

**DEPARTMENT OF ECONOMICS AND FINANCE
COLLEGE OF BUSINESS AND ECONOMICS
UNIVERSITY OF CANTERBURY
CHRISTCHURCH, NEW ZEALAND**

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Hayden Armstrong and Jeremy Clark

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**Department of Economics and Finance
College of Business and Economics
University of Canterbury
Private Bag 4800, Christchurch
New Zealand**

Does Higher Social Diversity Affect People's Contributions to Local Schools?

Evidence from New Zealand

Hayden Armstrong

Jeremy Clark*

Department of Economics and Finance, University of Canterbury, Private Bag 4800, Christchurch, 8020, New Zealand.

New Zealand is becoming more socially diverse, in common with other Western countries. Primarily U.S. based-evidence suggests that growing diversity may lower people's participation in society, and their contributions towards public goods. We test whether there is evidence of a similar relationship in New Zealand, specifically between social diversity and voluntary contributions towards local schools. We use data from the New Zealand Ministry of Education and the Census for the years 2001 and 2006 to estimate whether social heterogeneity affects a school's ability to raise funds locally. Individual school revenue data is matched with measures of the heterogeneity of the neighbourhood in which the school is located. We consider heterogeneity by language, ethnicity, religion and income. After running cross-section and fixed effects regressions which control for other factors, we find only limited evidence that diversity affects the financial support schools receive from their local communities. We do find that higher nominal household income inequality lowers the revenues schools collect from fundraising, but not the revenues they receive from parental contributions or donations.

Keywords: heterogeneity; social capital; school contributions; fundraising

* Corresponding author. Email: jeremy.clark@canterbury.ac.nz

1. Introduction

Common to virtually all Western countries, New Zealand is becoming a more diverse society. Driven in part by changes to tax and immigration policy and differential fertility rates, New Zealand is growing more heterogeneous in dimensions such as household income, languages spoken, ethnicity, and religious affiliation.¹ Growing evidence, particularly from studies using United States data, suggest that rising social heterogeneity may reduce the “thickness,” or volume of voluntary interaction of participants in society (“social capital”). Voluntary interactions that have been studied include membership in organisations (Alesina and La Ferrara 2000), registering to vote (Putnam 2007), volunteering (Costa and Kahn 2003a, 2003 b, Putnam 2007), returning census forms (Vigdor (2004)), and voluntarily contributing to public or charitable goods (Putnam 2007). Regarding contributions to public goods, social diversity may increase the likelihood that people’s preferences are not aligned, which may reduce the ability of “generalist” organisations to raise funds from the community (Alesina, Baqir and Easterly (1999), Liberman (1993)). Social diversity may also reduce the ability of communities to impose negative social sanctions for “free riding” across group lines (Miguel and Gugerty 2005). Alternatively, however, people who are less inclined to contribute to social interactions may simply be attracted to live in more heterogeneous areas, making diversity wrongly appear responsible for social withdrawal.

The effect of social diversity on community financial support for schools in particular has received little attention to date. One exception in a developing country context is Miguel and Gugerty (2005), who study the effects of ethnic heterogeneity on contributions to support local schools in rural Kenya. These authors find that area ethnic diversity significantly reduces funds people contribute, which in turn reduces school quality in more heterogeneous areas. Our study provides the first attempt we know of in a developed economy context to test whether neighbourhood heterogeneity (by various dimensions) has an effect on voluntary funding for schools. More broadly, we attempt to estimate the neighbourhood determinants of three categories of local funding for schools: quasi-compulsory ‘parental contributions’, fundraising, and cash donations. This information may enable schools to more effectively raise funds, either locally, or from other sources such as targeted government grants or international enrolments.

We use data from the New Zealand Ministry of Education and Census for 2001 and 2006 to estimate how social diversity affects a school’s ability to raise local funds via parental

contributions, fund-raising, or cash donations. Revenue data reported by individual primary and secondary schools is matched with measures of the heterogeneity for the geographic area unit in which the school is located. We consider neighbourhood heterogeneity by language, ethnicity, religion, and personal or household income, and conduct both cross-section, pooled cross section, and school fixed effects analysis.

We find that when other factors that could be expected to affect local funds are controlled for, there is surprisingly little evidence that neighbourhood heterogeneity affects the three kinds of local funds schools receive, either positively or negatively. No dimension of heterogeneity consistently affects parental contributions across our various specifications. We do find evidence that household income inequality reduces the revenues schools receive from fundraising. In particular, a one percentage point increase in a school's neighbourhood Gini coefficient of household income inequality is associated with a \$1,375 decrease in its fundraising revenues, all else equal. Finally, we find limited evidence that both religious fragmentation and household income inequality may be *positively* associated with the revenues schools receive from donations, though we cannot reliably test whether this result persists under fixed effects analysis that controls for unobserved characteristics of individual schools.

The remainder of the paper is organised as follows. Section 2 reviews the literature linking social heterogeneity and voluntary contributions towards public goods as well as literature on determinants of fund raising. Section 3 sets out a simple model of how different sources of school funding revenue interact. Section 4 sets out the data we use and our empirical estimation strategy. Section 5 provides our results, while Section 6 concludes with a discussion of our findings.

2. Literature Review

There has been little research on the connection between social heterogeneity and the ability of New Zealand schools to raise local funds. The closest New Zealand-based work of which we are aware is Thornton and Clark (2010), which looks at whether social diversity affects New Zealanders' likelihood of volunteering time to public goods in general. Internationally, however, there has been a rapidly expanding literature on the effects of heterogeneity on various "social capital" indicators, particularly in the United States, and particularly regarding the effects of heterogeneity by ethnicity or race. In surveying this literature, one should keep in mind that

there could be material differences in the social and government structures of many of the areas studied.

2.1 Social Capital

Social capital is a concept that seeks to define the strength of, and positive outcomes from, interactions between individuals in a society. The concept can be traced back to 1916, when it was used in a context similar to our own (Hanifan, 1916). Lyda Hanifan was the state supervisor of rural schools in Charleston, West Virginia. In stressing the importance of community involvement for prosperous schooling, Hanifan referred to social capital as being

tangible substances [that] count for most in the daily lives of a people, namely, goodwill, fellowship, mutual sympathy and social intercourse among a group of individuals and families who make up a social unit... [T]he individual is helpless socially, if left entirely to himself... [I]f he may come into contact with his neighbor, and they with other neighbors, there will be an accumulation of social capital, which may immediately satisfy his social needs and which may bear a social potentiality sufficient to the substantial improvement of living conditions in the whole community. The community as a whole will benefit by the cooperation of all its parts, while the individual will find in his associations the advantages of the help, the sympathy, and the fellowship of his neighbors.²

Modern definitions are more succinct. Putnam (2007) describes social capital as “social networks and the associated norms of reciprocity and trustworthiness”³. In this sense, local funds contributed to schools in New Zealand can be taken as an indicator of social capital. On the “demand” side, to raise funds effectively, a given school will likely try to develop relationships within a community. For example, it may approach certain businesses to sponsor a school’s cultural or sporting activities, or request help from a parent association to raise money through community fundraising events. On the “supply” side, there may be a correlation between a community’s general social attitudes and the willingness of its members to contribute funds to a local school.

2.2 Heterogeneity and Social Capital

Social heterogeneity can become relevant to the supply side of school fundraising for various reasons. Simple “own-group” bias would predict that in a school’s neighbourhood, members of group X may be less enthusiastic to contribute funds (or less embarrassed not to contribute) the more they perceive that the funds will benefit school children not of group X. Miguel and Gugerty (2005) provide a clear example of this in their study of ethnic diversity and

fundraising by local schools in rural Kenya. School boards reported that it was more difficult for local schools to enforce payment of compulsory school fees if a student's family belong to an ethnic minority. Similarly, local schools in more ethnically diverse areas raised less support via voluntary fundraising events that relied on significant social pressure for parents to make donations.

Alternatively, heterogeneity might affect the supply of local funds if it increases the variance of people's preferences regarding school (public) goods. Alesina, Baqir and Easterly (1999) find that heterogeneity has an effect of this kind on the provision of public goods by local governments. Using U.S. census data, Alesina et al. find that an area's ethnic diversity is negatively linked to the share of spending by that area's local authority on core public goods such as roads, public education, sewerage and rubbish collection, while there is a positive relationship with the proportion spent on healthcare. Alesina et al. hypothesise that diversity lowers spending on core public goods because it increases the median distance of people's most preferred quantity of a specific public good from that of the median voter, which makes them prefer a smaller scale of funding in a two-stage budgeting and good-selection process. Lieberman (1993) informally echoes this view with regard to public education, noting that "ethnic groups must reach an accommodation on various issues. As the accommodations become more distasteful to one or more groups, the disaffected parties become more supportive of alternatives to public education."⁴

2.3 Contrary Evidence

Given the tone of these findings, one could be forgiven for thinking that increased heterogeneity poses unrelenting problems for social capital in general, and community support for schools in particular. But there are several reasons to question this. Methodologically, all empirical studies attempting to test whether neighbourhood heterogeneity *causes* deterioration in social capital confront problems of endogeneity. For example, people who are less community-minded (an unobserved characteristic) may be more likely to select to live in more heterogeneous areas, making heterogeneity appear wrongly responsible for social withdrawal. Theoretically, sociologists speak of the 'contact hypothesis', which suggests that, in contrast to the 'conflict hypothesis', over time different ethnicities learn to accept each other the more they interact. Working together helps strengthen relationships, forge new common identities, and increase peoples' understanding of the differences in the lives of people from other ethnicities. Evidence of this can be seen in a much-cited study by Stouffer (1949) which looks at the attitudes of white

American soldiers towards desegregation within the army after World War Two. Stouffer found that the more contact white troops had with their black counterparts during the war, the smaller was the proportion opposed to desegregation. Looking at heterogeneity and indicators of social capital outside the United States, Letki (2008) finds that racial diversity in Britain has a significant negative effect on people's reported trust towards their neighbours, but no effect on other social capital indicators such as sociability, volunteering, or organisational involvement. Letki suggests that the differences in her findings from earlier work might result from better controlling for the effect of low socioeconomic neighbourhood indicators before considering the effect of heterogeneity *per se* on social capital.

2.4 Determinants of Local Funding for Schools

Common to other developed countries, New Zealand's public ("state") schools receive the bulk of their funds from the government. However, schools are also free to pursue or receive additional local funds. Both demand and supply side factors are likely to have an effect on the amount of local funds a school receives. The literature on fund raising for pre-tertiary schools is scarce, but insight can be gained by looking at other charitable institutions. Okten and Weisbrod (2000) consider a range of institutions such as hospitals, scientific research labs and higher education facilities, to look at factors that influence donations. They find that demand side factors such as expenditures on advertising and information dissemination have a positive and significant effect on donations. They also use the age of the organisation as a proxy for reputational stock, and find surprisingly, that this is negatively associated with donations for all but two of seven types of institution. They posit that age may also act as a proxy for wealth, so that donors may view older institutions as being less needy.

A study more closely related to schools is that by Okunade and Berl (1997), who consider the propensity for alumni of U.S. business schools to donate to their college. On the supply side, donations are positively related to the age of the alumni member as they "have higher net worth and a higher capacity for charitable giving"⁵. Gender, race and marital status are found to be insignificant, but donations are negatively related to whether alumni members have children. While the expense of children may hinder graduates' donations to their alma mater, children may act as a spur to their donations to nearby primary and secondary schools. Parents of enrolled children and even others who make donations to a local school may in part be getting material benefits for themselves or their children. Either way, the number of school age children in a household should be relevant to the funds supplied to local schools.

On the demand side, schools with more competent or business-savvy boards of trustees may seek more funds from governments, international student enrolments, and local initiatives, than schools with less competent boards, and be able to do so at less administrative cost. But given the abilities of a school's board of trustees, it likely faces a trade-off between expending effort on attracting different sources of revenue. Luksetich (2008) considers how fundraising by non-profit organisations (like schools) affects government funding. He finds that fundraising revenue has a significant positive impact on the amount of government grants that organisations receive. Investigating the reverse pathway, Okten and Weisbrod (2000) similarly conclude that increases in government grants do not crowd out donations, but rather increase them for most industries. This may be because increased government grants are a signal from the government that a particular service has value within the community which could lead to greater donations. But even within the realm of local funding sources, schools must decide how to expend effort on alternative sources. We next develop a brief model of how schools might make such decisions.

3. Funding Source Interactions

For simplicity, suppose there are only two non-governmental sources from which a school can pursue funds. Each school is endowed with a total amount of effort, \bar{E} , that it can put towards gaining funds from the alternative sources $i=1,2$. Thus each school faces a constraint:

$$E_1 + E_2 \leq \bar{E} \quad (1)$$

Assume that effort comes at some per unit cost, c_i , that can differ by source pursued. Finally, we assume that revenue generated from either non-governmental source is an increasing function of effort, multiplied by a parameter reflecting the generosity of the those targeted by that source, θ_i . A school with the objective to maximise net revenues from non-government sources faces the objective function:

$$\max_{E_1, E_2} \pi = f_1(\theta_1 E_1) + f_2(\theta_2 E_2) - c_1 E_1 - c_2 E_2 \quad (2)$$

We assume that each $f_i(\cdot)$ is a concave function of effort. Assuming that it is optimal to expend some effort on both sources, and that the total effort constraint is binding, the first order conditions of the Lagrangian formed from (2) and (1) are:

$$\frac{\partial L}{\partial E_i} = \theta_i \frac{\partial f_i(\theta_i E_i)}{\partial E_i} - c_i - \lambda = 0 \quad i = 1, 2 \quad (3)$$

$$\frac{\partial L}{\partial \lambda} = \bar{E} - E_1 - E_2 = 0 \quad (4)$$

The Lagrange multiplier can be thought of as the dollar amount that net revenues would increase if the school's fund-raising "effort budget" were to increase by one unit. Let us now consider how a school will respond to an exogenous shock to either c_i or θ_i . Shocks to c_i might result from changes to the wages of school staff or school board expertise. Shocks to θ_i might result from changes in neighbourhood generosity (possibly affected by heterogeneity).

From the two equations making up (3), a school will expend effort on both funding sources to the point that:

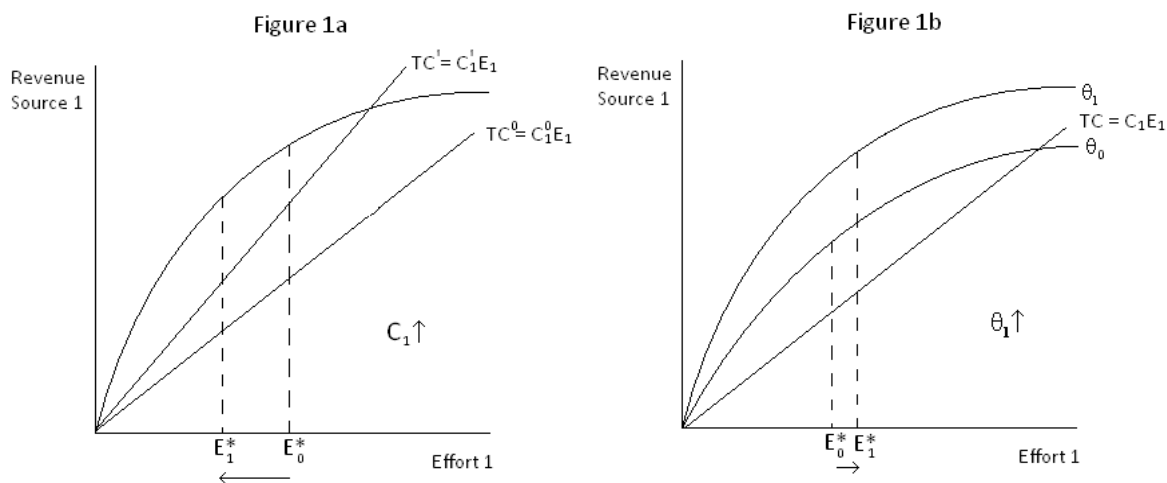
$$\theta_1 \frac{\partial f_1(\theta_1 E_1)}{\partial E_1} - c_1 = \theta_2 \frac{\partial f_2(\theta_2 E_2)}{\partial E_2} - c_2 \quad (5)$$

If the cost of pursuing funding source one, c_1 increases, then (5) and (4) will be maintained if the school decreases effort on this source and increases effort on the other. Total effort remains the same but the school will substitute effort toward the relatively cheaper funding source. This is illustrated in Figure 1(a).

Conversely, if the source targeted (e.g. the school's neighbourhood) becomes more generous, or θ_1 rises, marginal revenue will rise for any given amount of effort directed to this source. To maintain equality in (5) and (4), E_1 will increase and E_2 decrease. This is illustrated in Figure 1(b). This simple funding-source model suggests that non-governmental funding sources will serve as substitutes for one another. This suggests that schools receiving more funding from, say, parental contributions, will expend less effort securing revenues from international enrolments.

4. Data and Empirical Methods

The New Zealand Ministry of Education has kindly made available for this project data on the governmental and non-governmental revenues reported by each state and state-integrated school in 2001 and 2006. Revenue data were provided under the categories of 'government grants,' 'local funds,' and 'investments.' Local funds are then further broken down into major categories such as 'parental contributions,' 'donations' and 'fund-raising', but also 'overseas



students,' 'trading sales', 'house rents' etc. Unfortunately, among the schools reporting funding, the categorisation of local funds was not fully standardised until 2007.⁶ This has particular relevance for the distinction between 'parental contributions' and 'donations.' Schools could reasonably report quasi-compulsory fees under either category, as some use the term 'donation' on the bills they send to parents (Waikato Times, 2008). We address this problem by analyzing parental contributions and donations separately, but also in aggregate. To control for the funds received by schools from government, investment interest, and important "non community" sources of local funds such as overseas students and trading sales, we aggregate these together as a "school income" variable. Other than revenue data, the Ministry of Education also provided data on each school's roll size, socio-economic decile classification, and the census boundary in which the school is located. Socio-economic decile rankings for schools are calculated by the Ministry of Education for the purposes of government funding, and are based on an index of the socio-economic characteristics *of the parents who send children to a school*. This is distinct from census data to which we have access, which provides the characteristics of the people in the census area unit in which a school is located. It seems likely, however, that the two approaches will be highly correlated for public schools who enrol most of their students from local enrolment zones.⁷

We start with the population of all 2725 (2001) and 2598 (2006) public and integrated schools in New Zealand. From this we exclude 167 (2001) and 189 (2006) schools who report zero revenues from the five main sources.⁸ We further omit the Correspondence School of New Zealand, and the 4 schools located on the Chatham Islands, bringing our usable sample of

Table 1: Summary Statistics For Non Governmental Funds and Heterogeneity Measures

Dependant Variable	2001			2006		
	Mean	St. Dev	Obs	Mean	St. Dev	Obs
Dependant Variable						
Parental Contributions	50447	138168	2553	64790	142366	2405
Fund Raising	24334	49742	2553	33312	65583	2405
Donations	16661	54900	2553	23132	61835	2405
Ethnicity						
Fragmentation	0.334	0.165	2326	0.357	0.164	2243
Language						
Fragmentation	0.233	0.118	2326	0.246	0.119	2243
Religion						
Fragmentation	0.523	0.043	2326	0.538	0.038	2243
Household Income						
Gini	0.371	0.032	2323	0.355	0.036	2243
Individual Income						
Gini	0.440	0.031	2326	0.423	0.028	2239

Statistics are based on the data that was allocated to schools and not the total amount from the census. The dependant variables are nominal values of school revenue categories.

schools to 2553 in 2001, and 2405 in 2006.

Census data reported by Statistics New Zealand is also used for 2001 and 2006 to create neighbourhood heterogeneity measures, as well as controls for other factors which may influence local funds received by schools. Table 1 provides summary statistics for our three main categories of local funds, as well as our four neighbourhood heterogeneity measures. Summary statistics for all variables are provided in Appendix B. We use census data released at the level of area units, which contain an average of about 2,000 people (Statistics New Zealand, 2006).

4.1 Variables and Hypotheses

We explain in turn the dependent variables that will be used, our heterogeneity measures, and finally the other control variables.

4.1.1 Dependant Variables

We consider the three main categories of local funds received by public or integrated schools. First, parental contributions are the dollar amount that a school receives from parents in the

form of “suggested” but non-compulsory fees. Parents of children enrolled in a school receive bills specifying the parental contribution expected. The level of suggested fee is set by the individual school. Although non-compulsory by law, there is significant pressure on parents to pay these fees. Schools may phone and email parents to remind them that fees are due and, in extreme cases, have referred non-payment to debt collectors (Woulfe, 2008). The second sub-category of local funds is fundraising, which is any money which the school or its students receive in exchange for providing goods and services. This includes, for example, proceeds from school fairs or concerts, or the sale of confectionary or Christmas trees. The third sub-category of local funds is donations, which consists of money contributed to a school, apart from school fees, that is not paid in return for direct goods or services. This category includes money left in wills or given by businesses or individuals, but some schools may also report in this category money from quasi-compulsory parental contributions. Because of categorisation ambiguity, we will initially treat parental contributions and donations separately, but later in combination.

4.1.2 Measures of Heterogeneity

Following the social capital literature, we will be considering social heterogeneity along the dimensions of race/ethnicity, household and individual income, language, and religious affiliation (Putnam 2007, Alesina and La Ferrara 2000, 2002). We consider these the group dimensions (whether of neighbours or of a schools’ students) to be among those most likely to be salient or observable to the people considering contributing funds to a local school. As is common in the literature, we measure heterogeneity using a fragmentation index for qualitative dimensions such as language or religion, and a Gini coefficient for ordered dimensions such as personal or household income. These are constructed based on the population of the area unit in which each school is located. A fragmentation index F is defined as:

$$F = 1 - \sum_{k=1}^n p_k^2 \quad (6)$$

where p_k is the share of group k among the n possible groups in the neighbourhood. F is bounded between zero and one, though its exact upper bound is increasing in the number of possible groups n . It can be interpreted as the probability that two people, drawn randomly from a neighbourhood, belong to different groups. A Gini coefficient is defined as:

$$G = \sum_{i=1}^n \left(\sum_{j=1}^n \frac{1}{2} \frac{|x_i - x_j|}{n^2 \mu} \right) \quad (7)$$

In our case, x_i refers to the imputed midpoint income from one of six income categories that person or household i reports to contain their true income. Like the fragmentation index, the Gini is bounded between zero and one, and is increasing in heterogeneity.

The construction of our specific heterogeneity variables is described in detail in Appendix A, but is summarized below. Note that all group shares used to construct heterogeneity measures will also themselves be included as control variables. This will enable us to focus on the effects of heterogeneity *per se*, while controlling for whether certain income, ethnic, language or religious groups have different propensities to contribute to local schools.

1. *Ethnicity* – As used in the censuses of 2001 and 2006, a person belongs to a specific ethnic group if they identify with it or they feel they belong to it. Ethnicity thus embodies more than physical race or origin. Features common to people of the same ethnicity may include language, religion, a common geographic origin and uniqueness of interest (Errington, Cotterell, Randow, & Milligan, 2008). The New Zealand census provides six categories of ethnicity: European, Maori, Pacific Peoples, Asian, Middle Eastern/Latin American/African (MELAA) and Other. Because people can report more than one ethnic affiliation, ethnic “shares” are constructed over the total number of ethnic affiliations reported, rather than over the number of people responding. In addition, *European* and *Other* affiliations were combined for both census years because in 2006 there was a large increase in those who identified ‘New Zealander’ as their ethnicity on the census form. In 2001 Statistics New Zealand included ‘New Zealander’ responses under *European*, but in 2006 they were added to *Other*. This caused the formerly small *Other* category to increase by a factor of over five hundred.⁹

2. *Language* – people report on the census all languages in which they have the ability to carry on a conversation. Statistics New Zealand reports the frequency of languages spoken in each area unit, where the categories are aggregated to English, Maori, Samoan, NZ Sign Language and Other. As with ethnicity, people can report speaking more than one language, so that language shares in a neighbourhood are constructed over the total number of languages spoken, rather than over the total number of people responding.

3. *Religion* – as with ethnicity and language, people could report multiple religious affiliations for the census. Statistics New Zealand releases affiliations by the categories No Religion, Buddhist, Christian, Hindu, Islam/Muslim, Judaism/Jewish, Maori Christian, Spiritualism and New Age Religions, Other Religions and Residual Categories. Given the relative size of the shares, these in turn were aggregated to Christian, No Religion and Other Religion for use in the analysis.¹⁰

4. *Individual and Household Income* – These refer to the amount of money earned from all sources before tax in the 12 months up to the 31st of March in the census year. It is difficult to know in advance whether it would be household or individual inequality of income that might affect peoples' tendency to contribute funds to local schools, so we use each. Income data are available only by the frequency of individuals or households who belong to particular income bands¹¹, unadjusted for inflation between 2001 and 2006. While own group bias or preference dispersion might suggest that income heterogeneity might depress contributions to local schools, it is also possible that people earning relatively more may feel that they need to make larger contributions to compensate for those with relatively low incomes. Alternatively, the relatively rich may want to contribute less if they think that others are not doing their part.

4.1.3 Control Variables

Leaving aside heterogeneity measures and their underlying shares, there are a number of school- and neighbourhood factors which could affect local funding for schools, via demand or supply. We begin with factors specific to schools, then to the neighbourhoods in which they are located. One of the most important school-specific factors is total enrolment, which clearly has both demand and supply effects. If more children go to a school then a larger number of families are associated with it and the supply pool of local funds will be greater. Similarly, higher enrolments increase the need of schools for funds. Second, the number of international students enrolled affects supply in a similar way as general enrolment, but has two offsetting effects on demand. More international students increase a school's demand for local funds purely because there are more students to cater for. However, demand for local funds may also decrease as schools receive full tuition fees per international student enrolled, in contrast to the lesser subsidy they receive per domestic student. That is, for schools seeking additional funds beyond what governments provide, enrolling international students may be a substitute to raising local funds.

A third control specific to each school is its socio-economic decile ranking as calculated by the Ministry of Education. The decile measure reflects the socioeconomic characteristics of the households students belong to, in particular their immediate neighbourhood's average household income, occupation, household crowding, and educational qualifications. The Ministry uses census data in a manner which is unavailable for this research, matching the actual address for a sample of students to the exact neighbourhoods in which they live. The decile measure is used to determine the size of government grants and targeted educational funding for the school, which may then have an impact on its demand for non-governmental local funds (Ministry of Education, 2010b).

A final school-level control is a dummy variable for whether it is public or integrated. In New Zealand, integrated schools (as opposed to fully private schools) negotiate individual "special charters" with the government. They must meet the curriculum standards of public schools while additionally meeting charter requirements. Integrated schools receive partial government funding, but must fund their own capital and maintenance costs. Hence the local funds required by integrated schools may differ from public schools (Ministry of Education, 2010a). The special charter is usually put in place so a school can have the benefits of being a state school while preserving its religious underpinnings (Association of Integrated Schools New Zealand, 2010).

Turning to neighbourhood-specific controls, we have followed other studies of voluntary donations¹² by including measures relevant to supply, such as age, number of children, and marital status. Age is included as share categories for the ranges: 0-24, 25-59 and 60 or older. The number of children born to females over 15 years of age is available only for 2006, but included where possible under the share categories: no children, 1-4, and 4 or more. For 2001 cross-sectional or pooled regressions, we use instead the share of family types: single parents with children, a couple with children, or couple with no children. Marital status is the fraction of people who are legally married or in a civil union.

With regressions involving only 2006 data, we also include a supply side measure of neighbourhood stability: 'Years at usual residence.' This is defined as the length of time which a person has lived at their current usual residence. We include this as share variables: 0 years, 1-4, 5-9, 10-14, 15-29 and 30 years or more. Based on the social capital literature, we predict that the longer people have lived in a particular community, the more likely they are to have developed relationships which will predispose them to contribute to local schools. Next, as a

proxy for people's unobserved taste for supporting schools, we include highest educational qualification shares: none, high school, undergraduate, postgraduate, or other.

Finally, we also include the shares of people who receive income from self-employment (a business), and of those who own their own home. Aside from enabling us to capture unobserved wealth and tastes, self-employment or home ownership could also increase incentives for people to supply local funds, if doing so creates exposure for a business or increase the desirability of a neighbourhood.

4.2 Empirical Estimation Strategy

Taking our two years of data together, 90.6% of schools report receiving positive parental contributions, while 81.2% report positive fundraising revenues, and 38.4% report positive donations. Our approach will be to use Tobit regression to analyse cross-sectional data for 2001 and 2006 separately. We will then move to pooled cross section Tobit regression with controls for year and region. Finally, in cases where pooled cross section Tobit regression yields similar results as analogous OLS regression, we use linear fixed effects regression to control for unobserved, but time-invariant characteristics for each individual school.

4.2.1 Cross-Sectional Estimation

We begin with a baseline specification which contains variables found to be significant in past studies and other variables whose inclusion is guided by the reasoning mentioned above¹³. The specification will take the form:

$$Y_{ijkt} = \beta_0 + \beta_1 \text{Religion}_{jt} + \beta_2 \text{Language}_{jt} + \beta_3 \text{Ethnic}_{jt} + \beta_4 \text{Income}_{jt} + \beta_5 C_{ijkt} + \beta_6 D_{jkt} + \varepsilon_t. \quad (8)$$

Here Y_{ijkt} is the local funds of type k reported by school i in area unit j in the year t . *Religion*, *Language*, *Ethnic* and *Income* are measures of heterogeneity, C_{ijkt} is a vector of school-specific control variables, D_{jkt} is a vector of neighbourhood level control variables and 15 region dummies, and ε is the error term. With only ethnic and language heterogeneity being highly correlated (.8528), our baseline specification includes all four heterogeneity measures simultaneously.¹⁴ From the baseline, a second specification for 2006 only adds a lag of the 2001 dependent variable as a proxy for historical factors which may be influencing current contributions. Unobserved historical factors are likely to be correlated with other regressors which are included in the baseline specification. This correlation will transfer to the lag of the dependent variable, leaving the coefficients on other variables with less bias. This approach

assumes however that the unobserved factors are constant between 2001 and 2006 (Wooldridge, 2009).

Our third specification repeats the baseline but removes language heterogeneity to address its high correlation with ethnic heterogeneity measures. A fourth specification repeats the baseline, but uses natural logs for all variables that are measured in dollar terms to test for a possible non-linear relationship. Our fifth and final cross section specification removes insignificant variables from the baseline, exempting our heterogeneity measures, underlying share variables, and region dummies. Control variables are removed if doing so decreases the Akaike Information Criterion (AIC), starting with the least significant variable. Variables belonging to a set are only removed if their joint test for significance is also rejected at the 5% level. The variables removed using this procedure are listed in Appendix E.

4.2.2 Pooled and Fixed Effects Estimation

Unavoidably, some determinants of the supply and demand for a school's local funds will be unobserved, such as the amount of time and effort that a school puts into generating revenue, whether there are full time staff devoted to this, how caring and supportive parents and local residents are, how much money parents give to other charitable causes etc. Ideally, unobserved characteristics which do not vary between 2001 and 2006 could be captured using fixed effects (effectively assigning a dummy variable specific to each school). The situation is complicated here because of the non-negligible portion of schools who report zero amounts of each type of local funds, and thus the need to use Tobit. Unconditional Tobit fixed effects regressions are biased. Our approach will therefore start instead with pooled cross section Tobit regressions that include both year and region dummies. Region dummies ensure that unobserved, time-invariant characteristics that are common within a region, but differ across regions, are controlled (such as differences in regional cost of living or common custom regarding the use of quasi-compulsory parental contributions). Second, while not reported, we compare the results of these tobit pooled cross section regressions with analogous OLS regressions. If the latter results are sufficiently similar for us to conclude that the clustering of local funds at zero is not biasing OLS regressions, we shall then proceed to run linear fixed effects regressions that do control for unobserved school level characteristics. These exploit variation in differences in heterogeneity across neighbourhoods over time, in the form:

$$(Y_{ijk2006} - Y_{ijk2001}) = \beta_0 + \beta_1(H_{j2006} - H_{j2001}) + \beta_2(C_{ijk2006} - C_{ijk2001}) + \beta_3(D_{jk2006} - D_{jk2001}) + \beta_3(\rho_{ij2006} - \rho_{ij2001}) + (\varepsilon_{2006} - \varepsilon_{2001}) . \quad (9)$$

Here H_j is a matrix containing our four dimensions of heterogeneity, and ρ_{ij} are the unobserved effects in school i in area unit j in each time period. Our pooled cross section and fixed effects regressions will use similar control variables as the baseline specifications in cross section, though for pooled cross section we also add the specification removing language heterogeneity.

Finally, the reader should note that even a fixed effects specification that controls for unobserved school characteristics cannot address the issue of households self-selecting into neighbourhoods and schools. If, for example, individuals with less sympathy for contributing funds to local schools are more likely to settle in more heterogeneous neighbourhoods, a spurious negative effect of neighbourhood heterogeneity on contributions may be generated. On the other hand, one could argue that school fixed effects could address unobserved individual characteristics such as ‘sympathy for donating’ if people self-select into neighbourhoods and schools with a ‘contributions ethos’ that matches their own, in a manner akin to the Tiebout hypothesis of sorting between jurisdictions (Tiebout, 1956). But this is a strong assumption. If it does not hold, then all we can search for across specifications is a robust co-varying relationship between social heterogeneity and the local funds received by schools.

5. Results

5.1 Cross-Section Results

We begin with cross-section results for 2001 and 2006. Beginning with Parental Contributions, we provide complete regression results in Table 2 using household rather than individual income. To illustrate the interpretation of the coefficients, the coefficient on *Religion* for 2001 is -23,796, but it is not statistically significant. If it had been significant, the coefficient would have indicated that, holding all else constant, changing the religious fragmentation of a school’s area unit from complete homogeneity to complete heterogeneity in 2001 would have lowered total parental contributions by \$23,796, roughly 50% of the sample mean. Alternatively, a one percentage point increase in religious fragmentation in a school’s area unit in 2001 would have lowered total parental contributions by \$238. We will use this latter marginal interpretation.

Starting with non-heterogeneity controls, we see that total parental contributions are rising in school enrolment, falling in the population density of the school’s area unit, and lower if

Table 2: Complete Tobit regression for Parental Contributions using 2001 and 2006 Area Units

		2001		2006		Regression Statistics	
		Coefficient	St Err	Coefficient	St Err		
Heterogeneity	Religion	-23796	110792	-310630	105921***	2001	
	Language	-60175	474773	-485123	400777	Obs	2323
	Ethnicity	12826	79964	53697	64735		
	HH Income	123184	109573	166560	171331		
Ethnicity	Asian	-129313	270739	-17437	208621		
	Maori	-48324	75260	-181473	102135*		
	MELAA	796356	773929	146722	520506		
	Pacific	94042	149185	-123353	145382		
Income HH	20-30	2741	133798	95369	193188	F-stat	9.18
	30-50	-24684	114212	-53061	127852		
	50-70	-366544	135084***	-61173	131627		
	70-100	69676	144023	-121165	189058		
	100+	-190348	115534*	-24802	153632		
Language	Not Stated	-177648	105333*	-25624	136523	F-stat	9.18
	Maori	172502	605360	769271	488947		
	Other	-144283	860454	496732	708902		
	Samoaan	-247512	743965	659981	697565		
Religion	Sign	420811	1052665	655634	937690	F-stat	9.18
	Christian	-4014	85992	-16563	64436		
	None	221	92508	-200436	117422*	F-stat	9.18
Qualification	Highschool	-44135	101366	-121435	99395		
	Other	-401506	180712**	103055	190655		
	Undergraduate	-31931	215995	439331	215551**		
	Postgraduate	434156	298474	-97885	216356		
Children	1-3			170144	106643	Obs	2237
	4+			78634	121177		
Residence	1-4			7357	118610	F-stat	10.78
	5-9			-265413	110966**		
	10-14			17847	123922		
	15-29			-169161	125452		
	30+			50429	129667		
Family Type	Couple with Children	24743	77085			F-stat	10.78
	Single with Children	-12354	82557				
Age	25-59	310405	118986***	69896	108838	F-stat	10.78
	60+	-70871	119366	-195636	91971**		
Other	Female	-51501	167376	-783557	557022	F-stat	10.78
	Married	139572	79638*	-108174	117640		
	Home Ownership	-75813	49824	65685	54990		
	Self-employed	45807	48306	-127111	57639**		
	Donations	-0.08123	0.1877	-0.1287	0.0889		
	Fund Raising	0.21947	0.2141	-0.1743	0.1240		
	School Income	-0.0213	0.0398	0.0388	.0200*		
	School decile	-136.6	1478	1156	820.3		
	International roll	2512	1316*	211.5	975.6		
	Total roll	309.2	62.8638***	250.9	48.32***		
	School type State	-18323	8512**	-35504	9227***		
	Population Density			-11	4.582**		

Table 2 (Cont'd): Complete Tobit regression for Parental Contributions using 2001 and 2006 Area Units

	2001		2006		Regression Statistics
	Coefficient	St Err	Coefficient	St Err	
Regional Dummies					
Bay of Plenty	-22014	17249	1455	18523	
Canterbury	-91949	22130***	-39652	13886***	
Gisborne	-49112	20306**	-10872	17251	
Hawkes Bay	-16635	19419	-3297	18524	
Manawatu-Wanganui	-25388	17854	-33183	13529**	
Marlborough	-46776	19739**	-22001	16648	
Nelson	-3568	37281	50433	71302	
Northland	15003	14492	25092	13647*	
Otago	-67022	21224***	-34771	15686**	
Southland	-54193	19793***	-56676	16497***	
Taranaki	-16424	16241	-32734	13750**	
Tasman	-42177	18153**	-27975	14493*	
Waikato	-24253	14390*	6812	13465	
Wellington	-25546	13616*	-29390.2	12755**	
West Coast	-81875	22638***	-46555.1	24626*	
Constant	-29501	187699	682040	347203**	

***, ** and * denote significance at the 1%, 5% and 10% levels, respectively. Baseline Tobit regression for Parental Contributions. Robust standard errors are used. Only the household Gini is used for income heterogeneity.

the school is public rather than integrated. Region dummies also indicate that schools in the (omitted) Auckland region receive higher parental contributions (controlling for roll) than most other regions. Surprisingly, total parental contributions do not increase in school decile, nor in the proportion of households with higher incomes in the school's area unit. Other area unit characteristics may have some explanatory power, but none are robust across 2001 and 2006.

Turning to the heterogeneity measures, we see that the signs on religious and language fragmentation of school's area units are negative for 2001 and 2006. In contrast, the signs on the ethnic fragmentation and household income inequality of a school's area units are positive for both years. Of these, however, only religious fragmentation has a statistically significant (negative) effect, and then only in 2006. According to Table 2, and 1 percentage point increase in the religious fragmentation index of a school's area unit in 2006 was associated with a drop of \$3,106 in total parental contributions, on average. Otherwise, evidence of a relationship between social diversity and parental contributions in either direction is fairly weak.

To see whether these results are robust to alternative cross section specifications, we move to Table 3. Here we repeat the results for the baseline specification, but also examine the

Table 3: Parental Contributions - Tobit Cross Section, Coefficients on Heterogeneity Only

	2001					2006				
	Rel Frag	Lan Frag	Eth Frag	Gini	HHGini	Rel Frag	Lan Frag	Eth Frag	Gini	HHGini
1	-6884	-87547	22326	100551		-269192	-728692	89386	201318	
	107519	488696	81207	115288		101648***	371551**	63046	154354	
(a)	-23796	-60175	12826		123184	-310630	-485123	53697		166560
	110792	474773	79964		109573	105921***	400777	64735		171331
2						-266577	-792839	90262	153153	
						92837.5***	350164**	60488	136753	
(a)						-290276	-607899	59444		140162
						100165***	368634*	59945		145753
3	-5700		8896	102231		-260067		-20618	216598	
	109129		44996	114237		101720**		41241	154583	
(a)	-22974		3634		123859	-304727		-18994		171912
	112496		45480		109186	106639***		38260		169823
4	-4.735	-11.410	3.613	5.276		-0.304	0.178	-0.157	3.405	
	4.434	10.046	2.239	4.047		4.006	7.562	1.758	2.991	
(a)	-6.562	-14.351	4.865		5.717	-3.084	-0.683	-0.279		5.473
	4.431	10.522	2.587*		3.457*	4.080	7.959	1.775		3.131*
5	-4158	-97164	24817	105846		-273707	-813436.4	103982	216680	
	111548	483401	79910	116658		99258***	361415**	62492*	166374	
(a)	-11572	-239884	39821		109545	-312212	-412480	57330		151013
	112180	473395	76953		102545	101951***	416253	63528		171661

***, ** and * denote 1%, 5% and 10% significance, respectively. Robust standard errors are below coefficients. (a) specifications control for household income. Specifications: (1) Baseline (2) Includes a lagged dependant variable (3) Removes Language heterogeneity (4) Takes the natural log of all monetary variables (5) Reduced model. All subsequent changes were made to specification (1).

effect of including a lagged dependent variable (in 2006), dropping language fragmentation, using natural logs, and eliminating insignificant variables using the Akaike Information Criteria. We report results separately for specifications using individual income and income inequality, or household income and inequality. For brevity, only our heterogeneity coefficients are reported.

As becomes clear in Table 3, our cross section baseline results persist across a variety of specifications. While the signs on religious and language heterogeneity tend to be negative, and the signs on ethnic and household income heterogeneity tend to be positive, no type of heterogeneity is significant in explaining variation in parental contributions, with the exception of religious fragmentation in 2006.

Turning next to our cross section findings for fundraising revenues, Table 4 provides results in a similar format to Table 3. Heterogeneity appears to have a greater effect on

Table 4: Fundraising - Tobit Cross Section, Coefficients on Heterogeneity Only

	2001					2006				
	Rel Frag	Lan Frag	Eth Frag	Gini	HHGini	Rel Frag	Lan Frag	Eth Frag	Gini	HHGini
1	-95267	-364890	81567	-48186		-55334	-100609	6209	-187183	
(a)	41710**	171741**	30792***	57932		50156	219870	37672	77298**	
	-97922	-328781	70867		-54524	-53982	-211893	13628		-242677
	41758**	167823**	29684**		46483	50388	233966	38654		81135***
2						-62232	-189371	15257	-142443	
(a)						46904	218676	38224	77939*	
						-53707	-315896	25641		-188946
						48407	230424	38431		79265**
3	-90766.03		25573.24	-42846.3		-53872		-8895	-184980	
(a)	42561**		16109.2	57641.37		49642		24619	77425**	
	-94002		20559		-51265	-51026		-17919		-240247
	42415**		16315		46320	50391		23079		80355***
4	-5.390	-9.435	3.298	-9.282		-5.664	26.197	-3.925	2.688	
(a)	5.533	13.064	2.763	4.606**		5.453	11.609**	2.525	4.015	
	-4.622	-10.137	4.282		-6.204	-4.084	21.493	-2.752		-3.540
	5.357	13.384	2.687		4.572	5.768	11.575*	2.506		4.264
5	-101330	-339686	80584	-54163		-60075	-90743	2973	-188120	
(a)	41886**	172021**	29106***	53027		50286	241254	38347	74862**	
	-104974	-311473	69529		-39061	-49160	-197480	8384		-238120
	42403**	168403*	28101**		45544	51730	240979	38554		77133***

***, ** and * denote 1%, 5% and 10% significance, respectively. Robust standard errors are below coefficients. (a) specifications control for household income. Specifications: (1) Baseline (2) Includes a lagged dependant variable (3) Removes Language heterogeneity (4) Takes the natural log of all monetary variables (5) Reduced model. All subsequent changes were made to specification (1).

fundraising, but the results are mixed. Once again, the signs of the coefficients on religious and language fragmentation tend to be negative across various specifications, while the signs on ethnic fragmentation tend to be positive. Unlike with parental contributions, the signs on (individual or household) income inequality tend to be negative also. While religious fragmentation's negative covariance with fundraising tends to be significant in 2001 across specifications, it is not in 2006. Language fragmentation's negative covariance is also significant in some specifications in 2001, but not in 2006, while ethnic fragmentation's positive covariance is similarly significant in some specifications in 2001 but not 2006. Finally, household income inequality's negative covariance is not significant across the various specifications in 2001, but is significant in 2006. Thus, each type of heterogeneity in a school's area unit varies significantly

Table 5: Donations - Tobit Cross Section, Coefficients on Heterogeneity Only

	2001					2006				
	Rel Frag	Lan Frag	Eth Frag	Gini	HHGini	Rel Frag	Lan Frag	Eth Frag	Gini	HHGini
1	152378	78811	-36696	142234		114554	-246864	-36152	58070	
	158040	361603	71120	128409		139003	378798	65677	138249	
(a)	84150	180265	-60605		203227	28463	-198502	-58648		153139
	134110	362653	71022		114539*	115175	384746	66192		121274
2						137229	-188991	-34383	39584	
						138794	374193	65174	136384	
(a)						35461	-129201	-60716		147518
						108314	378143	65335		123028
3	150288		-24675	140491		113489		-74328	60820	
	158372		41177	127424		138840		41051*	138533	
(a)	79051		-33370		200067	31132		-89049		153352
	133488		41521		113394*	115943		39871**		121180
4	5.731	9.726	-0.545	0.299		-2.629	-11.725	1.319	-6.983	
	4.869	9.467	1.829	3.209		4.094	8.926	1.841	3.262**	
a)	3.820	9.534	-0.401		-1.339	-2.996	-9.099	0.352		-8.322
	4.547	9.325	1.951		3.000	4.295	8.590	1.731		2.916***
5	146152	100165	-37509	123529		142948	-291563	-14268	34340	
	152438	359420	70918	129041		138403	373997	65391	137128	
(a)	55724	78519	-35861		164283	59919	-168360	-44251		93219
	126354	347242	68158		108566	119964	385458	66147		115581

***, ** and * denote 1%, 5% and 10% significance, respectively. Robust standard errors are below coefficients. (a) specifications control for household income. Specifications: (1) Baseline (2) Includes a lagged dependant variable (3) Removes Language heterogeneity (4) Takes the natural log of all monetary variables (5) Reduced model. All subsequent changes were made to specification (1).

with the fundraising revenue they receive for at least some specifications in 2001 or 2006. But no type of heterogeneity varies significantly across all specifications in both years.

Turning finally to our cross section findings for donations, Table 5 provides results in similar format to Tables 3 and 4. As with (quasi-compulsory) parental contributions, there is only limited evidence that social heterogeneity has a significant effect on the donations that schools receive. The sign on religious fragmentation tends to be positive across specifications in 2001 and 2006, but never significant. Language fragmentation tends to have a positive sign in 2001 and a negative sign in 2006, but again is never significant. Ethnic fragmentation tends to have a negative sign in both years, but is significant only in 2006, and only in the specification where language fragmentation is excluded. Interestingly, household income inequality has a positive sign for (cash) donations, just as it did for (cash) parental contributions, but unlike for

fundraising. This might suggest that neighbourhood income inequality encourages straight cash support for local schools, even as it discourages successful fundraising via the sale of goods. But income inequality too is significant only for some specifications, primarily in 2001, and only at the 10% level.

While our cross section estimates of heterogeneity's effect on schools' local funds are interesting, they are undoubtedly biased because of the omission of unobserved factors. In particular, unobserved school- or neighbourhood factors that influence local funds, and that are correlated with heterogeneity, can bias our estimates (up or down) of heterogeneity's effects.

5.2 Pooled Cross Section and Fixed Effects

With pooled cross section, we include school and neighbourhood observations from both 2001 and 2006, now with a dummy to control for unobserved year- as well as region effects. The estimated effects of each dimension of heterogeneity are provided in Table 6. In general, pooled cross section results are similar to those found for single year cross section, though they are informative when effects differed between the two single year regressions.

Focussing on specifications using household income, we see that in contrast to single year analysis, the positive association between income inequality and parental contributions is now significant, while religious fragmentation no longer has an effect as it did for 2006 alone. Fundraising revenues are significantly falling in religious fragmentation as they were in 2001, and falling in household income inequality as they were in 2006. While the coefficient on language fragmentation is negative, and the coefficient on ethnic fragmentation is positive, neither passes the threshold of statistical significance as in 2006, including when language fragmentation is omitted. Turning finally to donation revenues, these are rising in household income inequality as in 2001. Donations are falling in ethnic fragmentation if language fragmentation is excluded, but not if it is included, as in 2006. Donations are not significantly affected by language or religious fragmentation, as before.

While pooled tobit cross section results control for unobserved differences in region and year, they do not control for unobserved differences between individual schools. While tobit school-level fixed effects models could not be estimated automatically in Stata, and did not converge when estimated manually, we did compare tobit and linear versions of pooled cross section regressions. We found the coefficient signs and magnitudes and significance to be

Table 6: Tobit Pooled Cross Section Results - Coefficients on Heterogeneity Only

	Area Unit				
	Rel Frag	Lan Frag	Eth Frag	Gini	HH Gini
Parental Contributions:					
Individual Income	-58319	-517218	81898	113159	
	71915	311157*	51761	76540	
Household Income	-85402	-282433	41120		164067
	68051	334903	53911		89596*
(a) Individual Income	-51692		3761	120980	
	72449		29242	76479	
(a) Household Income	-81708		-1569		166438
	68856		28637		88784*
Fund Raising					
Individual Income	-69953	-214176	37335	-74212	
	32540**	138284	24522	39836*	
Household Income	-67997	-236923	36972		-108578
	32596**	147299	25170		40139***
(a) Individual Income	-67230		5063	-71334	
	32489**		14844	39875*	
(a) Household Income	-64938		1240		-106753
	32666**		14706		39832***
Donations					
Individual Income	236659	-41554	-50934	74625	
	107479**	269692	49489	73898	
Household Income	144198	65341	-74997		192019
	98345	282120	50669		78554**
(a) Individual Income	237065		-57311	75269	
	107490**		29648*	73849	
(a) Household Income	142870		-65065		191674
	98468		29809**		78302**

***, ** and * denote significance at the 1%, 5% and 10% levels, respectively. Robust standard errors are below coefficients. (a) specifications omit language fragmentation.

similar for parental contributions and fundraising, but less so for donations. This is not surprising, given that 81-91% of schools reported receiving the first two types of local funds, and only 38% the third. Thus, to check the robustness of our Tobit pooled cross section results, we also estimate linear school fixed effects models. While we report these results for all three types of local funds, they are most valid for parental contributions and fundraising. Table 7 reports results for the baseline specification using household income.

In general, few types of heterogeneity are significantly related to local funds once unobserved (but time invariant) school characteristics are controlled. For parental contributions, household income inequality loses the significance it temporarily held in pooled cross section, while religious fragmentation regains a significant effect, but now positive. In particular, schools whose area units experienced a 1 percentage point increase in religious fragmentation saw parental contributions revenues *increase* by \$4,186 on average. For fundraising, religious fragmentation loses the significant negative effect found in pooled cross section, but income inequality retains its negative, significant effect. Schools whose area units experienced a 1 percentage point increase in household income inequality saw fundraising revenues decrease by \$1,375, all else equal. While the linear fixed effects estimates for donations are likely biased, they indicate that household income inequality loses its positive significant effect found in pooled cross section, while religious fragmentation takes on a positive significant effect as it did for parental contributions.

5.3 Summing Up

The reader could be forgiven for struggling to identify a pattern to our results. To assist, Table 8 provides a summary of qualitative findings for each type of heterogeneity across our models and specifications. Hyphenated entries refer to where half of our specifications gave one outcome, and half another.

Our most robust findings are that the ethnic diversity of the area unit in which schools are located does not significantly affect the local funds they receive, whether as parental contributions, fundraising, or donations. In contrast, the household income inequality surrounding a school appears to lower the revenues it collects from fundraising, but does not affect (or even possibly increases) the revenues it collects from parental contributions or donations. The effects of religious fragmentation surrounding a school are inconclusive: it may depress the revenues that schools collect from fundraising, but this effect does not persist once

Table 7: Linear Fixed Effects Regressions

	Parental Contributions		Fundraising		Donations		Regression Statistics		
	Coefficient	St Error	Coefficient	St Error	Coefficient	St Error			
Heterogeneity	Religion	418579	146154***	59014	57959	76232	45648*	Parent Contrib	
	Language	27657	720157	-430333	295818	202442	323526		
	Ethnicity	-63274	143188	-44399	80503	18090	76867	Obs	4561
Ethnicity	HH Income	119232	96898	-137480	53296***	-19432	47208		
	Asian	-24303	414862	-42354	173741	-15406	155631	R ² within	0.172
	Maori	33219	160546	140551	114922	-104174	90563	R ² betw	0.236
Income HH	MELAA	-1128526	812688	-524815	372368	-354160	396501	R ² overall	0.217
	Pacific	-361622	265144	-219893	128819*	-319964	147495**		
	20-30	132761	94156	11142	57347	-64983	52667	F-stat	3.62
Language	30-50	195312	108203*	46451	52473	42247	62664		
	50-70	133936	98718	-19838	48944	19317	45400	Fundraising	
	70-100	270182	117776**	72911	48316	29929	54330		
Religion	100+	341986	108334***	97201	60971	105017	61225*	Obs	4561
	Not Stated	-44805	103626	-58927	40314	-37968	51572		
	Maori	146091	1117077	652040	458251	-230476	494853	R ² within	0.191
Qualification	Other	50081	1380453	781498	518858	-192829	578058	R ² betw	0.141
	Samoan	10986	1168125	643724	464812	-189932	497706	R ² overall	0.144
	Sign	-5321	1372781	1037052	586415*	-417900	637903		
Family Type	Christian	162092	113728	94018	46843**	42261	49369	F-stat	3.03
	None	145894	93593	73591	45069	28618	41288		
	Highschool	-241315	99463**	-27884	43531	-112393	41910***	Donations	
Age	Other	-87568	202054	-68939	111446	-40472	102181		
	Undergrad.	-405741	205700**	-210165	122008*	-52078	123602	Obs	4561
	Postgrad.	466497	401320	38527	159693	-190639	183733		
Other	Couple w Kids	-9509	82896	-5410	42665	14475	39567	R ² within	0.194
	Single w Kids	-120317	110858	-49755	47226	-6249	40711	R ² betw	0.039
	25-59	-45823	147408	26471	71659	-42168	62517	R ² overall	0.006
Constant	60+	-287758	182794	57166	82361	12008	64595		
	Female	-190883	225429	-56287	81631	-149529	95524	F-stat	2.8
	Married	-111841	95904	-49550	56974	-34714	43647		
Other	Home Owner	-85885	85602	-136675	45018***	-42356	35292		
	Self employed	-99769	87520	17434	45944	9580	36364		
	Parent Contrib			-0.1336	0.0297***	-0.1268	0.0383***		
Other	Fundraising	-0.5581	0.1194***			-0.2845	0.0543***		
	Donations	-0.5058	0.1641***	-0.2718	0.0643***				
	School Income	-0.0153	0	0.0159	0.0114	0.0130	0.0105		
Other	School decile	-392.5	437.5	257.9	225.9	147.3	192.1		
	Int'l roll	2858.5	1574.1*	334.5	598.8	-1925.8	671.6***		
	Total roll	205.2	137.4	143.69	44.09***	52.04	37.11		
Constant			70420	99494	140604	92517			

***, ** and * denote significance at the 1%, 5% and 10% significance levels, respectively. Robust standard errors are used. Only household income fragmentation is used for income heterogeneity.

unobserved school-specific factors are taken into account. Finally, the effect of language fragmentation in a school's area on its ability to raise local funds is similarly inconclusive. It may

Table 8: Qualitative Summary of Findings

		2001	2006	Pooled Cross Section	Fixed Effects
Parental Contributions	Religious Fragmentation	0	-	0	+
	Language Fragmentation	0	0/-	0/-	0
	Ethnic Fragmentation	0	0	0	0
	Individual Income Gini	0	0	0	
	Household Income Gini	0	0	+	0
Fundraising	Religious Fragmentation	-	0	-	0
	Language Fragmentation	-/0	0	0	0
	Ethnic Fragmentation	+/0	0	0	0
	Individual Income Gini	0	-	-	
	Household Income Gini	0	-	-	-
Donations	Religious Fragmentation	0	0	+/0	+
	Language Fragmentation	0	0	0	0
	Ethnic Fragmentation	0	0	-/0	0
	Individual Income Gini	0	0	0	
	Household Income Gini	+/0	0	+	0

lower the parental contributions that schools receive (though again this does not persist in fixed effects), but looks to have no effect on their fundraising or donations revenues.

5.4 Addressing Misclassified Parental Contributions

As mentioned previously, prior to the Ministry of Education's releasing standardised revenue definitions in 2007, there was some ambiguity in whether individual schools might classify their quasi-compulsory fees as "donations" rather than as "parental contributions." As a result, it is possible that some revenues listed as donations may in fact have been parental contributions. We address this potential measurement error two ways. First, we combine parental contributions and donations together and rerun the analysis already described using the baseline specification. Second, since schools are not likely to mis-classify donations as parental

contributions, we run linear regressions for the 90.6% of schools who report receiving parental contributions. The results of both approaches are presented in Appendix Table D.

In general, the effects of each type of heterogeneity are similar in our combined analysis or restricted parental contribution analysis as they were for unrestricted parental contributions. Religious fragmentation appears to have a negative effect on revenues using pooled cross section analysis, but instead a positive effect in fixed effects once individual school characteristics are controlled for. Language and ethnic fragmentation appear to have no significant effect. And household income inequality appears to have a negative effect on revenues using pooled cross section analysis, but this is not significant in fixed effects.

6. Discussion and Conclusion

In this paper we have sought to test whether increased social diversity in New Zealand is having an effect (positive or negative) on a particular social capital indicator: the voluntary revenues received by schools from their local communities. An international literature, particularly based on U.S. data, has found evidence of a negative correlation between neighbourhood heterogeneity in dimensions such as race or language, and social capital indicators such as people's likelihood of trusting others, being members of organisations, or contributing time or money to local public goods. However, there have been few studies of the effect of social diversity on local communities' financial support of their schools. A rare exception is a study by Miguel and Gugerty (2005), who find a negative relationship between local ethnic diversity and voluntary funding of schools. Their study, however, is in a developing country context (rural Kenya).

We use data provided by the New Zealand Ministry of Education on the local revenues reported by individual schools in 2001 and 2006, along with census data on the characteristics of the areas surrounding these schools in both years, to test whether a similar relationship holds between heterogeneity and school support in New Zealand. We examine the effect of heterogeneity in the neighbourhoods ("area units") surrounding schools on three categories of revenues they receive: quasi-compulsory parental contributions, fundraising, and donations. We measure neighbourhood heterogeneity in terms of religion, language, and ethnic fragmentation, and in terms of individual or household income inequality using the Gini coefficient. Controlling for other characteristics that might be expected to affect local revenues, we test whether variation in neighbourhood heterogeneity can explain variation in the support

schools receive under various specifications. We use Tobit cross section estimation for 2001 and 2006 separately, as well as pooled, and use linear fixed effects that controls for unobserved individual school characteristics that were stable between 2001 and 2006.

In contrast to what might be expected from the findings of the broader social capital literature, we find little evidence that neighbourhood social heterogeneity affects the local funds received by schools in New Zealand, whether positively or negatively. Perhaps our most robust evidence of a relationship concerns household income inequality and school fundraising. We find schools receive less revenue from fundraising as household income inequality in their area rises. From our fixed effects estimation, a one percentage point increase in a school's neighbourhood Gini coefficient is associated with a \$1,375 decrease in revenues from fundraising, all else equal. Curiously, we do not find evidence that income inequality has a similar effect on parental contributions or cash donations. We also find no systematic evidence that ethnic or language fragmentation affects any of the three categories of local funds, particularly once individual unobserved school characteristics are taken into account. Finally, we find mixed evidence regarding the effect of religious fragmentation. In cross section estimates, religious fragmentation looks to depress revenues from fundraising, and for 2006, from parental contributions. But under fixed effects that follow individual schools and neighbourhoods over time, religious fragmentation looks to raise revenues from parental contributions, and leave fundraising revenues unaffected.

While none of our specifications can fully address potential bias from people's endogenous choice of neighbourhood and school, we find little evidence that increasing social diversity in New Zealand is eroding community financial support for local schools. In the context of the social capital literature, this is good news indeed.

Appendix A – Variable Construction Details

Dependant Variables

Parental Contributions: This is a single monetary variable provided directly by the Ministry of Education. It is unadjusted for inflation between 2001 and 2006, and consists of “voluntary” fee payments by parents.

Fund Raising: This is a single monetary variable provided directly by the Ministry of Education. It is unadjusted for inflation between 2001 and 2006. It includes money received in exchange for goods and services.

Donations: This is a single monetary variable provided directly by the Ministry of Education. It is unadjusted for inflation between 2001 and 2006. It includes bequests and other monetary gifts.

Heterogeneity Measures (Religion, Language, Ethnicity, Income (Individual and Household))

Heterogeneity by religion, language and ethnicity is measured using the fragmentation index as described in equation (6), while heterogeneity by individual or household income is measured using the Gini coefficient as described in equation (7). Because the New Zealand census allows people to report more than one ethnic, language or religious affiliation, the denominator used to calculate population shares is the sum of the affiliations rather than total number of people.

The shares underlying the fragmentation indices are themselves Included as controls, and are based on the same level of aggregation as for the calculation of the fragmentation indices.

Religion: Shares are calculated for Christian, None and Other. Other is an aggregated category made up of the sum of the shares: Buddhist, Hindu, Islam/Muslim, Jewish, Maori Christian, Spiritualism and New Age, and Other. *None* is the aggregation of the census categories No Religion and Not Elsewhere Included. The share *Christian* is omitted from all regressions as the baseline.

Language: Language spoken shares are calculated for English, Maori, Samoan, Sign Language, None and Other. The share English is omitted from all regressions as the baseline.

Ethnicity: Shares are calculated for European, Maori, Pacific Peoples, Asian, and Middle Eastern/Latin American/African (MELAA). *European* is the aggregation of categories European and Other. The aggregated share *European* is omitted from all regressions as the baseline.

Income: Shares are calculated for those with individual income within the brackets \$0-\$5,000, \$5,001-\$10,000, \$10,001-\$20,000, \$20,001-\$30,000, \$30,001-\$50,000, 50,001+ and Not Stated. Shares are calculated for those with household income within the brackets \$0-\$20,000, \$20,001-\$30,000, \$30,001-\$50,000, \$50,001-\$70,000, \$70,001-\$100,000, 100,001+ and Not Stated. For both individual and household income specifications, the share with the lowest income range is omitted as the baseline.

The Gini measure is constructed as $\sum_{i=1}^n \left(\sum_{j=1}^n \frac{1}{2} \frac{|x_i - x_j|}{n^2 \mu} \right)$. Each person in a specific census income band is

assumed to have the midpoint income value. Individuals in the top category of \$50,000+ were assumed to have \$100,000 and households in the top category of \$100,000+ were assumed to have \$150,000. Individuals and Households in *Not Stated* were omitted when calculating the Gini coefficient.

Appendix A (Cont'd): Variable Construction Details

Other Neighbourhood Level Control Variables

In general the variables that follow are shares with the denominator being the sum of the reported affiliations rather than the total number of people in the area unit unless otherwise stated. Shares are based on the corresponding census variable unless otherwise stated.

Age (Years): Shares are for age ranges 0-24, 25-59 and 60+. Each category was made up from the sum of the relevant five year age cohorts contained in the census data. The share 0-24 is omitted as the baseline.

Children (Number of): Shares are None, 1-3, and 4+. Those who objected to answering or not elsewhere included were omitted. The share None is omitted as the baseline. Data is only available for 2006.

Family Composition: Shares are Couple without Children, Couple with Children and Single with Children. The share Couple without Children is omitted as the baseline.

Educational Qualification: Shares are None, High School, Other, Undergraduate University, and Postgraduate University. None is the sum of Not Elsewhere Included, and No Qualification. *High School* combines the census categories: Level 1, 2, 3 or 4 (certificate gained either at high school or post high school), and Overseas Secondary School Qualification. Other is made up from the census categories Level 5 Diploma and Level 6 Diploma. Undergraduate University is made up from the categories Bachelor Degree and Level 7 Qualifications. Postgraduate University is made up from the census categories Postgraduate and Honours Degree, Masters Degree, and Doctorate Degree. The share *None* is omitted as the baseline.

Years at Residence: Shares are None, 1-4, 5-9, 10-14, 15-29 and 30+ years. The category *None* is omitted as the baseline. Data is only available for 2006.

Female: Shares are Female and Male. Male is omitted as the baseline.

Self Employed: the share of individuals over all individuals who report self-employment income.

Married: the share of individuals 15 or older who were legally married, or (in 2006) in a civil union.

Home Ownership: the share of individuals 15 or over who owned or partly owned their usual residence.

School Level Control Variables

School Income: This is calculated as the sum in dollars of what tend to be schools' five largest revenue categories (excluding teachers' salaries): Ministry of Education Grants, Other Government Grants, Investment Interest, Trading Sales, Overseas Students Tuition.

Decile: This is calculated by the Ministry of Education. They assign a decile number to each school based on census data regarding the household income, occupation, household crowding, educational qualifications and income support of their students' immediate residential neighbourhoods ("meshblocks"). Only data for households with school age children are included and the importance of a meshblock is weighted by the number of students that live in it. The lowest ten percent of schools – the worst off socioeconomically – are assigned decile one and so on. Government grants are larger per pupil for schools assigned a lower decile, as captured in School Income.

School Type State: This dummy variable equals one if the school is "state: not integrated", and zero if the school is "state: integrated" or "private: fully regulated". Fully private schools are not included.

Roll (Number of Students): we include controls for the International Roll and Total Roll.

APPENDIX B: SUMMARY STATISTICS

	2001			2006		
	Obs	Mean	Std. Dev.	Obs	Mean	Std. Dev.
School Level Variables						
Parental Contributions	2553	50447	138168	2405	64790	142366
Fundraising	2553	24334	49742	2405	33312	65583
Donations	2553	16661	54900	2405	23132	61835
Min of Education Grants	2553	294698	310180	2405	414294	458460
Grants from Other Depts	2553	29382	67640	2405	39974	158604
Interest Income	2553	11185	17929	2405	20902	31521
Overseas Students	2553	20030	106095	2405	37947	151041
Trading Sales	2553	29731	95004	2405	32423	77347
School Income (sum of 5)	2553	385026	480174	2405	545540	704989
School Decile	2553	5.4250	2.8645	2405	5.5875	3.9423
International Roll	2553	3.5511	12.6149	2405	3.5023	12.0127
Total Roll	2553	272.5347	286.6115	2404	299.5674	327.4279
School Type State	2553	0.8723	0.3338	2405	0.8653	0.3415
School's Area Unit Variables						
Ethnic Fragmentation	2326	0.3338	0.1654	2243	0.3566	0.1636
Language Fragmentation	2326	0.2331	0.1177	2243	0.2460	0.1194
Religion Fragmentation	2326	0.5234	0.0426	2243	0.5381	0.0383
Income Gini	2326	0.4404	0.0309	2243	0.4226	0.0285
Household Income Gini	2323	0.3714	0.0320	2239	0.3551	0.0358
European	2326	0.7532	0.1901	2243	0.6262	0.1603
Other	2326	0.0002	0.0007	2243	0.1076	0.0413
Eur+Other	2326	0.7534	0.1902	2243	0.7338	0.1951
Maori	2326	0.1608	0.1448	2243	0.1595	0.1411
Pacific Islander	2326	0.0438	0.0950	2243	0.0483	0.1009
Asian	2326	0.0379	0.0562	2243	0.0528	0.0788
ME/LA/A	2326	0.0041	0.0069	2243	0.0057	0.0081
English Lang	2326	0.8635	0.0833	2243	0.8539	0.0867
Maori Lang	2326	0.0502	0.0562	2243	0.0468	0.0548
Samoan Lang	2326	0.0134	0.0325	2243	0.0134	0.0330
NZ Sign Lang	2326	0.0070	0.0035	2243	0.0057	0.0035
Other Lang	2326	0.0659	0.0549	2243	0.0802	0.0660
Christian	2326	0.5489	0.0753	2243	0.4973	0.0727
No Religion	2326	0.2624	0.0560	2243	0.3092	0.0684
Buddhist	2326	0.0076	0.0088	2243	0.0092	0.0100
Hindu	2326	0.0066	0.0120	2243	0.0096	0.0182
Islam/Muslim	2326	0.0039	0.0080	2243	0.0057	0.0109
Judaism	2326	0.0013	0.0020	2243	0.0013	0.0019
Maori Christian	2326	0.0229	0.0410	2243	0.0221	0.0416
Spiritualist	2326	0.0041	0.0030	2243	0.0046	0.0030
Other religions	2326	0.0044	0.0046	2243	0.0051	0.0060

APPENDIX B (Cont'd): SUMMARY STATISTICS

	2001			2006		
	Obs	Mean	Std. Dev.	Obs	Mean	Std. Dev.
Individual Income						
\$0 - \$5000	2326	0.1286	0.0286	2243	0.1163	0.0278
\$5001 - \$10,000	2326	0.1235	0.0359	2243	0.0741	0.0206
\$10,001 - \$20,000	2326	0.2305	0.0514	2243	0.2066	0.0568
\$20,001 - \$30,000	2326	0.1496	0.0281	2243	0.1438	0.0248
\$30,001 - \$50,000	2326	0.1608	0.0433	2243	0.2072	0.0391
\$50,001 plus	2326	0.0924	0.0597	2243	0.1451	0.0764
Not Stated	2326	0.1145	0.0489	2243	0.1070	0.0522
Household Income						
\$0 - \$20,000	2323	0.2044	0.0775	2239	0.1442	0.0585
\$20,001 - \$30,000	2323	0.1313	0.0334	2239	0.1123	0.0367
\$30,001 - \$50,000	2323	0.1789	0.0340	2239	0.1727	0.0350
\$50,001 - \$70,000	2323	0.1294	0.0341	2239	0.1381	0.0298
\$70,001 - \$100,000	2323	0.0811	0.0369	2239	0.1227	0.0378
\$100,001 plus	2323	0.0827	0.0689	2239	0.1382	0.0934
Not Stated	2323	0.1922	0.0620	2239	0.1719	0.0675
Female	2326	0.5042	0.0259	2243	0.5064	0.0242
Age 0-24	2326	0.3634	0.0570	2243	0.3534	0.0596
Age 25-59	2326	0.4746	0.0507	2243	0.4730	0.0509
Age 60+	2326	0.1620	0.0616	2243	0.1736	0.0646
Share Married	2326	0.4763	0.1057	2243	0.4543	0.1048
Share Homeowners	2326	0.5177	0.1195	2243	0.5113	0.1291
Share Self-employed	2326	0.1918	0.1226	2243	0.1797	0.1074
Education Qualification:						
None	2326	0.4202	0.1185	2243	0.3668	0.1168
High School	2326	0.4122	0.0544	2243	0.4364	0.0484
Other	2326	0.0879	0.0258	2243	0.0817	0.0240
Undergraduate	2326	0.0551	0.0432	2243	0.0819	0.0536
Postgraduate	2326	0.0246	0.0266	2243	0.0332	0.0319
Family Composition						
Couple, no children	2326	0.3898	0.0871	2243	0.4051	0.0936
Couple, with children	2326	0.4219	0.0753	2243	0.4127	0.0759
One parent, with children	2326	0.1882	0.0877	2243	0.1822	0.0872
Share HH with no children				2242	0.2800	0.0960
Share HH 1-3 children				2242	0.5483	0.0774
Share HH 4+ children				2242	0.1718	0.0660
0 Ys at Residence				2243	0.2332	0.0644
1-4 Yrs at Residence				2243	0.3152	0.0399
5-9 Yrs at Residence				2243	0.1736	0.0301
10-14 Yrs at Residence				2243	0.1012	0.0249
15-29 Yrs at Residence				2243	0.1222	0.0325
30+ Yrs at Residence				2243	0.0547	0.0240
Population Density				2243	1070.40	1126.54

Appendix C: Variables Removed from Cross Section Specification 5 Using Akaike Information Criteria

2001

Parental Contributions		Fundraising		Donations	
<u>Gini Specification</u>	<u>HHGini Specification</u>	<u>Gini Specification</u>	<u>HHGini Specification</u>	<u>Gini Specification</u>	<u>HHGini Specification</u>
Decile	Decile	Family Comp	Family Comp	Female	Female
Female	Female	Self-employed	Self-employed	Family Type	Family Comp
Family Comp	Family Comp	Age	Age		Education
	Education	Home-owners	Home-owners		Self-employed
	Self-employed	Married	Married		
	School Income				

2006

Parental Contributions		Fundraising		Donations	
<u>Gini Specification</u>	<u>HHGini Specification</u>	<u>Gini Specification</u>	<u>HHGini Specification</u>	<u>Gini Specification</u>	<u>HHGini Specification</u>
Int'l Roll	Int'l Roll	Education	Education	School Income	School Income
Age	Home-owners	Home-owners	Home-owners	Pop Density	Pop Density
	Married	School Income	School Income	Self-employed	Self-employed
	Yrs Resident	Pop Density	Pop Density	Family Size	Family Size
		School State	School State	Yrs Resident	Yrs Resident
		Self-employed			

Appendix Table D: Addressing Measurement Error

		2001	2006	Pooled Cross Section	Linear Fixed Effects
Parental Contributions + Donations (Tobit)	Religious Fragmentation	-30046 127383	-328196 111299***	-99643 74669	435208 145213***
	Language Fragmentation	-80767 481337	-676305 426760	-352248 345064	110613 703291
	Ethnic Fragmentation	-5745 80720	54223 71592	25977 56928	-48018 147655
	Household Income Gini	200778 189943	49387 199457	114132 133144	-31080 148418
Only Schools with Positive Parental Contributions (OLS)	Religious Fragmentation	65562 117140	-264611 103813**	-46968 67930	319338 165288*
	Language Fragmentation	-232487 493608	-180979 390706	-201071 331486	447992 734621
	Ethnic Fragmentation	-12658 83326	-5903 64021	8357 53119	-106674 155965
	Household Income Gini	265166 161655	86093 193155	160864 85587*	91615 94801

***, ** and * denote significance at the 1%, 5% and 10% levels, respectively. Baseline Specification. Robust standard errors are used. Only the household Gini is used for income heterogeneity.

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Notes:

¹ See Thornton and Clark (2010) and Smeith and Dunstan (2004). Age-specific fertility rates by ethnicity for 2001 and 2006 are available from Statistics New Zealand.

² See Hanifan (1916, 130-131).

³ See Putnam (2007, 137).

⁴ See Lieberman (1993, 171).

⁵ See Okunade and Berl (1997) page 210.

⁶ Personal correspondence, Sarah Tumen of the Ministry of Education.

⁷ It seems reasonable to assume that parents choose a school based in part on its proximity to the family home. New Zealand also has a zoning system where schools are obliged to accept any students who are usually resident within their catchment area. Students who live outside the area can apply to go to that school but face the possibility of having to enter a ballot and being put on a waiting list (Ministry of Education, 2010c).

⁸ These five main sources are: Ministry of Education Grants, Other Government Grants, Investment Interest, Trading Sales, and Overseas Students. Teachers' salaries are excluded.

⁹ See Appendix B for the exact figures.

¹⁰ For exact details as to aggregation see Appendix A.

¹¹ The exact bands are described in Appendix A.

¹² Especially that of Okunade and Berl (1997).

¹³ See section 4.1.3.

¹⁴ The second highest correlation is between ethnic and religious fragmentation, at .706, and third highest is between language and religious fragmentation, at .621.