
| N | 8752 | 8752 | 8752 | 8752 | 8752 | 8752 |

There are a small number of extreme grade changes where students have differences of more than 4 GPA points (either plus or minus) between their non-disrupted grade and their disrupted grade. In general the big negative changes (where the disrupted grade is much lower than the non-disrupted grade) are caused by the student not doing the online tests but doing well in the term test and final exam. Some students who are confident in their own ability and are in fact relatively good students may not consider the online tests worth doing given their low weighting.

The large positive changes (where the disrupted grade is much higher than the non-disrupted grade) are caused by the student doing relatively well in the online MC tests and poorly in the exam

compared to the term test. A grade based on the online MC and term test is thus much higher. There are a number of students in the sample who do well in the online tests and the invigilated term test and then for reasons unknown simply do not even sit the final exam.

Tables 2 and 3 also show the percentage of students that would experience a GPA disruption of ± 1 or ± 2 GPA points. For most of the score to grade mapping, 1 GPA point corresponds to 5 percentage points (e.g. a B grade is 65 – 69.9 percent and a B+ is 70 to 74.9 percent). Two GPA points therefore corresponds to 10 percentage points in a raw score.

While there will be some students whose grade changes by more than ± 2 GPA points, what is desirable is a minimisation of this disruption to grades. What is clear from tables 2 and 3 is that the disruption to grades becomes more extreme as the weight on the online multiple choice tests rises. When the weight applied to the online multiple choice tests is 0.8 then 48 percent of students lie in the ± 2 GPA point range when using raw scores (table 2) although this rises to 77.8 percent if scaling is used (table 3). In contrast when the weight is 0.2 the values are 91.5 and 92.6 percent respectively.

We can see the two weighting schemes of (0.2, 0.8) and (0.4, 0.6) as two different approaches to dealing with a disruption to assessment. For the first this is similar to loading the weight of the missed final exam onto the term test (which is how the disruption was handled in 2011-S1 for ECON 104). For the second this is similar to spreading the weight of the missed final exam across the online MC tests and term test (which is how the disruption was handled in 2011-S1 for ECON 105). Both of these approaches produce similar disruptions to grades with at least 85 percent of students experiencing no more than a ± 2 GPA point change to their non-disrupted grade. Both of these weighting schemes are better than not including the online tests at all which is not surprising since the non-disrupted grade includes the online tests.

What tables 2 and 3 also show is that a complete reliance on online tests is likely to produce substantial disruptions to grades. The weighting scheme (1.0, 0.0) is the case where all invigilated assessment is cancelled and the grade is assigned purely on the basis of in-course work. In this case only 39.1 percent of students are in the ± 2 GPA point difference range when using raw scores though this does rise to 69.9 percent if scaling is used. Some students would experience extreme grade changes. These students will have done well in the online tests and very poorly in the term test and final exam.

Noticeable from these results is the grade inflation that occurs as the weight on the online tests rises. At the extreme end where all the weight is placed on the online tests, the average rise in GPA is 3.4 points. However, as table 3 shows, overall grade inflation can be removed via scaling but the extent of the disruption to individual students is still substantial with the range of disruption extending from -8 to +9 GPA points.

Summarising to changes in GPA is useful and instructive but does not reveal how grades are impacted for different grade bands. Some readers may find this information useful. The tables in appendix 1 show non-disrupted grades vs. disrupted grades for each grade band using two example weight schemes, (0.2, 0.8) and (0.8, 0.2).

Time limiting of online tests (where the online tests are only open for a limited time) appears to make a difference. While the pattern of disruption is similar, the use of time limited online tests leads to a lower level of disruption to grades compared to when tests are open for the whole semester. This is particularly apparent as the weight applied to the online assessment rises. This result is explored further in Agnew and Hickson (2011).

2011 Semester 2

We then apply the 2011-S1 weighting schemes (where the final exam was cancelled) to the 2011-S2 data where all assessment items took place as planned. We are then able to compare the theoretical disrupted grades to the known non-disrupted grades. Table 4 shows the disruption to grades using both raw scores and scaling to an historical distribution. Table 5 shows means for the assessment items in 2011 semesters 1 and 2. The tables in appendix 1 show the disruption to each grade band.

TABLE 4

Percent of Students and the Change in GPA for 2011-S2 Under 2011-S1 Weighting Schemes (see note below).

| | Microeconomics (ECON 104) | | Macroeconomics (ECON 105) | |
|--------------------------------------|----------------------------------|-------------------|----------------------------------|-------------------|
| Change in GPA | Raw | Historical | Raw | Historical |
| +10 | | | | |
| +9 | | | | |
| +8 | | | | |
| +7 | | | | |
| +6 | 0.6 | | | |
| +5 | 0.6 | | | |
| +4 | 4.4 | | 0.3 | 0.3 |
| +3 | 6.7 | 0.6 | 1.4 | 0.9 |
| +2 | 14.3 | 0.6 | 3.4 | 3.4 |
| +1 | 24.4 | 3.8 | 12.3 | 8.0 |
| 0 | 41.3 | 24.4 | 47.3 | 29.8 |
| -1 | 6.3 | 18.7 | 20.3 | 27.5 |
| -2 | 1.0 | 25.7 | 11.2 | 22.6 |
| -3 | 0.3 | 17.1 | 3.4 | 7.2 |
| -4 | | 7.9 | 0.3 | 0.3 |
| -5 | | 1.0 | | |
| -6 | | | | |
| -7 | | | | |
| -8 | | | | |
| -9 | | | | |
| -10 | | | | |
| Overall Change in GPA | +0.9 | -1.5 | -0.3 | -0.8 |
| | | | | |
| Percent of students in range (-1,+1) | 72.0 | 46.9 | 79.9 | 65.3 |
| Percent of students in range (-2,+2) | 87.3 | 73.2 | 94.5 | 91.3 |
| N | 315 | 315 | 349 | 349 |

Weightings:

Microeconomics: 5% online MC tests, 5% progress test, 10% tutorials, 80% term test.

Macroeconomics: 22% online MC tests, 22% tutorials, 56% term test.

TABLE 5
Mean Value of Assessment Items by Course (2011)

| Course | Assign- ment | Online MC tests | Progress test | Tutorials | Term test | Final exam |
|-------------|-----------------|--------------------|------------------|-----------|--------------|---------------|
| ECON104S111 | n.a | 76.2 | 75.4 | 58.3 | 63.1 | cancelled |
| ECON105S111 | cancelled | 77.6 | n.a | 60.0 | 57.5 | cancelled |
| ECON104S211 | n.a | 64.2 | 69.4 | 72.7 | 63.3 | 52.6 |
| ECON105S211 | 68.1 | 74.6 | n.a | 62.1 | 55.5 | 60.3 |

Both sets of weightings performed slightly better than what might have been expected given the historical simulations. In this simulation 87 percent of students would experience a +/-2 change in GPA in ECON 104 and 95 percent in ECON 105. These are the two highest values when compared with the historical simulations (table 2). The overall changes to GPA were in line with the historical simulations (+0.9 and -0.3 for 104 and 105 respectively).

In ECON 104, scaling would have been very disruptive. The reason for this is a change in the cohort. The historical group of students on which the historical grade distribution is based is markedly different from the current cohort. For example, changes in the wider university mean that engineering students now tend to take ECON 104 in S2 rather than S1 with engineering students tending to be strong students.

Recall that in ECON 104 semester 1 the weighting for the cancelled final exam was allocated entirely to the term test while in ECON 105 the weighting for the final exam was distributed equally across all the available assessment items. Does our data shed any light on which approach might be better in general? Since the approach used in ECON 105 (macroeconomics) gave a 94.5 percent value for the +/-2 GPA change range and the approach used in ECON 104 (microeconomics) gave 87.3 percent it would appear at first look that spreading evenly is better. If that hypothesis is correct then we should see less grade disruption in ECON 104 if we apply the ECON 105 approach (spread evenly). Further we should see more grade disruption in ECON 105 if we apply the theoretically inferior ECON 104 approach (i.e. all on the term test). Table 6 shows the 2011-S2 simulations with the weighting approaches reversed. The interesting outcome is that both courses actually perform worse with the reverse weighting schemes.

TABLE 6
Percent of Students and the Change in GPA for 2011-S2 using “Reversed” Weighting Schemes (see note below).

| | Microeconomics (ECON 104) | | Macroeconomics (ECON 105) | |
|--------------------------------------|----------------------------------|-------------------|----------------------------------|-------------------|
| Change in GPA | Raw | Historical | Raw | Historical |
| +10 | | | | |
| +9 | | | | |
| +8 | | | | |
| +7 | | | | |
| +6 | 0.6 | | 0.3 | 0.3 |
| +5 | 2.5 | | | |
| +4 | 5.1 | | 0.6 | 0.6 |
| +3 | 11.4 | | 0.3 | 0.9 |
| +2 | 17.1 | 1.0 | 1.7 | 3.4 |
| +1 | 24.1 | 3.8 | 6.6 | 9.5 |
| 0 | 32.7 | 27.3 | 35.8 | 28.7 |
| -1 | 5.1 | 14.3 | 22.6 | 25.5 |
| -2 | 1.0 | 27.6 | 20.0 | 22.1 |
| -3 | 0.3 | 19.4 | 7.7 | 6.6 |
| -4 | | 4.4 | 4.3 | 2.6 |
| -5 | | 1.9 | | |
| -6 | | 0.3 | | |
| -7 | | | | |
| -8 | | | | |
| -9 | | | | |
| -10 | | | | |
| Overall Change in GPA | +1.2 | -1.5 | -0.9 | -0.8 |
| | | | | |
| Percent of students in range (-1,+1) | 61.9 | 45.4 | 65.0 | 60.7 |
| Percent of students in range (-2,+2) | 80 | 74 | 86.7 | 86.2 |
| N | 315 | 315 | 349 | 349 |

This table shows the impact on grades under the alternative assumptions. Here microeconomics replicates the S1 macroeconomics approach and we distribute the weight of the omitted final exam equally over the remaining assessment items (progress test, online MC tests and tutorials). Macroeconomics is calculated using the S1 microeconomics approach where the weight from the omitted final exam is placed entirely on the term test.

IV. CONCLUSION

Improvements in technology have resulted in a shift to more online assessment particularly in large first year courses. In the event of an unanticipated disruption to normal life, universities tend to further shift to an online environment in both delivery and assessment. Course instructors still, however, need to assign grades despite not having the full set of planned assessments.

Online assessments are correlated with other items of assessment such as invigilated tests and exams but not perfectly so. As a result we find substantial grade disruption as the weighting on online assessments increases relative to invigilated assessments as evidenced by the fall in the percentage of students in the ± 2 GPA change range. We find evidence that time restricted online tests lead to less disruption to grades compared to when tests are open for the whole semester particularly as the weighting applied to the online tests increases.

We also find that grade inflation occurs as the weighting applied to online tests increases. Grade inflation can be moderated by scaling to an historical distribution of grades; however such scaling can lead to substantial grade disruption where the quality of the cohort is different than the historical average. This implies that instructors should use raw data rather than employ scaling unless it is certain there is no change in the cohort quality compared to previous years.

In the disrupted semester 1 of 2011 two slightly different approaches were used in Microeconomics (104) and Macroeconomics (105) to re-distribute the final exam weighting, viz. (i) allocating all the final exam weight to the term test; and (ii) distributing the final exam weight evenly. We do not find evidence supporting one or other of these approaches as better in a general sense. The choice of which approach to use can be left to the instructor's judgment and will depend on factors particular to individual courses and institutions. We do find that at least one piece of invigilated assessment is crucial so planning two invigilated assessments is a sound risk management strategy in being able to adapt to the impact of an unanticipated major disruption to a university course.

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APPENDIX 1

Non-disrupted vs. Disrupted Grades for Grade Bands – Examples.

These tables are best read across each row. For example, in row 1 of table A1(a) we see that in the sample period (2005-S1 to 2010-S1) 4.5 percent of students actually received an A+ (the number in the far right column). Under the alternative weighting scheme of (0.2, 0.8) 3.1 percent of students would have continued to receive an A+, 0.9 percent would receive an A, 0.4 percent an A- and 0.1 percent a B+. The column total shows how many students would now receive an A+ being 5.2 percent. Note that in the historically scaled set, row and column totals are constrained to be the same with any minor differences due to rounding.

The disruption to grades with different weighting schemes can also be seen in these tables. Students on the diagonal receive the same alternative grade as their non-disrupted grade. Compared to the weighting scheme of (0.2, 0.8) the weighting scheme (0.8, 0.2) shows smaller numbers on the diagonal (using either raw or scaled grades) and greater dispersion away from the diagonal.

Tables A1(e) to A1(h) show disruption by band for 2011-S2 using 2011-S1 weights.

Percent of Students – Using Raw Scores 2005-S1 to 2010-S1

Table A1(a) Weighting: (0.2, 0.8) (n=8752)

| | | Disrupted Grade | | | | | | | | | | | Tot. |
|---------------------|----|-----------------|-----|-----|-----|-----|------|------|------|-----|-----|------|------|
| | | A+ | A | A- | B+ | B | B- | C+ | C | C- | D | E | |
| Non-disrupted Grade | A+ | 3.1 | 0.9 | 0.4 | 0.1 | | | | | | | | 4.5 |
| | A | 1.4 | 1.5 | 1.3 | 0.8 | 0.4 | 0.1 | | | | | | 5.4 |
| | A- | 0.5 | 1.6 | 1.8 | 1.9 | 1.0 | 0.4 | 0.1 | 0.1 | | | | 7.4 |
| | B+ | 0.2 | 0.6 | 1.6 | 2.3 | 1.7 | 1.3 | 0.6 | 0.1 | 0.1 | | | 8.4 |
| | B | | 0.2 | 0.7 | 2.1 | 2.3 | 2.5 | 1.1 | 0.7 | 0.2 | | | 9.9 |
| | B- | | 0.1 | 0.3 | 1.1 | 2.0 | 2.8 | 2.0 | 1.4 | 0.5 | 0.2 | | 10.5 |
| | C+ | | | 0.1 | 0.3 | 1.0 | 2.2 | 2.5 | 2.3 | 1.5 | 0.5 | 0.1 | 10.5 |
| | C | | | | 0.1 | 0.4 | 1.2 | 2.1 | 2.7 | 2.4 | 1.3 | 0.6 | 10.7 |
| | C- | | | | 0.1 | 0.2 | 0.6 | 1.3 | 1.9 | 2.2 | 1.6 | 1.1 | 8.9 |
| | D | | | | | | 0.1 | 0.2 | 0.6 | 1.1 | 1.5 | 1.7 | 5.3 |
| | E | | | | | 0.1 | | 0.1 | 0.3 | 1.1 | 1.9 | 15.0 | 18.5 |
| Tot. | | 5.2 | 4.9 | 6.2 | 8.8 | 9.1 | 11.2 | 10.0 | 10.1 | 9.1 | 7.0 | 18.5 | 100 |

Table A1(b) Weighting: (0.8, 0.2) (n=8752)

| | Disrupted Grade | | | | | | | | | | | | |
|---------------------|-----------------|-------------|-------------|-------------|------------|------------|------------|------------|------------|------------|------------|-------------|------------|
| | | A+ | A | A- | B+ | B | B- | C+ | C | C- | D | E | Tot. |
| Non-disrupted Grade | A+ | 4.3 | 0.1 | 0.1 | | | | | | | | | 4.5 |
| | A | 4.4 | 0.6 | 0.2 | 0.1 | | | | | | | | 5.4 |
| | A- | 5.1 | 1.3 | 0.7 | 0.2 | | | | | | | | 7.4 |
| | B+ | 4.3 | 1.9 | 1.2 | 0.5 | 0.3 | 0.1 | | | | | | 8.4 |
| | B | 4.0 | 2.1 | 1.7 | 1.1 | 0.6 | 0.2 | 0.1 | | | | 0.1 | 9.9 |
| | B- | 3.1 | 2.0 | 2.3 | 1.3 | 1.0 | 0.5 | 0.2 | | | | 0.1 | 10.5 |
| | C+ | 2.4 | 1.6 | 1.9 | 1.7 | 1.3 | 0.7 | 0.4 | 0.2 | | | 0.1 | 10.5 |
| | C | 1.9 | 1.4 | 1.7 | 1.6 | 1.6 | 1.1 | 0.6 | 0.3 | 0.2 | 0.1 | 0.3 | 10.7 |
| | C- | 1.4 | 1.0 | 1.2 | 1.4 | 1.3 | 1.1 | 0.6 | 0.5 | 0.1 | | 0.2 | 8.9 |
| | D | 0.4 | 0.5 | 0.6 | 0.6 | 0.6 | 0.9 | 0.5 | 0.4 | 0.4 | 0.2 | 0.4 | 5.3 |
| | E | 0.2 | 0.6 | 0.5 | 0.7 | 0.8 | 1.1 | 1.4 | 1.1 | 1.4 | 1.1 | 9.6 | 18.5 |
| Tot. | | 31.5 | 13.1 | 12.1 | 9.2 | 7.5 | 5.7 | 3.8 | 2.5 | 2.1 | 1.4 | 10.8 | 100 |

Percent of Students – Using Historical Grade Distribution 2005-S1 to 2010-S1**Table A1(c) Weighting: (0.2, 0.8) (n=8752)**

| | Disrupted Grade | | | | | | | | | | | | |
|---------------------|-----------------|------------|------------|------------|------------|-------------|-------------|-------------|-------------|------------|------------|-------------|------------|
| | | A+ | A | A- | B+ | B | B- | C+ | C | C- | D | E | Tot. |
| Non-disrupted Grade | A+ | 2.8 | 1.2 | 0.4 | 0.1 | | | | | | | | 4.5 |
| | A | 1.3 | 1.6 | 1.3 | 0.8 | 0.3 | 0.1 | | | | | | 5.4 |
| | A- | 0.4 | 1.7 | 2.3 | 1.6 | 0.9 | 0.4 | 0.1 | | | | | 7.4 |
| | B+ | 0.1 | 0.6 | 2.0 | 2.1 | 2.0 | 0.9 | 0.5 | 0.2 | | | | 8.4 |
| | B | | 0.1 | 0.9 | 2.2 | 2.6 | 2.3 | 1.1 | 0.6 | 0.2 | | | 9.9 |
| | B- | | 0.1 | 0.3 | 1.2 | 2.2 | 2.7 | 2.0 | 1.4 | 0.4 | 0.1 | | 10.5 |
| | C+ | | | 0.1 | 0.3 | 1.3 | 2.2 | 2.5 | 2.5 | 1.3 | 0.3 | 0.1 | 10.5 |
| | C | | | | 0.2 | 0.4 | 1.2 | 2.4 | 2.9 | 2.3 | 0.8 | 0.5 | 10.7 |
| | C- | | | | | 0.2 | 0.7 | 1.4 | 2.1 | 2.0 | 1.3 | 1.2 | 8.9 |
| | D | | | | | | 0.1 | 0.3 | 0.7 | 1.5 | 1.2 | 1.5 | 5.3 |
| | E | | | | | | | 0.2 | 0.5 | 1.2 | 1.6 | 15.0 | 18.5 |
| Tot. | | 4.5 | 5.4 | 7.4 | 8.4 | 10.0 | 10.4 | 10.6 | 10.7 | 8.9 | 5.3 | 18.5 | 100 |

Table A1(d) Weighting: (0.8, 0.2) (n=8752)

| | Disrupted Grade | | | | | | | | | | | | |
|---------------------|-----------------|------------|------------|------------|------------|-------------|-------------|-------------|-------------|------------|------------|-------------|------------|
| | | A+ | A | A- | B+ | B | B- | C+ | C | C- | D | E | Tot. |
| Non-disrupted Grade | A+ | 2.6 | 0.9 | 0.5 | 0.2 | 0.1 | | 0.1 | | | | | 4.5 |
| | A | 1.3 | 1.3 | 0.9 | 0.7 | 0.5 | 0.3 | 0.1 | 0.1 | | | | 5.4 |
| | A- | 0.6 | 1.5 | 1.4 | 1.2 | 1.1 | 0.9 | 0.5 | 0.2 | | | | 7.4 |
| | B+ | 0.1 | 1.0 | 1.4 | 1.2 | 1.4 | 1.5 | 1.0 | 0.4 | 0.3 | | | 8.4 |
| | B | | 0.4 | 1.4 | 1.4 | 1.4 | 1.7 | 1.5 | 1.3 | 0.5 | 0.1 | 0.1 | 9.9 |
| | B- | | 0.2 | 0.9 | 1.1 | 1.5 | 1.7 | 1.8 | 1.7 | 1.1 | 0.3 | 0.3 | 10.5 |
| | C+ | | | 0.4 | 1.1 | 1.2 | 1.5 | 1.7 | 2.0 | 1.3 | 0.7 | 0.5 | 10.5 |
| | C | | | 0.1 | 0.7 | 1.1 | 1.3 | 1.4 | 2.0 | 1.9 | 1.0 | 1.1 | 10.7 |
| | C- | | | 0.2 | 0.6 | 0.8 | 0.9 | 1.2 | 1.5 | 1.6 | 1.0 | 1.1 | 8.9 |
| | D | | | | 0.1 | 0.4 | 0.3 | 0.6 | 0.7 | 1.0 | 0.7 | 1.5 | 5.3 |
| | E | | | | 0.1 | 0.2 | 0.4 | 0.6 | 0.8 | 1.1 | 1.5 | 13.8 | 18.5 |
| Tot. | | 4.5 | 5.4 | 7.4 | 8.4 | 10.0 | 10.4 | 10.6 | 10.7 | 8.9 | 5.3 | 18.5 | 100 |

Percent of Students – Using Raw Scores 2011-S2 Using 2011-S1 Weightings**Table A1(e) Microeconomics (104) (n=315)**

| | Disrupted Grade | | | | | | | | | | | | |
|---------------------|-----------------|-------------|-------------|-------------|------------|------------|------------|------------|------------|------------|------------|-------------|------------|
| | | A+ | A | A- | B+ | B | B- | C+ | C | C- | D | E | Tot. |
| Non-disrupted Grade | A+ | 13.0 | 0.3 | 0.3 | | | | | | | | | 13.7 |
| | A | 4.1 | 2.5 | 0.6 | | | | | | | | | 7.3 |
| | A- | 2.2 | 3.2 | 2.5 | 0.3 | | | | | | | | 8.3 |
| | B+ | | 2.9 | 2.5 | 1.0 | 0.3 | | | | | | | 6.7 |
| | B | 0.3 | 0.3 | 1.9 | 2.2 | 2.9 | 1.0 | | | | | | 8.6 |
| | B- | | 0.6 | 1.6 | 0.6 | 2.9 | 1.0 | 1.0 | | | | | 7.6 |
| | C+ | | 0.3 | 0.6 | 1.3 | 1.3 | 2.5 | 2.2 | 0.3 | 0.3 | | | 8.9 |
| | C | | | | 0.6 | 0.3 | 0.6 | 1.3 | 1.6 | 1.0 | | 0.3 | 5.7 |
| | C- | | | | | 0.6 | 1.6 | 2.9 | 2.2 | 1.6 | 0.6 | 0.3 | 9.8 |
| | D | | | | | | 0.6 | 1.0 | | 2.2 | 0.6 | 1.0 | 5.4 |
| | E | | | | | 0.6 | 0.3 | 1.0 | 0.6 | 1.9 | 1.3 | 12.4 | 18.1 |
| Tot. | | 19.6 | 10.1 | 10.0 | 6.0 | 8.9 | 7.6 | 9.4 | 4.7 | 7.0 | 2.5 | 14.0 | 100 |

Table A1(f) Macroeconomics (105) (n=349)

| | Disrupted Grade | | | | | | | | | | | | |
|---------------------|-----------------|-------------|------------|------------|-------------|------------|------------|------------|------------|------------|------------|-------------|------------|
| | | A+ | A | A- | B+ | B | B- | C+ | C | C- | D | E | Tot. |
| Non-disrupted Grade | A+ | 12.0 | 1.7 | 1.4 | | | | | | | | | 15.2 |
| | A | 3.2 | 3.7 | 2.0 | 0.9 | | | | | | | | 9.7 |
| | A- | | 1.4 | 3.4 | 5.2 | 1.4 | 0.6 | | | | | | 12.0 |
| | B+ | | 0.6 | 0.3 | 3.7 | 2.3 | 2.0 | | 0.3 | | | | 9.2 |
| | B | | | 0.3 | 1.7 | 2.6 | 2.6 | 0.3 | 1.4 | | | | 8.9 |
| | B- | | | | 0.6 | 0.6 | 2.3 | 1.7 | 2.0 | 0.6 | | | 7.7 |
| | C+ | | | | | 0.3 | 1.1 | 1.7 | 2.0 | 1.1 | 0.3 | | 6.6 |
| | C | | | | | 0.3 | | 0.3 | 0.9 | 1.1 | 0.9 | 0.6 | 4.0 |
| | C- | | | | | | 0.6 | 0.3 | 1.1 | 1.1 | 1.4 | 1.1 | 5.7 |
| | D | | | | | | | | 0.6 | 1.1 | 0.9 | 0.3 | 2.9 |
| | E | | | | | | | 0.3 | 0.6 | 0.9 | 1.4 | 14.9 | 18.1 |
| Tot. | | 15.2 | 7.4 | 7.4 | 12.1 | 7.5 | 9.2 | 4.6 | 8.9 | 5.9 | 4.9 | 16.9 | 100 |

Percent of Students – Using Historical Grade Distribution 2011-S2 Using 2011-S1 Weightings
Table A1(g) Microeconomics (104) (n=315)

| | Disrupted Grade | | | | | | | | | | | | |
|---------------------|-----------------|------------|------------|------------|------------|------------|------------|-------------|-------------|-------------|------------|-------------|------------|
| | | A+ | A | A- | B+ | B | B- | C+ | C | C- | D | E | Tot. |
| Non-disrupted Grade | A+ | 2.5 | 3.2 | 3.8 | 2.2 | 1.6 | 0.3 | | | | | | 13.7 |
| | A | | | 0.6 | 2.5 | 1.9 | 1.6 | 0.6 | | | | | 7.3 |
| | A- | | | | 1.0 | 3.2 | 1.9 | 2.2 | | | | | 8.3 |
| | B+ | | | | | 0.6 | 2.9 | 2.9 | 0.3 | | | | 6.7 |
| | B | | | | | 0.3 | 1.3 | 2.2 | 3.8 | 1.0 | | | 8.6 |
| | B- | | | | | | 1.0 | 1.9 | 2.9 | 1.3 | 0.6 | | 7.6 |
| | C+ | | | | | | 0.6 | 1.0 | 1.6 | 3.8 | 1.0 | 0.6 | 8.9 |
| | C | | | | | | | | 1.0 | 1.6 | 1.0 | 2.2 | 5.7 |
| | C- | | | | | | | | 1.0 | 2.2 | 3.2 | 3.5 | 9.8 |
| | D | | | | | | | | | 1.3 | 0.3 | 3.8 | 5.4 |
| | E | | | | | | | | 0.6 | 0.3 | 1.0 | 16.2 | 18.1 |
| Tot. | | 2.5 | 3.2 | 4.4 | 5.7 | 7.9 | 9.6 | 10.8 | 11.2 | 11.5 | 7.1 | 26.3 | 100 |

Table A1(h) Macroeconomics (105) (n=349)

| | Disrupted Grade | | | | | | | | | | | | |
|---------------------|-----------------|------------|------------|------------|------------|-------------|-------------|-------------|-------------|------------|------------|-------------|------------|
| | | A+ | A | A- | B+ | B | B- | C+ | C | C- | D | E | Tot. |
| Non-disrupted Grade | A+ | 4.9 | 4.3 | 4.6 | 1.4 | | | | | | | | 15.2 |
| | A | 0.6 | 2.0 | 3.4 | 2.9 | 0.9 | | | | | | | 9.7 |
| | A- | | | 0.9 | 4.0 | 5.2 | 2.0 | | | | | | 12.0 |
| | B+ | | | 0.3 | 0.3 | 3.7 | 3.4 | 1.1 | 0.3 | | | | 9.2 |
| | B | | | | 0.3 | 1.7 | 2.9 | 2.6 | 1.4 | | | | 8.9 |
| | B- | | | | | 0.6 | 1.1 | 3.4 | 2.3 | 0.3 | | | 7.7 |
| | C+ | | | | | | 0.6 | 2.6 | 2.6 | 0.9 | | | 6.6 |
| | C | | | | | | 0.3 | 0.3 | 1.4 | 1.4 | 0.6 | | 4.0 |
| | C- | | | | | | | 0.9 | 1.1 | 2.0 | 1.4 | 0.3 | 5.7 |
| | D | | | | | | | | 0.9 | 1.7 | | 0.3 | 2.9 |
| | E | | | | | | | 0.3 | 0.9 | 1.4 | 2.6 | 12.9 | 18.1 |
| Tot. | | 5.5 | 6.3 | 9.2 | 8.9 | 12.1 | 10.3 | 11.2 | 10.9 | 7.7 | 4.6 | 13.5 | 100 |

Appendix D

Agnew, S. (2015). Current Trends In Economics Enrolments at Secondary And Tertiary Level. *New Zealand Economic Papers* 49(1) p. 33-43.

ABSTRACT

The number of students studying economics in New Zealand secondary schools and universities has declined sharply in recent years. The introduction of the National Certificate of Educational Achievement (NCEA), which resulted in a far wider choice of subjects mirrored the experience in Australian schools in the 1990's when a range of more vocational subjects were introduced. Of immediate concern for economics departments around New Zealand is the recent introduction of Business Studies NCEA achievement standards in secondary schools. If the New Zealand experience mirrors that of the Australian experience, the introduction of business studies into secondary schools will lead to a substantive decrease in the number of students studying economics at the tertiary level.

JEL: A20, A21, A22

Keywords: Economics Education, NCEA, Undergraduate Economics

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INTRODUCTION

The subject of economics has experienced rapid change in the secondary school sector in New Zealand over the last decade. In 2004, level three of the National Certificate of Educational Achievement (NCEA) was introduced at Year 13, the final year of secondary education. Where previously, students sat a narrow range of traditional subjects to earn University Entrance (UE); under NCEA, students could count credits from a much broader range of subjects toward obtaining UE. In 2004 there were 83 different subjects being sat by students in Year 13. This increased choice of subjects able to contribute toward UE led to a decrease in the number of students studying Economics in Year 13 from 7,393 in 2003 to 5,818 in 2004, a decrease of 21%. There was a further drop in 2005 to 4,963, before stabilising then increasing slightly to 5,604 in 2010. Other traditional subjects such as Calculus suffered a similar fate. The number of students sitting Calculus in Year 13 fell from 10,708 in 2003 to 8,845 in 2004, with a further drop to 7,781 in 2005, before recovering slightly to 8,448 in 2010.

In the 1990's Australian secondary schools experienced a similar evolution in terms of student choice. Lewis & Norris (1997) found a decline in Australian university and secondary school economics enrolments in the early to mid 1990's. They asked Heads of Departments of 38 Australian universities (with 35 responding) to give their perceptions of the reasons for the declining popularity of economics among students, and found a general consensus that the major reason for the falling number of students taking economics was a change in the school curriculum.

Greater overall retention rates at school resulted in increased demand for and provision of vocationally oriented courses. Lewis & Norris (1997) go on to state “Thus, it is the increasing number of vocationally orientated courses, and the perception (and in many cases the actuality) that studying these increase one’s chances of entering TAFE or getting a job that explains the decline in school enrolments”. (p. 8). In New Zealand, traditional subjects such as calculus have seen a slight improvement in Year 13 enrolments since 2010 (to 8,698 students in 2012). In contrast, the number of students sitting Economics in Year 13 has further fallen from 5,604 in 2010 to 5,088 in 2012. As table one shows, there has been a decrease of 31% in the number of students sitting Year 13 economics in secondary schools from 2003 to 2012.

Table One: The number of students taking Year 13 economics in NZ secondary school.

| Year | Economics Year 13 Enrolments |
|-----------------|-------------------------------------|
| 2012 | 5088 |
| 2011 | 5185 |
| 2010 | 5604 |
| 2009 | 5356 |
| 2008 | 5586 |
| 2007 | 5,239 |
| 2006 | 5,036 |
| 2005 | 4,963 |
| 2004 | 5,818 |
| 2003 | 7,393 |
| % Change | -31% |

To uncover a possible explanation for the more recent decline in economics from 2010, the answer may lie across the Tasman.

LITERATURE

Stokes & Wright (2012) quote Morgan (2009) stating that the onset of the Global Financial Crisis seemed to have increased demand for economics courses in the UK, with a 15.2% increase in 2009 of commencing students taking economics, double the 7.0% increase in overall student numbers. Stokes & Wright (2012) note however that the equivalent economics numbers in Australia have fallen steadily since 2007, possibly due to the lesser impact of the global financial crisis. They found that despite an increase in the number of commencing students studying in the university sector of 29% from 2004 to 2010, the number of commencing students studying Economics declined by 2%. Interestingly, for the corresponding period Business and Management numbers rose 27%, Marketing and Sales 34 % and Law 30%. Creighton (2014) also describes economics enrolments “withering” outside of Australia’s eight major institutions, as evidenced by the closures of the economics departments at Edith Cowan University and the University of Western Sydney. He goes on to state that in 2007 economics made up 1.17% of total student enrolments at Australian universities, down from 1.95% in 1990. The decline in economics enrolments in Australian universities has now lasted for two decades from 1990 to 2010. The improving rates of enrolments in business courses while economics enrolments decline is a common thread through the Australian literature since the 1990’s. Bachan (2004) found a similar effect in the UK, when between 1992 and 2004, the number of students sitting Business Studies A-Level examinations increased by 80%,

when for the same period, the number of students sitting A-Level Economics examinations dropped by 51%. This led Buchan to conclude that to a certain extent students were substituting A-Level Business Studies for A-Level Economics. Alauddin & Valadkhani (2003) expressed a similar sentiment when concluding that based on a literature review and supporting time series data, the main reason for economics continuing to be less attractive for students undertaking an undergraduate degree is the successful performance of “rival business courses”. They go on to say that “Economists need to seriously consider revising the contents of their courses to make them more applicable to the real world problems” (P. 26). Marangos (2002) in a survey of students studying Introductory Microeconomics at Monash University found that

“employment projections did not incorporate working as economists implying that they were not planning to major in economics.....The survey results indicate that students value economics not for the intrinsic nature of economics but rather as a means to complement their majors in their business studies and as such enhancing their employment prospects” (p. 91).

Lewis & Norris (1997) quote Millmow (1995) when establishing a possible reason for declining economic enrolments at the university level:

“In many ways the rise and rise of business courses at the expense of economics is because the new glamour disciplines of marketing, HRM, and management are glorified by the university salesfolk and command a good media profile. Economics, by contrast, has a tawdry, shop worn look that part reflects the seemingly killjoy aspects of the economists’ tasks” (Millmow 1995).

As part of their research, Lewis & Norris (1997) asked heads of economics departments to rank eleven possible causes (derived from the literature) for the decline in enrolments in economics degrees, and to score each possible cause on a scale of 1 (not important) to 5 (important). The scores from the 35 respondents were averaged for each possible cause, and ranked, with those causes yielding a mean of 3 or higher shown in table two below.

Table Two: Australian HOD’s perceptions of the cause of declining economics enrolments

| Cause | Mean Score |
|---|------------|
| 1. Business studies are seen as more career focused than economics | 4.6 |
| 2. Business studies degrees are seen as leading to higher paid jobs | 3.9 |
| 3. Economics is seen as too rigorous and/or abstract | 3.8 |
| 4. School students are taking “easier” courses such as business studies | 3.5 |
| 5. Students are increasingly less well prepared in mathematics | 3.4 |
| 6. Economics is perceived as “boring” | 3.3 |
| 7. Students are seeking a more rounded and pragmatic approach than that perceived to be offered by Economics. | 3.1 |

Source: Lewis & Norris (1997)

The popularity of business was clearly seen as a significant reason for the decline in economics enrolments in Australian universities, by heads of the various economics departments. This led Lewis & Norris (1997) to conclude:

“Academic economists have, generally, argued that economics provides an excellent rigorous training suitable for many occupations. They have tended to be critical of less rigorous courses (in business, for instance) and have been unwilling to compromise on the content of courses, knowing what is best for students. The students, it seems, do not agree. The prevailing view among academics is that the solution is to persuade students of the benefits of an economic degree. Perhaps, however, academics should make more concessions to student preferences. Only a small proportion of economics undergraduates go on to become professional economists, mostly after taking honours. It may be a little late but, clearly, academics need to thoroughly assess the contents and structure of units in economics degree programs and “service” units, with a view to matching them to student preferences” (p. 12 & 13).

Marongos (2002) expressed similar sentiments

“However, economic departments have to recognise that the vast majority of their students have no intention in undertaking a major in economics. Therefore economic departments’ role, if the trend continues, would be transformed into a service department offering complementary subjects for business studies. The survival of the economics department would depend on how successful they are in adjusting to the new conditions. Teaching materials have to shift the emphasis of economics from being abstract and hypothetical to incorporate problem solving techniques and demonstrating the relevance of economics for business studies and future employment...Some may argue that this strategy does not seem appropriate for a social science with the prestige of economics. While undesirable and unsatisfactory for those who advocate economics to be the leading science in the business area, this strategy may be the only alternative for survival” (p. 91).

This shift in the focus of economics to being a service department for complementary subjects is noted by Stokes & Wright (2012), when they discuss the impact lessening numbers studying economics has had on the delivery of economics in Australian universities. The development of one semester business economics type papers replacing the traditional microeconomics and macroeconomics split, to provide minimal economics for non-economics majors prompted Stokes & Wright(2012) to believe that “Economics has, therefore, changed from being an important discipline and course in its own right to being primarily one of service teaching in a business or commerce degree” (p. 2).

As early as 1999, Alvey & Smith in a survey of six out of seven universities found that “heads of economics departments in New Zealand universities attributed the decline in economics enrolments to the same factors as did their Australian counterparts: competition from business studies programs” (p. 94). However, there has been little examination of relative enrolments in economics and other business subjects since in New Zealand.

The economics experience in the New Zealand secondary school and tertiary sectors of the past ten years appears to bear a striking resemblance to the Australian experience since the 1990’s. Initially

an increase in the subject choices available at the senior level in secondary schools leading to a decrease in economics enrolments, followed by a surge in popularity of business subjects which are perceived as being more vocational, at both the secondary and tertiary level. The Australian literature suggested the way forward for economics departments was to evolve course offerings to be more appealing toward business graduates. There has been some evidence of this occurring in New Zealand at the 100 level, with titles such as 'Economics for Business' appearing in some institutions. There has also been a widespread adoption of one semester 100 level papers consisting of a combination of micro and macroeconomics. The reason for this however appears to be a need to have a single economics paper in the 'cores' that have developed in most New Zealand colleges of business, mainly as a response to those colleges seeking accreditation with international organisations such as AACSB. All New Zealand universities have 15 points of 100 level economics required in the core set of papers for their business or commerce degree. (In addition, Waikato also requires a 200 level economics paper in the core for their BMS and BBA degrees). The same is the case for NZICA's economics requirement, except for Canterbury which requires 30 points, and Victoria that effectively requires 30 points by have the second of a two paper cycle as their NZICA requirement. Although all universities require students to do at least one 15 point economics paper in the core of their business degrees, student choice is still important, as one 100 level economics paper does not meet the prerequisites required to study the range of 200 level economics papers necessary for an economics major. The structural change of requiring one economics 100 level paper should not impact on the number of economics majors.

METHOD

This paper is a descriptive study incorporating statistics obtained from data analysts at the Ministry of Education and the New Zealand Qualifications Authority (NZQA). Results from a survey of economics heads of departments at 7 of the 8 New Zealand universities, as well as survey results from students in a 100 level economics paper at the University of Canterbury are also incorporated in the latter parts of the paper.

RESULTS AND DISCUSSION

As table three below shows, in the past five years there has been a considerable drop in the number of students taking the traditional 'commerce' subjects at secondary school of economics and accounting. Note that a student is counted as an economics student if they are enrolled in one national standard. A student enrolled in five economics standards would still only count as one student in the table. The all subjects column will consist of the number of students multiplied by the number of different subjects each student is enrolled in at least one national standard.

Table Three: The number of students taking Year 9 to 13 subjects at New Zealand secondary schools

| | Economics | | Accounting | | Commerce Related | | Year 9-13 All Subjects | |
|-----------------|------------------|--------------|-------------------|--------------|-------------------------|--------------|-------------------------------|--------------|
| | <i>Yr 9 – 13</i> | <i>Yr 13</i> | <i>Yr 9 – 13</i> | <i>Yr 13</i> | <i>Yr 9 – 13</i> | <i>Yr 13</i> | <i>Yr 9 – 13</i> | <i>Yr 13</i> |
| 2012 | 26,356 | 5,088 | 15,195 | 3,256 | 16,300 | 2,455 | 1,860,043 | 217,992 |
| 2011 | 26,926 | 5,185 | 16,359 | 3,319 | 14,907 | 1,991 | 1,901,822 | 219,466 |
| 2010 | 28,554 | 5,604 | 16,250 | 3,390 | 14,817 | 2,295 | 1,915,508 | 226,169 |
| 2009 | 30,721 | 5,356 | 17,580 | 3,626 | 16,828 | 2,201 | 2,043,750 | 214,029 |
| 2008 | 32,479 | 5,586 | 19,279 | 3,695 | 16,595 | 2,001 | 2,079,470 | 196,826 |
| % Change | -19% | -9% | -21% | -12% | -2% | 23% | -11% | 11% |

The 11% fall in Year 9-13 all subjects from 2008 to 2012 could be the result of two trends: fewer students of Year 9-13 age at schools; or students deciding to take fewer subjects at school. Whatever the cause, there has been a more than proportionate 19% decrease in the number of students taking economics and accounting in years 9-13. For the corresponding five year period there has been a negligible decrease in students studying commerce related subjects, including business studies. What is more pertinent for the tertiary sector is the trend at Year 13 level, the final year of secondary school. Individual differences from year to year are difficult to explain, with a wealth of possible causes such as demographic factors, pass rates the year before, pass rates in other subjects. For example, in 2010 Economics Year 13 enrolments increased by 246 students while accounting dropped by 236 students. One could surmise this is consistent with a switch from accounting to economics, possibly due to a hard accounting exam the year before. However, it could just as easily be explained by some schools dropping accounting classes at Year 13 and replacing them with economics classes. The fact that economics increased by 246 Year 13 students in 2010, then fell by 419 Year 13 students the next year shows the difficulty of attempting to explain any year by year variations. However, at the Year 13 level, it is reasonable to conclude that the 23% increase in students studying Commerce Related subjects as at least contributed to the 12% and 9% decrease in students studying Accounting and Economics respectively. What is important to note is the decreasing long term trend in students sitting economics and accounting, while at the same time business studies is experiencing large growth. This is especially pertinent given the experiences of school in England and Australia when business studies was introduced into schools. It is worth noting that even given the decline in economics, there is still twice the number of students sitting Year 13 economics than Year 13 Commerce Related subjects.

When looking at the number of students enrolled in specific business studies achievement standards in secondary schools, there has been phenomenal growth in a short period of time. As table four shows, in the three years since the introduction of level one business studies achievement standards, there has been a 146% increase in enrolments, with enrolments in level two business studies achievement standards increasing by 86% in the two years they have been offered. For table four, a student is counted as a business student if they are enrolled in a minimum of one national standard. A student enrolled in five business studies standards would still only count as one student.

Table Four: The number of students taking business studies achievement standards in New Zealand Secondary Schools

| | 2010 | 2011 | 2012 |
|--------------------|--------------|--------------|---------------|
| Level One | 4,250 | 8,625 | 10,452 |
| Level Two | 0 | 4,541 | 8,434 |
| Level Three | 0 | 0 | 4,611 |

The Australian literature suggested that decreases in the number of students studying economics at secondary school flowed through to tertiary economics. This is also the case for economics in New Zealand. From 2008 to 2012 tertiary bachelor enrolments have been increasing for domestic students by (with international enrolments remaining constant) in universities by 7%, with enrolments in institutes of technology and polytechnics increasing by 49%. Overall, enrolments for all public tertiary institutions increased by 15% from 2008 to 2012, while the number of students enrolled in an economics bachelor degree in a New Zealand university for the same period declined by 20%. For the comparable period, business & management, sales & marketing and finance & banking have experienced increases of 9%, 14% and 7% respectively. Accounting has experienced a 1% increase, while information systems experienced a 5% decline. Note the numbers referred to in the previous paragraph are students rather than EFTS.

Similar results occur when examining the number of commerce and economics student enrolments for the tertiary sector as whole, which dismisses the possibility that the decline in university economics enrolments is merely a result of a different mix of enrolments in different types of institutions across the tertiary sector.

For the 2008 to 2012 period, postgraduate enrolments in economics have also fallen, with the decrease being predominantly caused by a decrease in enrolments at the honours level. Masters enrolments decreased negligibly from 470 to 460, while Doctorate enrolments increased from 80 to 90. Honours enrolments however declined by 22% from 1,100 students to 860. This decrease occurred solely between the years of 2010 and 2012, with 2008 enrolments being at the same level as 2010.

When student enrolments are separated out by NZQA level (with level 5 being 100 level, level six 200 level and level seven 300 level), it is interesting to note that the decline in the number of students taking economics as part of a bachelor degree in New Zealand universities is occurring at the 100 and 200 level, as shown in table five.

Table Five: Number of students enrolled in bachelor degrees in NZ Universities by NZQA level

| NZQA Level | 2008 | 2009 | 2010 | 2011 | 2012 | % CHANGE |
|-------------------|---------------|---------------|---------------|---------------|---------------|-----------------|
| 04 | 10 | 0 | n | 10 | 0 | |
| 05 | 11,720 | 10,230 | 9,690 | 8,970 | 8,980 | -23% |
| 06 | 3,930 | 4,070 | 3,660 | 3,530 | 3,420 | -13% |
| 07 | 1,800 | 1,790 | 1,830 | 1,890 | 1,880 | 4% |
| 08 | 60 | 60 | 40 | 30 | 40 | |
| 09 | 10 | 20 | 10 | 10 | 10 | |
| TOTAL | 16,030 | 14,810 | 13,920 | 13,000 | 12,850 | 20% |

Notes

- 1 'n' means less than 5.
- 2 All cells of 5 or more have been rounded to the nearest 10. Totals have been rounded independently, therefore the sum of rows or columns may not add to the total.
- 3 Students enrolled in more than one level are counted once in each level. Consequently the sum of each level may not add up to total.

An intuitive explanation for this decline is the impact of the previously mentioned 'core' sets of papers in New Zealand universities, for students studying a bachelor degree in a commerce or business. With universities requiring a core of up to seven papers, with additional papers required depending on the major, students have minimal or no space available to take elective 100 level papers. Where previously a Management major for example may have taken first year management and two economics first year papers (a micro and a macro), they now have only room for the mandatory core papers and the 100 level management papers required to major in management. Of the mandatory core papers, no university has more than one paper (15 points) of economics, with the exception of Waikato University which has a greater points requirement in their BMS and BBA(Fin) degrees. Although the core may be a majoring requirement in some universities, documents giving course advice to students through planned degree structures show the core being completed in the first year of a student's study, rather than being spread across the three years the degree will take. Interestingly, the existence of 'core' papers explains why students may be taking fewer economics papers but the information in table nine is the number of students taking economics in a given year, not EFTS (equivalent full time students). In response to the question "If a student is doing say three economics papers, would they be counted just the once in these statistics, or three times?" a senior data analyst from the Ministry of Education when contacted by email replied "We do report the field of study information related to courses students enrolled in. The field of study is determined by the NZSCED codes of courses. For your question on taking different papers in Economics, we count them once by the narrow NZSCED field (first four digits of NZSCED code) if they take different papers. In your example taking three economics papers, all three papers will have the same narrow NZSCED code (0919) and we count each student once". The NZSCED codes referred to are given below for economics and econometrics:

0919 Economics and Econometrics

091901 Economics

Courses that provide, or develop further the abilities of individuals with an understanding of the production, consumption and transfer of wealth. Principal subject matter includes microeconomic theory, macroeconomic theory, mathematical economics, environment and resource economics, finance, economics, health economics, industry economics and industrial organisation, international economics and international finance, labour economics, macroeconomics (including monetary and fiscal theory), public sector economics, welfare economics, transport economics, economic geography, economic development and growth, urban and regional economics, political economy, and comparative economic systems.

091903 Econometrics

Courses that prepare or develop further the abilities of individuals to apply mathematical and statistical techniques in solving economic problems and in testing and demonstrating theories in economics. Principal subject matter usually includes economic models and forecasting, econometric and statistical methods, time-series analysis, cross-sectional analysis, and panel data analysis. (Ministry of Education website, 2013).

It could be that the decrease in the number of students studying first and second year economics in NZ universities as part of a bachelor degree could be driven by fewer students studying economics as part of another degree such as a Bachelor of Arts, or it could simply be measurement error, with the senior data analyst issuing the warning that “We could identify the level of papers (100, 200 300 levels) by the national qualification levels (NZQF levels) of courses. Please note that some Universities do not allocate the levels correctly”.

Although there have been a declining number of 100 level and 200 level students studying economics at New Zealand universities, the conversion rates from 100 to 200 level have been relatively stable. After a substantial increase from 34% of 100 level students moving on to take 200 level in 2008 to 40% in 2009, the conversion rate has stayed relatively stable, fluctuating between 38% and 39% from 2010 to 2012. Given that the introduction of 100 level economics papers into core sets of papers will have increased the number of non-economics majors in 100 level classes, the consistent conversion rates from 100 to 200 level since 2009 is a positive sign. The conversion rates from 200 to 300 level have increased steadily from 46% in 2008 to 55% in 2012, which has resulted in a 4% increase in the number of 300 level students for the same period.

However, despite positive conversion rates, whatever the total overall decrease in students studying economics in NZ universities as part of a bachelor degree is inescapable. To help shed some light on the causes of this decrease, the same survey that was given to Heads of departments in Australia by Lewis & Norris (1997) was sent to Heads of departments at New Zealand’s eight universities. All department heads responded with the exception of Massey University. The mean score of the seven individual responses was calculated for each statement, and is shown in table six, along with the original Australian HOD responses from Lewis & Norris (1997). The NZ responses are shown in order of importance (1= not important, 5=important), with the Australian rankings given in brackets.

Table Six: HOD perceptions of causes of declining economics enrolments

| | NZ Head of Departments (n = 7) | Australia Heads of Department |
|--|--------------------------------|-------------------------------|
| Students are seeking a more rounded and pragmatic approach than that perceived to be offered by Economics. | 3.428571 | 3.1 (7 th) |
| Economics is seen as too rigorous and/or abstract. | 3.285714286 | 3.8 (3 rd) |
| Students are increasingly less well prepared in mathematics | 3.285714286 | 3.4 (5 th) |
| Business studies are seen as more career focused than economics. | 3.142857143 | 4.6 (1 st) |
| Business studies degrees are seen as leading to higher paid jobs. | 3 | 3.9 (2 nd) |
| Economics is perceived as "boring" | 2.571428571 | 3.3 (6 th) |
| There is a student perception of high first year failure rates in economics papers. | 2.5 | 2.6 (9 th) |
| School students are taking "easier" courses such as business studies rather than economics. | 2.5 | 3.5 (4 th) |
| Economists are blamed for the recent recession. | 2.142857143 | 1.7 (10 th) |
| Students are increasingly more interested in interdisciplinary studies | 1.714285714 | 2.8 (8 th) |

The means for each statement for the Australian HOD's were higher than the HOD's, especially for the business statements around business studies being more career focused and leading to higher paid jobs. This may be a by-product of the fact that the swing to business studies from economics is only just emerging in NZ, where the effect had been more prolonged when the Australian HOD's completed the survey.

CONCLUSION

Although there has been a large decline in the number of students both in secondary schools and universities studying economics in New Zealand, the decrease has not impacted on the number of students majoring in economics at New Zealand universities as part of a bachelor degree. However the decline in overall numbers studying economics at universities does still have major implications for the funding of economics departments. The usual approach of cross subsidising small 300 level or honours level economics classes through large 100 level classes may have to be reviewed, especially with many students now studying one 15 point economics 100 level course where in the past before 'core' sets of papers were introduced to most commerce degrees in New Zealand, they may have studied two. The 'threat' of business studies achievement standards now having been introduced into New Zealand schools, which can be used by students for university entrance and NCEA certificates looms on the horizon. The Australian experience shows that the introduction of business studies into Australian schools led to a significant decrease in the number of students studying economics at university. Anecdotally, when speaking to a handful of teachers at the recent New Zealand Commerce and Economics Teachers Association (NZCETA) national conference, the author of this paper learnt of two North Island schools that had replaced their Year 11 economics classes with business studies classes, only two years after the introduction of Year 11 business studies achievement standards; with one of the two schools having had two classes totalling over 70 students studying economics two years prior. The author is also aware of a medium sized school in Christchurch that has cancelled their Year 11 and Year 12 economics classes for 2014 due to a lack of demand, and will cancel their Year 13 class in 2015. The rapid growth in the number of students studying business studies in secondary schools since their introduction in 2012 at Year 11 should serve as a warning for economics departments in the tertiary sector. A final sobering thought for economics departments in universities around New Zealand is that as a result of the 2010 and 2011 earthquakes in Christchurch, first year economics numbers at the University of Canterbury have decreased by over 40%, with subsequent flow on effects for 200 and 300 level economics classes. Assuming most of these have been spread over other universities in New Zealand, increased demand for economics in other universities by students who previously attended Canterbury may have moderated a structural shift away from economics in some universities. In attracting more students into economics, the 100 level lecturer has a role to play in ensuring that economics is taught with a real world relevance, through using video clips and newspaper articles in lectures, as well as showing the link between economics and employment. This can be as simple as showing what economists do. High school students in particular see managers everywhere, every business has a least one manager, some have many. However, where do school students have exposure to economists in their workplace? There has been an effort amongst economics lecturers in New Zealand to make economics teaching engaging, from hosting the Australasian Teaching Economics Conference to running Economics Education sessions at the New Zealand Association of Economists annual conference. In 2013 a special edition of the New Zealand Economic Papers journal focusses on innovation in undergraduate teaching. Having interesting 100 level economics papers can be an important tool in enticing students who may only be doing economics as a core or NZICA requirement into majoring in the subject. Given the positive conversion rates from 100 to 200 level economics, it appears that 100 level lecturers are currently doing a good job. The challenge is to get more 100 level students into those economics classes.

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Appendix E

Harrison, N., Agnew, S. and Serido, J. (2015). Attitudes to debt among indebted undergraduates: A cross-national exploratory factor analysis. *Journal of Economic Psychology* (46) p. 62-73.

1 Introduction

Over the last fifty years, the likelihood of students across the developed world accruing debt to finance their studies has grown rapidly (Usher, 2005). This has partly been a response to the 'massification' of higher education, with higher numbers progressing to university and governments reducing or abolishing grant funding as it has become judged to be an unsustainable drain on the public purse. Another strand has been the liberalisation of various forms of commercial credit, with young people having access to various forms of overdraft, credit card and personal loan that would not have been available to their antecedents. Banks and other financial institutions have taken the view that students are useful customers to have, as they tend to turn into high-earning graduates who will invest, save or borrow in greater depth later in their working lives.

From the students' perspective, borrowing to fund extended education is generally seen as a good investment, with long-term rates of return that exceed the cost of borrowing for most (Walker and Zhu, 2011). There has been a strong (and growing) perception that a degree is essential for entry into lucrative non-manual careers, such that some judgement of the expected return becomes a component within the cost/benefit analysis that those considering university make. This is wholly consistent with *human capital theory* (Becker, 1994), which predicts that individuals will make economically rational decisions about their education, as with other forms of capital investment, although Brynin (2013) questions the extent to which prospective students are in a position to make this assessment. However, there are also wider wellbeing returns that act as an additional incentive, for example around the diversity of social experiences, improved job satisfaction or an increase in life expectancy associated with being a graduate. Furthermore, Brown (2003) argues that due to an 'opportunity gap' in graduate labour markets in developed economies, growing competition for a static number of jobs causes a drive for more credentials in order to establish a personal competitive advantage, such that contemporary students require a longer education to achieve the same occupational status as previous generations. This, in turn, is driving increased borrowing, for both undergraduate and postgraduate study.

With student debt thus becoming commonplace in many developed nations, it is surprising that more attention has not been placed on understanding what factors drive students' attitudes and behaviours around debt. This clearly has implications for theory, policy and practice, both for the individual and for wider society. This paper aims to move forward understanding of how students construct their attitudes to debt. In particular, it will address the following research questions:

How many dimensions are there within the complex attitudes around student debt and what do these dimensions describe?

What is the most simple, robust and parsimonious model for these dimensions?

To what extent is this model consistent between countries?

This paper describes the results of an cross-national study, with data collected from corresponding samples of students from three English-speaking nations that were selected pragmatically to eliminate issues around translation in an exploratory study; it is appreciated that other nations, particularly outside of the Anglophone world, may well have different perspectives. The study is grounded broadly within a behavioural economics perspective, seeking to understand economic

decisions that may be complex, contradictory or irrational. The primary data are subjected to exploratory factor analysis, with the structure and description of these factors being reflected upon and discussed. Finally, some implications for theory, policy and practice are suggested.

1.1 Policy contexts

The three countries represented in this study have varying approaches to the provision of governmental loans to students, amounts available and varying take-up rates. At the time of the study the approximate prevailing exchange rates were £1 = US\$1.50 = NZ\$2.

In *England*⁹, government loans for undergraduate students were introduced in the late 1980s to supplement the existing programme of means-tested grants for living costs. Their scale and importance has grown rapidly since the early 2000s, when grants were temporary abolished and tuition fees were introduced. English students have been paying the full cost of their tuition (up to £9,000 a year) since 2012, with loans available to defer the cost; there is also a complex system of means-tested grants and bursaries in place to offset a proportion of the fees (usually no more than one-third). Combined with an expanded loan available for maintenance costs, the English cohort in this study could borrow up to £14,500 per year, up from around £8,500 for those entering in 2011. Total indebtedness over the course of a three-year degree could therefore exceed £40,000.

Student loans in England have always been based on a delayed repayment system, where the first payment is ordinarily due nine months after graduation. However, if the graduate is earning under a threshold, repayments can be deferred. From 2012, this threshold was raised to £21,000 a year, which is some way above the average graduate starting salary, such that most students would not expect to repay for some years. Repayments are set at 9 percent of income over the threshold. Prior to 2012, the interest on student loans was pegged to the retail price index, but there is now a means-tested premium of up to 3 percent above inflation. Take-up of student loans prior to 2012 was around 85 percent, but it is now approaching 100 percent as very few students are able to fund maintenance and tuition costs from their existing resources.

The Student Loan Scheme in *New Zealand* (NZ) has undergone a number of modifications since its introduction in 1992. Students are able to borrow for course related costs such as textbooks, living expenses, and to pay for tuition fees. Initially, the interest rate charged on student loans was indexed to the consumer price index; however in 2000, interest was abolished for full-time students and part-time students on low incomes. This was extended in 2006, when loans were made interest free for all borrowers living in New Zealand, even including ex-students who were no longer studying. In 2010, a voluntary repayment bonus was introduced, which is a 10 percent bonus borrowers can receive for making voluntary repayments that total NZ\$500 or more in a tax year. So a borrower making a voluntary repayment of NZ\$1,000 receives NZ\$1,100 credit against their loan balance. The policy aimed to encourage borrowers to make extra repayments to repay their loans more quickly (and reduce costs to the government); however, it was not providing the expected value and was repealed in 2013.

As of 2012, 82 percent of full-time students took out a student loan, up from around 68 percent prior to the abolition of interest in 2006. The total amount of loan available to the current cohort of

⁹ The constituent nations within the United Kingdom have different student funding systems and levels of indebtedness. The data in this paper and the references to social policy focus on England, which has the highest levels of average debt. The English system is similar to those in Wales and Northern Ireland, while Scotland does not charge tuition fees and so average debt levels are much lower.

students is around NZ\$13,500 a year. Repayments are made once income reaches a threshold (around NZ\$19,000) and are pegged at 12 percent on income over this threshold.

In the *United States* (US), education is often labelled the ‘pathway out of poverty’ and government support for post-secondary and college education, primarily need-based funding, has been available since 1965. Through the 1992 reauthorisation of the Higher Education Act, access to federal funds for education broadened, annual borrowing limits were increased, and all students, regardless of financial need, gained access to unsubsidised student loans. To obtain federal funding, students apply for financial aid annually and, based on family income and related factors, students receive a personalized statement of the total financial aid available to them. Educational funding in the US is complex, covering a wide range of sources including need-based grants and scholarships (e.g. Federal Pell Grants, TEACH grants and aid for military families), subsidised and unsubsidised student loans, loans to parents and work-study options. Consequently, the amount available as well as repayment costs, including the interest charged and payment terms, vary depending on the type of aid received, who owns the debt (i.e. student or parent) and financial ability to pay the debt (e.g. employment status and annual income).

In 2011, the estimated 25.5 million undergraduates received 51 percent of their aid in the form of grants, 40 percent as loans, and 9 percent in a combination of tax credits and work-study. In that same period, public four-year college students graduated with average debt US\$23,800, with 57 percent of students taking loans. For the first time since 1992, total education borrowing, including federal student and parent loans, as well as non-federal loans, declined by 4 percent in real terms (Baum, Ma, & Payea, 2012).

1.2 Literature review

There is an extensive literature concerning attitudes to personal debt and indebtedness, with evidence suggesting a wide range of psychological factors that may be related to an individual’s propensity to take on debt and their subsequent reaction to doing so, including perceptions of risk, personality, materialism, anxiety, gratification horizon, optimism and locus of control (for a recent structured review, see Kamleitner, Hoelzl & Kirchler, 2012). However, we conceptualise student debt as being a distinct area of concern, largely as the debt is mainly accrued to finance a specific educational investment, either directly through tuition fees or indirectly in meeting the living costs associated with a period outside (or on the fringes of) the labour market. In addition, students are (generally) at an early point in their lifecourse and undergoing their first experience of debt and financial management. It is also an active area of education and social policy concern.

The phenomenon of student debt has come under research scrutiny since it began to emerge on a large scale in the 1980s and 1990s. Those writing from a sociological or social policy perspective have tended to focus on the relationship between student debt and elements of the student experience, such as mental health (e.g. Cooke et al., 2004; Jessop et al., 2005), part-time working (Hunt, Lincoln & Walker, 2004; Moreau & Leathwood, 2006; Richardson et al., 2013) and propensity to withdraw (e.g. Quinn et al., 2005). There has also been interest in the demographics of student debt, including around gender, social class and ethnicity (e.g. Hesketh, 1999; Scott et al., 2001; Kettley et al., 2008; Harding, 2011).

Perhaps most importantly, however, student debt has been repeatedly theorised as a major determinant in the demand for higher education, in the UK at least (e.g. Pennell and West, 2005; Jones and Thomas, 2005; Callender, 2012; Wilkins et al., 2013). It is generally argued that an underlying fear of debt discourages people from applying to university, especially those from lower

socio-economic groups and others with a stronger aversion towards borrowing (e.g. women and those from minority ethnic communities). For this reason, all three countries in this study employ a variety of student aid programmes (either at national, regional or institutional level) to ameliorate the debt burden for those considered to be most at risk of being deterred.

However, this argument has been somewhat undermined by recent events. England has seen two recent episodes (2006 and 2012) where tuition fees have been tripled, with a concomitant sharp increase in average student debt. However, demand has remained buoyant and there is evidence to suggest that any dissuasive effect has more keenly been felt within more affluent communities who might be expected to have a lower price elasticity of demand (Harrison, 2012; Higher Education Funding Council for England 2013). This suggests that the structure of students' attitudes and responses to debt is more complex than simply aversion or fear.

The first notable attempt to investigate the psychological structure of students' debt attitudes was published in Davies and Lea (1995), who developed a unidimensional Attitudes to Debt scale, constructed to run from pro-debt to anti-debt. This scale comprises 14 items covering both philosophical/moral positions and more everyday responses. It was found to be correlated to lifestyle and total existing debt, such that those with higher expenditure on clothing and entertaining and higher overall debt professed more pro-debt attitudes. It was also argued that comfort with debt increased the longer that a student found themselves indebted. Furthermore, they argue that there may be two types of student debtor – those who borrow due to a lack of family resources or a unexpected incident, and those who borrow to meet their lifestyle expectations, knowing that there is a family safety net in place or that their future incomes will provide them with a route out of debt.

Callender and Jackson (2005) used a reduced version of the Attitudes to Debt scale with prospective students to argue that an underlying 'debt aversion' was a major driver in decisions taken by young people about their educational investments. However, the data showed only a very modest relationship between debt aversion, demographic variables and the demand for higher education. Callender and Jackson also included a scale for 'cost/benefit balance of going to university', which might more appropriately be described as the perceived utility of debt under human capital theory, although this too appeared to have limited impact on anticipated future behaviour; its correlation with debt aversion was not explored.

Drawing on a US sample, Norvilis et al. (2003) question the cross-cultural and cross-temporal reliability (as measured by Cronbach's alpha) of the Attitudes to Debt scale. Haultain et al. (2010) continue in the same vein, drawing attention to its low measures of internal reliability across a range of studies in the UK and NZ. Instead, they use data from New Zealand school pupils and undergraduates to construct a two-factor model of student debt attitudes. The two uncorrelated factors were identified as being Fear of Debt and Debt Utility - i.e. the extent to which an individual appreciated the usefulness of debt to pay for things that would otherwise be unaffordable. Under this model, it would therefore be possible to simultaneously fear taking on debt, but be willing to do so on for the benefits it brings.

Using the Attitudes to Debt scale on another US sample, Norvilis et al. (2006) concluded that it was not a useful predictor of the amount of debt held by students. Subsequent research (Norvilis and Mao 2013) finds no predictive value in either US or Chinese samples in terms of financial confidence, financial well-being or credit card use, while questioning the internal reliability of both the Attitudes to Debt scale and Haultain et al.'s bidimensional scale.

Others have independently attempted to develop measures of debt attitudes. Eckel et al. (2007, 259) use a Canadian sample in an experimental study to argue that 'debt aversion plays little or no role in

the demand for postsecondary education finance in the form of a loan', although the measure used is of questionable validity, being based primarily on existing patterns of credit card use. Chudry et al. (2011) similarly find that UK students' future borrowing intentions are not influenced by their measure of Debt Aversion; one of four debt attitudes that they isolate using exploratory factor analysis, along with Debt Comfort, Self-Image Importance and Money Management. Only the last of these was a significant predictor, with students who showed an engaged and instrumental approach to student finance being more likely to expect to borrow in the future. Thus, while Chudry and colleagues identify four orthogonal dimensions of variation, only one of these has a causal role in borrowing intentions.

Focusing on student credit card use rather than student loans, Peltier et al. (2013) develop a six factor model from a US sample: Anxiety, Impulsivity, Social Status, Parental Involvement, Locus of Control and Compulsivity. Perhaps counterintuitively, they find that Anxiety is associated with higher indebtedness, suggesting either that the latter drives the former or that some use debt to offset their anxiety; such issues with causality are common in this area and raise questions about the development of models. Peltier and colleagues do find that the two factors involving the perceived utility of debt (Impulsivity and Social Status) are positively associated with borrowing.

Bachan (2013) has a similar finding, with a very simple measure of self-reported debt aversion being associated with higher debt, rather than an hypothesised lower debt – albeit at a non-significant level. Conversely, Oosterbeek and van den Broek (2009) find that the same measure adds significant predictive power to their model of student borrowing in the Netherlands. If this is the case, there are clearly unresolved issues with the development of a psychological model for students' attitudes to debt that is robust across culture and student finance systems.

Finally, the rationale behind this study derives, in part, from the qualitative data reported in Harrison, Chudry, Waller and Hatt (2015). Based on interviews with first year students, this proposes a six-way typology of debt attitudes ranging from 'debt positive' to 'debt angry', with a centre-of-gravity around those who were well-informed about what they were doing and resigned to indebtedness as a 'normal' feature of being a student. These data were used as a starting point for the development of the questionnaire, which seeks to investigate the validity of this typology and factors that define it.

2 Methodology

This study is quantitative in nature, working from the position that individuals are able to provide an acceptably accurate self-report of their attitudes using common tools such as the Likert scale. While such data is inevitably less rich or detailed than what might be collected through interviews, its numerical nature permits the use of well-established statistical techniques to infer a model of the main determinants of attitude and how these dimensions interact with each other. This, in turn, provides insight into the extent of variability within the sample and, by association, wider and international populations.

This is not to suggest that such attitudes are deterministic at the individual level, nor that they are necessarily constant through time and situation. It is also appreciated that self-reports will be socially constructed and that this may compromise their reliability, although the anonymous and impersonal approach used will have mitigated against this. In addition, the sample size made possible through a quantitative approach allows for a higher degree of representativeness and tolerance for individual measurement errors.

The study was centred around three universities - one each from England, the US and NZ. These were selected on the basis that they shared a similar student cohort, being mid-ranked institutions within their own national context. All three were situated within medium sized cities and had a mixed local and national recruitment profile that broadly echoed the national demographic profile for higher education students. They are therefore assumed to be typical sites from which defensibly-representative samples might be drawn.

The sampling frame for the study comprised full-time 'home' (i.e. not international) undergraduates in their first year on business (including management, marketing, accountancy, commerce, economics and applied mathematics) or social science (including sociology, psychology, politics and education) programmes; there was no age criterion and exploratory analysis demonstrated that model reported below was robust across age groups. International students were excluded as they are generally ineligible for student loans in the country in which they are studying.

It was decided to focus the study on first year students only. This was partly a pragmatic decision around resources, but it was also intended to target a period when debt was a new experience for them. Davies and Lea (1995) and Lea, Webley and Bellamy (2001) report that the experience of indebtedness leads to changes in attitudes towards debt, especially in terms of increasing comfort with borrowing. This may be due to developing familiarity, an increased understanding of risk or the desire to eliminate the cognitive dissonance associated with being compelled into an undesirable position. There is, therefore, a risk of conflating being indebted with positive attitudes towards debt, with the danger that it is assumed that those in debt are those with the most pre-existing comfort, whereas student debt is a 'choice' into which many students find themselves forced by increasing costs and limited family resources. As a result, we were keen to capture data in the period when the students' attitudes were forming and before they were extensively shaped by on-going experience. In taking this methodological decision, we were aware that data collected later in the student lifecycle might vary significantly from this sample.

As noted above, the questionnaire used was developed from the results of the interview data reported in (Harrison et al, 2015), with these interviews providing a rich context for the elements of indebtedness that students reported as being important to them. The scales developed by Davies and Lea (1995) and Haultain et al. (2010) were not felt to be appropriate as they focused primarily on an abstract concept of debt, rather than students' responses to their lived experiences of indebtedness. An original questionnaire was piloted in England in December 2012 and a number of refinements made as a result, including reducing the number of items to remove those that appeared unimportant in the structure of attitudes. The final questionnaire also contained demographic questions, a personality inventory and a financial literacy test (the results of these components are to be reported elsewhere). The final version of the questionnaire comprised 20 items measured on a Likert scale running from 1 (Strongly agree) to 5 (Strongly disagree).

The data were collected in an interval spanning October 2013 and January 2014. Due to the different cycles of the academic years in the three countries, this corresponded to a period roughly halfway through the students' first year of study. A nearly identical version of the questionnaire was used, with minor differences to accommodate local vocabulary and spelling.

A similar approach to data collection was used in each university. The questionnaire was rendered online using Moodle in NZ and Survey Monkey in England and the US, with e-mail and in-person reminders being provided over the course of one month. Responses from students outside the sampling frame and those without debt were subsequently removed by hand. In England and NZ, a prize draw incentive was used to increase response rates, while students in the US were offered class credit. Both approaches helped to ameliorate self-selection bias by engaging with groups who might not typically respond to an unsolicited survey invitation.

A total of 496 valid responses were received, comprising 240 from NZ, 199 from England and 57 from the US (where fewer students have student loans). Table 1 provides descriptive statistics for the three national samples.

Table 1: Sample descriptive statistics

| | England | | NZ | | US | | ALL | |
|------------------------------------|---------|----|-----|----|----|----|-----|----|
| | n | % | n | % | n | % | N | % |
| Social science degree | 75 | 38 | 114 | 48 | 26 | 46 | 215 | 43 |
| Business degree | 124 | 62 | 126 | 52 | 31 | 54 | 281 | 57 |
| Male | 66 | 33 | 92 | 38 | 26 | 46 | 184 | 37 |
| Female | 133 | 67 | 148 | 62 | 31 | 54 | 312 | 63 |
| Majority ethnic group | 178 | 89 | 208 | 88 | 41 | 72 | 427 | 81 |
| Minority ethnic group | 21 | 11 | 32 | 12 | 16 | 28 | 69 | 14 |
| Mother has degree | 43 | 22 | 91 | 38 | 33 | 58 | 167 | 34 |
| Mother does not have degree | 156 | 78 | 149 | 62 | 24 | 42 | 329 | 66 |
| Father has degree | 54 | 27 | 94 | 39 | 31 | 54 | 179 | 36 |
| Father does not have degree | 145 | 73 | 156 | 61 | 26 | 46 | 317 | 64 |

Response rates were high for a general online survey. For example, the rate in England was 16 percent, 17 percent in NZ and 27 percent in the US. The samples were found to be broadly representative of the populations from which they were drawn by demographic variables, although women were slightly over-represented and students from minority ethnic groups were slightly under-represented.

SPSS v19 was used for the analysis, with a specialist additional module using an enhanced module for factor analysis using R v2.10.1.

3 Results

Table 2 shows the cross-national contrasts between means and standard deviations for each of the 20 questionnaire items. As the items were not normally distributed, the Kruskal-Wallis analysis of variance test was used to examine the differences between countries, with a Mann-Whitney pairwise *post hoc* analysis to determine which comparisons were significant; a 5 percent significance level was used.

As shown in Table 3, English students were significantly more likely than US or NZ students to view debt as an expected part of attending university and less prone to worry about the affordability of repayments than US students, but also more likely than NZ students to view this as unfair. US students had a significantly higher propensity than English and NZ students to see a degree as a means of securing a job and higher earnings. US students also professed less use of debt for luxuries than both other nationalities and less use of debt to fund their social life than English students, while being less likely to assert that they knew what credit card and overdraft debts they were incurring than both English and NZ students. NZ students were significantly more likely, on average, than English students to see university expenses as the best use for student debt. However, they had a lower propensity to believe they knew the repayment terms for their loan and a higher propensity to report feel socially isolated by their debt than English students.

Table 2: means and standard deviations for each item, by country

| | England | | NZ | | US | | ALL | |
|---|---------|-------|------|-------|------|-------|------|-------|
| | M | S.D. | M | S.D. | M | S.D. | M | S.D. |
| Debt is an expected outcome of attending university | 1.67 | .846 | 1.93 | .851 | 2.30 | 1.205 | 1.87 | .915 |
| Educational loan debt is a good investment for the future | 2.29 | .928 | 2.28 | .916 | 2.21 | .967 | 2.28 | .925 |
| Even though I am incurring debt now, it will be worth it in the future | 1.92 | .819 | 1.78 | .681 | 1.89 | .846 | 1.85 | .759 |
| I expect to earn more in the future because I went to university | 1.78 | .738 | 1.66 | .725 | 1.38 | .524 | 1.68 | .720 |
| I feel I have a good understanding of how student loans work | 2.24 | .970 | 2.31 | .918 | 2.33 | .970 | 2.29 | .944 |
| I feel isolated by my student debt | 3.78 | 1.024 | 3.50 | 1.019 | 3.84 | 1.041 | 3.65 | 1.032 |
| I have a good idea about how much credit card and overdraft debt I am incurring | 1.95 | .878 | 2.12 | 1.151 | 2.55 | 1.212 | 2.09 | 1.066 |
| I have a good idea about how much student loan debt I am incurring | 2.08 | .992 | 1.99 | 1.021 | 2.09 | .986 | 2.04 | 1.004 |
| I have a greater chance of getting a job if I have a degree | 1.74 | .961 | 1.75 | .713 | 1.35 | .588 | 1.70 | .701 |
| I know about the repayment terms for my student loan | 2.57 | 1.143 | 2.83 | 1.130 | 2.52 | 1.177 | 2.69 | 1.147 |
| I minimize my spending to minimize my debt | 2.41 | 1.124 | 2.46 | 1.062 | 2.34 | 1.066 | 2.43 | 1.086 |
| I sometimes can't sleep because I worry about how much debt I am in | 3.96 | 1.114 | 3.67 | 1.246 | 3.78 | 1.228 | 3.80 | 1.198 |
| I use debt so I don't miss out on 'normal' student experiences | 3.49 | 1.145 | 3.40 | 1.116 | 3.26 | 1.231 | 3.42 | 1.141 |
| I use debt to pay for a good social life | 3.63 | 1.115 | 3.83 | 1.063 | 4.06 | 1.089 | 3.77 | 1.093 |
| I use debt to pay for luxuries | 4.01 | .964 | 4.05 | .982 | 4.45 | .812 | 4.08 | .965 |
| I will start to deal with my student debt once I leave university and get a job | 2.01 | .856 | 1.90 | 1.003 | 1.89 | .880 | 1.94 | .932 |
| I worry about debt to the point where it affects my grades | 4.11 | .973 | 4.07 | 1.004 | 3.96 | 1.247 | 4.07 | 1.020 |
| I worry that the repayments on my debt will become unaffordable | 3.13 | 1.265 | 2.97 | 1.111 | 2.68 | 1.183 | 3.00 | 1.188 |
| The best use of my student debt is to pay for my university expenses | 1.84 | .781 | 1.53 | .690 | 1.78 | 1.057 | 1.68 | .789 |
| The debt I create as a student is an unfair start to my working life | 2.58 | 1.116 | 2.92 | 1.128 | 2.71 | 1.165 | 2.76 | 1.136 |

Scales run from 1 = Strongly agree to 5 = Strongly disagree

Table 3: post hoc analysis of items with significant differences by country

| | England | US | NZ | K-W statistic |
|---|---------|----|----|---------------|
| I feel isolated by my student debt | - | = | + | 11.735** |
| I worry that the repayments on my debt will become unaffordable | - | + | | 6.948* |
| The debt I create as a student is an unfair start to my working life | + | = | - | 10.293** |
| I use debt to pay for a good social life | - | + | = | 8.487* |
| I use debt to pay for luxuries | - | + | - | 12.075** |
| I have a greater chance of getting a job if I have a degree | - | + | - | 18.117*** |
| I expect to earn more in the future because I went to university | - | + | - | 15.940*** |
| The best use of my student debt is to pay for my university expenses | - | = | + | 20.395*** |
| Debt is an expected outcome of attending university | + | - | - | 28.380*** |
| I know about the repayment terms for my student loan | - | = | + | 7.820* |
| I have a good idea about how much credit card and overdraft debt I am incurring | + | - | + | 9.040* |

* $p < .05$, ** $p < .01$, *** $p < .001$

‘+’ denotes that this group had a significantly lower score (i.e. agreement with the statement) on this item compared to the group denoted with ‘-’. ‘=’ denotes that this group’s score was not significantly different from the other two groups.

Exploratory factor analysis was then undertaken on the 20 items. In terms of the suitability of factor analysis for this dataset, Bartlett’s test for sphericity was significant ($\chi^2_{190} = 3385.963$, $p < .001$), while the KMO statistic of .775 demonstrated a strong sampling adequacy. In addition, the large sample size of 496 gave a nearly 25:1 ratio of cases-to-variables, which is in line with both traditional and more recent ideas of best practice (Field, 2005; Hogarty et al., 2005). On this basis, it was felt appropriate to move to factor extraction.

Following Ruscio and Roche (2012) and Courtney (2013), the dataset was explored using the *comparison data* and *parallel analysis* techniques in preference to the less reliable scree plot or Kaiser’s rule approaches. These two approaches both suggested that a four-factor solution would be most appropriate for the data; there was no evidence for fewer than four factors, as suggested by previous researchers.

As the research question was focused on identifying an underlying structure of latent variables, a factor analysis approach was selected in preference to principal components analysis. Due to the use of an ordinal Likert scale, *principal axis factoring* was selected as the extraction method, using polychoric correlations in preference to Pearson correlations.

As there were no specific grounds to assume that factors relating to debt attitudes should not be correlated, oblique rotation (*Oblimin*) was used to generate a final model. Orthogonal rotation (using the *Varimax* procedure) was also explored, but this provided a similar solution while artificially preventing the factors from correlating.

The full factor loadings are presented in Appendix A. Given the exploratory nature of the study, a loading threshold of .400 was used to isolate the most important items comprising each factor and these results are presented in Table 4 below.

Table 4: Factor loadings for four factor solution with oblique rotation

| | Loaded items | Loading |
|-----------------|--|----------------|
| Factor 1 | I sometimes can't sleep because I worry about how much debt I am in | .783 |
| | I worry about debt to the point where it affects my grades | .778 |
| | I feel isolated by my student debt | .750 |
| | I worry that the repayments on my debt will become unaffordable | .690 |
| | The debt I create as a student is an unfair start to my working life | .526 |
| Factor 2 | I use debt to pay for a good social life | -.805 |
| | I use debt to pay for luxuries | -.760 |
| | I use debt so I don't miss out on 'normal' student experiences | -.652 |
| | I minimize my spending to minimize my debt | .449 |
| Factor 3 | Even though I am incurring debt now, it will be worth it in the future | .662 |
| | I have a greater chance of getting a job if I have a degree | .552 |
| | I expect to earn more in the future because I went to university | .546 |
| | Educational loan debt is a good investment for the future | .445 |
| | The best use of my student debt is to pay for my university expenses | .431 |
| Factor 4 | I feel I have a good understanding of how student loans work | .872 |
| | I know about the repayment terms for my student loan | .780 |
| | I have a good idea about how much student loan debt I am incurring | .598 |

The four-factor model provided a simple and ‘overdetermined’ solution, with no items loaded on multiple factors and a strong conceptual coherence within the factors; three items did not load substantially on any factors and were therefore discounted. The rotated solution captured 45 percent of the variance within the dataset. The four factors were named as follows:

1. **Anxiety.** This factor measured the extent to which the student was undergoing negative affect due to their indebtedness, including a sense of unfairness.
2. **Utility-For-Lifestyle (UFL).** This factor measured the individual’s use of credit to support an active social life which matched their normative expectations of ‘studentness’. (NB: This factor was negatively loaded.)
3. **Utility-For-Investment (UFI).** This factor measured the extent to which the individual believed that their debt was an investment that would lead to better (and better paid) work in the future.

- 4. Awareness.** This factor measured the individual's self-reported knowledge of their debt burden and the conditions for its repayment.

As can be seen in Table 5 below, the polychoric correlations showed a degree of inter-relationship between the four factors. Specifically, the Awareness factor was significantly correlated with all three other factors. Students who were better informed about their debt were, on average, less anxious about it, more likely to believe that it was a good investment and less likely to incur debt for lifestyle expenses. It is also interesting to note that the two factors relating to the utility of debt were not correlated, suggesting that they are distinct aspects of how students view the credit that is available to them and that they do not form a zero-sum game where being positive about debt for personal investment precludes using it for lifestyle purposes, and *vice versa*. Finally, it can be seen that Anxiety is not correlated with either of the utility factors.

Table 4: Polychoric correlation coefficients between extracted factors

| | Awareness | UFI | UFL |
|---------|-----------|-------|-------|
| Anxiety | -.203*** | -.037 | -.034 |
| UFL | .241*** | <.001 | |
| UFI | .256*** | | |

* $p < .05$, ** $p < .01$, *** $p < .001$

Finally, the factor analysis was rerun for England and NZ sub-samples and the results are presented in Appendices B and C; the US sample was too small for meaningful analysis. While there were minor differences in loading and the amount of variance captured by the factors, the basic model was consistent between the two countries.

4 Discussion

The four-factor model of students' responses to debt reported in this paper provides a relatively strong description of the underlying data, explaining around half of the variance through factors that are conceptually coherent. As far as could be examined, the model is robust between countries and it is asserted that the model is a good representation of attitudes among indebted higher education students – at least in the three countries studied. We note that the four factors map neatly onto the three components of attitude: affective (Anxiety), cognitive (Awareness) and behavioural (Utility-For-Investment and Utility-For-Lifestyle). However, it is acknowledged that exploratory factor analysis is driven, to an extent, by the items included and that additional factors may exist that are not defined by the item set used in this study.

This study adds to the already established literature (Norvilis et al. 2003; Norvilis et al. 2006; Haultain et al. 2010; Norvilis et al. 2013) which asserts that Davies and Lea's (1995) unidimensional Attitudes to Debt scale is insufficient to adequately describe this conceptual space. This could be due to changes in the role of, and meaning ascribed, to student debt in the intervening twenty years, as it has become more widespread and a more accepted aspect

of the university experience. Alternatively, it may be that the small sample size compromised their analysis.

The current study is also in a degree of conflict with the findings of Haultain et al. (2010) who argued for a two-factor model. The two studies are not entirely incompatible, however. Firstly, the Anxiety factor in this study and their Fear of Debt factor are readily analogous, suggesting that an affective component is crucial to understanding students' responses to debt. Secondly, there is a clear congruence between their Debt Utility factor and the factor named Utility-For-Lifestyle in the current study. It is suggested that both are measuring a latent attitudinal variable that relates to the extent to which a student is comfortable with using debt to meet the lifestyle that they have chosen. Such relationship between lifestyle expectations and the use of debt has been asserted by Davies and Lea (1995), Metcalf (2005) and Harrison and Chudry, 2011, among others. It is noted that US students, on average, perceive a lower utility in using debt for social or luxury purposes.

However, this study argues for an additional conceptualisation of utility that is absent from Haultain et al. (2010). The third factor in this study's model (Utility-For-Investment) addresses the students belief in education as a long-term financial investment and the extent to which the accumulation of debt is acceptable given higher future employability and earnings expectations. In other words, it reflects the belief in human capital theory (Becker, 1994) and the relative return-on-investment from accruing debt to improve one's own labour market position. This study argues that this form of utility is orthogonal to lifestyle utility and represents a separate dimension in students' responses to debt.

The final factor in this study (Awareness) has not previously emerged in the literature. It represents a latent variable described in the extent to which the individual feels informed about their debt. While it is not a direct measure of knowledge, it is likely to reflect the degree of control that the individual feels with regard to their debt and may be related to Locus of Control (e.g. Peltier et al., 2013) or Money Management (Chudry et al., 2011), which have been hypothesised to have a role in debt behaviour in other studies. Furthermore, it is reasonable to contend that there is an underlying openness to seeking out and internalising information about debt which is personal in nature and which may foster a degree of confidence. In other words, it may be possible to feel well-informed and confident, but still anxious, leading to debt reduction or avoidance; conversely, one might be unaware, but sufficiently comfortable with indebtedness to increase borrowing.

The Awareness factor plays an interesting role within the model, being significantly correlated with all three other factors. Further work is needed to explore the extent to which these relationships may be causal. For example, does having high perceived knowledge about finances help to reduce anxiety, or do those who are anxious about debt refuse to interest themselves in financial matters, preferring a position of 'blissful ignorance'? Similarly, does financial awareness and/or confidence help students to make economically-rational cost/benefit decisions about educational borrowing, or is there an unknown latent variable that predicts both the desire understand one's finances and the extent to which one 'buys into' human capital theory?

Finally, it is important to recognise that the Awareness factor is derived from self-reported items and that it does not necessarily mean that the individual's confidence in their knowledge is well-founded. Indeed, there may be a degree of overconfidence at work, where the individual *believes* that they are informed at the same time that their understanding is

actually flawed (see, for example, Moore & Healy, 2008 or Ehrlinger et al., 2008). Research suggests that there is a danger that such overconfidence can lead to poor future decision-making (see Skata, 2008), although in this instance the Awareness factor relates to possessing factual information about one's own debt rather than confidence in making decisions about it; simply being aware of the level of debt and the mechanics of repayment is not a guarantee of capability to manage debt effectively. However, the correlations between Awareness and the other three factors do speak for it having a positive role, at least in the short-term.

The model presented in this paper is consistent with the six types proposed by Harrison et al, 2015, but it suggests that these types represent clustered positionings within a multi-dimension model, rather than the dimensions of this model. For example, the 'debt oblivious' type appears to be described by a combination of low Anxiety and Awareness and high Utility-For-Lifestyle, while the 'debt positive' type has low Anxiety coupled with a high Utility-For-Investment. There is therefore scope for possible new types not described in Harrison et al, 2015. For example, an individual with high Awareness, Utility-For-Investment and Anxiety scores might be described as 'debt risky', calculatingly trading off their short-term anxiety for long-term benefit. A putative type of those with high Anxiety and low Utility-For-Investment are likely to be those dissuaded from higher education altogether, with possible debt causing them negative affect with no belief that the outcomes of accruing the debt will be positive.

The analysis of the average item scores demonstrate that US students, on average, have a stronger belief in the ability of higher education to provide labour market advantage. This is consistent with stereotypes around the meritocratic nature of American society and an underlying credentialism that leads to career success. As this belief is lower in England and NZ, it might be hypothesised that students in these countries are more sensitive to the costs of higher education relative to the long-term benefits.

Indeed, this might begin to explain recent trends in applications in England, where a significant increase in the expected debt burden has counterintuitively led to a fall in applications from higher socio-economic groups (Harrison, 2012; HEFCE, 2013). It is suggested that those dissuaded were those who were unconvinced about their return-on-investment from student loans, perhaps due to a declining graduate premium, overqualification and plausible alternatives to higher education in establishing a lucrative career (Brown et al., 2011). This might be heightened further for those with modest academic ability who are unlikely to have top graduate opportunities opened up for them by a degree. Conversely, those from lower socio-economic groups (like their American peers) appear to continue to express a strong belief in the ability of higher education to offer them greater opportunities and incomes than would otherwise be available.

If this is the case, the Utility-For-Investment factor in this study should perhaps be conceptualised as a form of disposition towards risk, grounded in a cost-benefit analysis that weighs up the financial and emotional costs of their debt with their estimates of the long-term return (in various forms) from their educational investment. Indeed, Eckel et al. (2007), Oosterbeek and van den Broek (2009) and Bachan (2013) all find that a willingness to take risks are associated with increased indebtedness, while Brynin (2013) argues for an inherent risk in higher education due its uncertain returns. Furthermore, the Utility-For-Investment factor may also capture a sense of the individual's temporal horizon, with educational investment necessarily requiring a long-term perspective. Indeed, Eckel et al. (2007), Oosterbeek and van den Broek (2009), Norvilitis and MacLean (2010) and Bachan (2013) all

report that patience, gratification delay and discounting are also salient to borrowing decisions. What remains unclear is the direction of this effect and whether it might be expected to work in opposite ways for student loans (long-term investment) and credit cards and other forms of consumer credit (short-term gratification).

The recent increase in student loan take-up in New Zealand (from around 68 percent in 2005 to 82 percent in 2012) could therefore be seen as a result of a reduction in the perceived risk associated with them; the period has also seen a 20 percent rise in university admissions (Ministry of Education, 2013). This may also explain why NZ students are less aware of the repayment terms for their loan than their peers from England and the US. However, New Zealand also has a very strong tradition of graduates repaying their loans quickly after graduation (19 percent of those graduating in 2008 doing so within three years), suggesting that anxiety about indebtedness remains high (*ibid.*).

Given the recent changes to student funding in England, it is unsurprising to find that this group are most likely to feel that debt is unfair; whether this is a result of the significantly higher student debt burden in England or simply a short-term response to the heightened media and political discourse cannot be determined from the data. Despite the perceived unfairness, British students were nevertheless more confident, on average, of meeting their debt obligations, suggesting that they drew comfort from the safety nets in place.

5 Limitations and further research

This study gathers data from three nations, but the sample in each instance is drawn from a single university. It is unclear the extent to which this might influence the data, although the universities selected were broadly typical for their national context, which should help to mitigate sampling bias. It is also important to reference the self-selection bias inherent in those responding to the questionnaire. Once again, reasonable efforts were made to mitigate this and the individual samples were broadly representative of the populations from which they were drawn on a range of demographic markers.

A deliberate decision was taken to limit analysis to those students with first-hand experience of student debt. These data therefore reflect only the views of those who have engaged with indebtedness and exclude those who have chosen not to accrue debt, either because their financial circumstances do not require it or they have an alternative form of income (e.g. part-time work). It does not, therefore, provide a comprehensive picture of student responses to debt, although it is felt unlikely that data from those not accruing debt would radically alter the dimensions discussed in this paper. Exploring this group (now very rare in England and increasingly uncommon in NZ) in more detail would require a future study.

6 Conclusions

This paper reports a four-factor model of students' responses to indebtedness, based on 496 individuals drawn from three countries. These factors have been named Anxiety, Utility-For-Investment, Utility-For-Lifestyle and Awareness; the first three were uncorrelated, but Awareness shows a relationship with all three other factors. This provides a strong challenge to Davies and Lea's (1995) unidimensional model, while extending Haultain et al.'s (2010) bidimensional model and finding a degree of congruence with other researchers' findings.

The discussion develops the argument that the interplay between, in particular, Anxiety and Utility-For-Investment has an important role in defining whether an individual seeks to enter higher education and secondary choices such as location and course. For example, an individual may bear the short-term anxiety of indebtedness if they have a high expectation of what their education will provide in the long-term. The role of Awareness is more moot, it being impossible to determine the extent to which knowledge about student and commercial loans drives responsible and low-anxiety borrowing, as opposed to indebtedness leading to higher levels of knowledge about debt. Given that our sample is drawn from new undergraduates, it is suggested that the former is more likely to hold.

This being the case, there are useful ramifications for university managers and policymakers. Firstly, improving confidence about money management may lead to reduced anxiety and lifestyle spending, while bolstering a belief in the utility of borrowing for personal and career development. Secondly, and perhaps more importantly, this belief would appear to be key in decisions about entering higher education, such that outreach and recruitment work that focuses on strengthening concepts of utility and reducing perceived risk is more likely to be successful. There is clearly an ethical component to this too, with a requirement that information is presented honestly, notwithstanding the significant unknowns about graduate employment outcomes. The other ramification for policy is that applications from lower socio-economic groups are likely to remain buoyant as long as there is a reasonable expectation of improved long-term life chances. This may be strong in times of high youth unemployment, but potentially more fragile when opportunities are many and financially attractive.

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Appendix A: Factor loadings for four-factor model

| | F1 | F2 |
|---|-------------|--------------|
| I sometimes can't sleep because I worry about how much debt I am in | .783 | -.094 |
| I worry about debt to the point where it affects my grades | .778 | -.130 |
| I feel isolated by my student debt | .750 | -.101 |
| I worry that the repayments on my debt will become unaffordable | .690 | .045 |
| The debt I create as a student is an unfair start to my working life | .526 | -.001 |
| I use debt to pay for a good social life | .082 | -.805 |
| I use debt to pay for luxuries | .096 | -.760 |
| I use debt so I don't miss out on 'normal' student experiences | .200 | -.652 |
| I minimize my spending to minimize my debt | .357 | .449 |
| Even though I am incurring debt now, it will be worth it in the future | -.281 | .022 |
| I have a greater chance of getting a job if I have a degree | -.104 | .015 |
| I expect to earn more in the future because I went to university | -.138 | -.040 |
| Educational loan debt is a good investment for the future | -.347 | -.064 |
| The best use of my student debt is to pay for my university expenses | .250 | .348 |
| I will start to deal with my student debt once I leave university and get a job | .101 | -.009 |
| Debt is an expected outcome of attending university | .153 | -.086 |
| I feel I have a good understanding of how student loans work | -.037 | -.170 |
| I know about the repayment terms for my student loan | -.097 | -.012 |
| I have a good idea about how much student loan debt I am incurring | -.008 | .010 |
| I have a good idea about how much credit card and overdraft debt I am incurring | .009 | .128 |

Loadings of over .400 are highlighted

Appendix B: Factor loadings for four-factor model (NZ sample only)

| | F1 | F2 |
|---|--------------|--------------|
| I sometimes can't sleep because I worry about how much debt I am in | .779 | -.082 |
| I worry about debt to the point where it affects my grades | .756 | -.104 |
| I feel isolated by my student debt | .724 | -.083 |
| I worry that the repayments on my debt will become unaffordable | .729 | .067 |
| The debt I create as a student is an unfair start to my working life | .555 | -.017 |
| I use debt to pay for a good social life | .133 | -.767 |
| I use debt to pay for luxuries | .101 | -.813 |
| I use debt so I don't miss out on 'normal' student experiences | .208 | -.643 |
| I minimize my spending to minimize my debt | .285 | .410 |
| Even though I am incurring debt now, it will be worth it in the future | -.376 | .064 |
| I have a greater chance of getting a job if I have a degree | -.013 | .003 |
| I expect to earn more in the future because I went to university | -.200 | -.128 |
| Educational loan debt is a good investment for the future | -.432 | -.012 |
| The best use of my student debt is to pay for my university expenses | .096 | .494 |
| I will start to deal with my student debt once I leave university and get a job | .150 | .016 |
| Debt is an expected outcome of attending university | .260 | -.034 |
| I feel I have a good understanding of how student loans work | .028 | -.139 |
| I know about the repayment terms for my student loan | -.008 | .044 |
| I have a good idea about how much student loan debt I am incurring | -.034 | .092 |
| I have a good idea about how much credit card and overdraft debt I am incurring | -.041 | .200 |

Loadings of over .400 are highlighted

Appendix C: Factor loadings for four-factor model (England sample only)

| | F1 | F2 |
|---|--------------|--------------|
| I sometimes can't sleep because I worry about how much debt I am in | -.764 | -.214 |
| I worry about debt to the point where it affects my grades | -.758 | -.121 |
| I feel isolated by my student debt | -.786 | -.176 |
| I worry that the repayments on my debt will become unaffordable | -.641 | .031 |
| The debt I create as a student is an unfair start to my working life | -.511 | .072 |
| I use debt to pay for a good social life | .030 | -.814 |
| I use debt to pay for luxuries | -.078 | -.722 |
| I use debt so I don't miss out on 'normal' student experiences | -.131 | -.727 |
| I minimize my spending to minimize my debt | -.495 | .353 |
| Even though I am incurring debt now, it will be worth it in the future | .202 | -.026 |
| I have a greater chance of getting a job if I have a degree | .117 | -.023 |
| I expect to earn more in the future because I went to university | .033 | -.077 |
| Educational loan debt is a good investment for the future | .314 | -.136 |
| The best use of my student debt is to pay for my university expenses | -.492 | .139 |
| I will start to deal with my student debt once I leave university and get a job | -.023 | .002 |
| Debt is an expected outcome of attending university | .012 | .046 |
| I feel I have a good understanding of how student loans work | .084 | -.174 |
| I know about the repayment terms for my student loan | .161 | -.028 |
| I have a good idea about how much student loan debt I am incurring | -.010 | .032 |
| I have a good idea about how much credit card and overdraft debt I am incurring | -.049 | .032 |

Loadings of over .400 are highlighted

Appendix F:

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