

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

**Group Identity and Relation-Specific Investment: An
Experimental Investigation**

Hodaka Morita and Maroš Servátka

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

Group Identity and Relation-Specific Investment: An Experimental Investigation

Hodaka Morita
School of Economics
Australian School of Business
University of New South Wales
h.morita@unsw.edu.au

Maroš Servátka
New Zealand Experimental Economics Laboratory
Department of Economics and Finance
University of Canterbury
maros.servatka@canterbury.ac.nz

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Abstract

The hold-up problem has played a central role in the study of firm boundaries that originated with the pathbreaking essay by Coase (1937). This paper studies a previously unexplored mechanism through which integration could resolve the hold-up problem. Based on Tajfel and Turner's (1979) social identification theory, we conjecture that team membership increases the degree of altruism towards another team member, and this in turn helps resolving the hold-up problem. We test this conjecture in a laboratory experiment. Our subjects are randomly divided into two teams and given their respective team uniforms to wear. In Task 1 they answer two trivia questions and can use a chat program to help their team members. In Task 2 the subjects play a standard hold-up game with a member of their own team (representing integration) or with a member of the other team (non-integration). We find that team membership significantly increases the investment rate as well as the share of the surplus offered back to the investor and thus mitigates the hold-up problem.

JEL Classification: C91, D20, L20

Keywords: altruism, experiment, hold-up problem, identity, integration, other-regarding preferences, relation-specific investment, team membership

1. Introduction

A fundamental question in the literature on the theory of the firm asks how integration between two parties helps resolve the problem of inefficiency associated with relation-specific investment (often referred to as the “hold-up problem”). In this paper we focus on identity, a central concept in social psychology, as a key element in our exploration of this important research question. According to the social identity theory, categorization of individuals as group members leads them to display ingroup favoritism (Turner, 1975; Tajfel, 1978; Tajfel and Turner, 1979). Under integration, the parties classify themselves as members of the same organization and share common goals, leadership, values and practices. The organizational identification is often strengthened through the manipulation of symbols such as logos and traditions (Ashforth and Mael, 1989). Organizational identification is a specific form of social (or group) identification, which decreases the level of opportunism between members and facilitates better coordination and communication (Turner, 1982, 1984; Ashforth and Mael, 1989; Kogut and Zander, 1996).

We propose that group identity, which is present when two parties are integrated within the same organizational boundary, plays a critical role in resolution of the hold-up problem, and test our conjectures in a controlled environment of a laboratory experiment that allows us to clearly identify the effects of group identity on investment incentives.

Under the standard setup, relation-specific investment in bilateral trade creates a surplus to be shared between two parties because the value of such investment is appreciably lower in any use other than supporting the transaction between the two parties. The surplus-sharing leads to the problem of inefficiency in a world of incomplete contracts, and the central theme of the theory of the firm is that integration between the two parties mitigates or resolves this inefficiency. The property-rights theory has focused on asset ownership as a critical element of the mechanism through which integration affects investment incentives (see Section 2.1 for details). We contribute to the literature by experimentally investigating group identity as another critical, and yet previously unexplored element that contributes to the resolution of the hold-up problem.

Experimental economists have recently found that group identity strengthens other-regarding behavior among group members. Also, a number of experimental studies show that human subjects exhibit other-regarding behavior under various setups of the hold-up problem. Based on these findings we conjecture that group identity strengthens agents’ altruistic preferences, which in turn help resolve or mitigate the hold-up problem. In our experiment the seller decides whether or not to invest $\$F$. If no investment is made, the game ends. If the seller invests, $\$G$ ($> F$) is made available to be split between the seller and the buyer. The buyer then makes a take-it-or-leave-it offer $\$p$ to split $\$G$. The seller can receive $\$p$ by accepting the offer in which case the buyer receives $\$G - p$. If the seller rejects the offer, $\$G$ disappears and neither party receives any additional money. In this game, the seller does not invest if he cares only about his own monetary payoff, leading to inefficiency (note that the investment is efficient given $G - F > 0$). However, the seller may choose to invest in the presence of other-regarding preferences.

Prior to the game, we randomly divide the subjects into two teams, called Yellow Team and Orange Team. We then let members of the same team wear the same color t-shirts and help each other through on-line chat to answer trivia questions. These design features are intended to create and strengthen group identity through categorization of subjects (Yellow Team and Orange Team), usage of symbols (t-shirts), and cooperation to achieve the same goal (trivia questions). We then compare subjects' behavior in two treatments, one where each subject is anonymously paired with another subject on the same team, and the second where each subject on one team is paired with another subject on the other team.

We hypothesize that the seller is more likely to invest under the same team treatment because the induced group identity between the seller and the buyer strengthens their other-regarding preferences and this in turn gives the seller higher incentives to invest. Findings from our experiment support this hypothesis. We observe that: (i) Sellers invested more often when paired with buyers from their own team than when paired with buyers from the other team; and (ii) Buyers' offers to sellers on their own team were higher than to sellers on the other team.

The present paper contributes to the experimental economics literature by presenting the first experimental evidence on the effects of group identity on the hold-up problem. Our finding contributes to the theory of the firm literature by indicating that group identity has a potential to act as a channel through which integration between two parties can resolve or mitigate the hold-up problem.

It is widely recognized that mergers often fail in reality. Weber and Camerer (2003) used laboratory experiments to explore merger failure due to conflicting organizational cultures. In their experiments, they allowed subjects in non-integrated "firms" to develop a culture, and then merged two firms together. They found that performance decreases following the merger. In contrast to Weber and Camerer, we focus on the implications of integration and non-integration, as two alternative governance structures, in the context of the hold-up problem.

The rest of the paper is organized as follows. Section 2 presents more detailed discussions on our contributions to three relevant strands of literature and section 3 presents the theoretical framework and hypotheses. Section 4 then explains our experimental design and procedures, section 5 presents the results of the experiment, and section 6 offers concluding remarks.

2. Literature review

This paper builds on earlier work of three types: (a) a large body of research on the theory of the firm, (b) the social psychology and experimental economics research on social identity, and (c) the experimental economics literature on the hold-up problem. In this section, we discuss our contributions to these three strands of literature.

2.1 The theory of the firm literature

The literature on the theory of the firm, originated with the famous essay by Coase (1937), now consists of a large body of research. Gibbons (2005) clearly defined and compared four theories of the firm, among which relation-specific investment plays a critical role in the rent-seeking theory (Williamson, 1971, 1979, 1985; Klein et al., 1978) and the property-rights theory (Grossman and Hart, 1986; Hart and Moore, 1990; Hart, 1995).^{1,2} In the rent-seeking theory of the firm, a key element is individually optimal but socially destructive haggling over surplus (or “appropriable quasi-rents”) that is created by relation-specific investment. Under non-integration, two parties are unable to prevent this inefficient haggling induced by appropriable quasi-rents, while under integration their incentives are aligned and the inefficient outcome can thus be avoided. The theory asserts that larger appropriable quasi-rents make integration more likely, and a number of empirical studies supported this prediction (see, e.g., Shelanski and Klein, 1995 for a survey).

In the property-rights theory, ownership of non-human assets is the defining characteristics of firms in a world with incomplete contracts, where ownership conveys “residual rights of control”—that is, all the decision rights not specified in a contract. In contrast to the rent-seeking theory, the property-rights theory assumes efficient bargaining irrespective of whether the two parties are integrated or not, and requires non-contractible relation-specific investments. Efficient bargaining then causes the parties to share the surplus from their relation-specific investments. Each party’s asset ownership determines that party’s surplus share, which in turn determines that party’s investment incentive. If it is important to maximize one party’s investment, then that party should own all the assets (integration), whereas if the parties’ investment incentives are both important, then dividing the assets between the parties (non-integration) will lead to an efficient outcome.

One of the key contributions of the property-rights theory, pioneered by Grossman and Hart (1986), was that it gave a unified account of the costs and benefits of integration (Holmström and Roberts, 1998; Gibbons, 2005). However, in reality, incentives for relation-specific investment are provided by a variety of means, of which ownership is but one, as pointed out by Holmström and Roberts (1998). Their paper thus calls for taking a much broader view of the firm and the determination of its boundaries and suggests there might exist various other mechanisms to be considered. Holmström and Roberts proposed the long-term and repeated nature of the interaction between relevant parties to be another important mechanism that affects incentives to undertake relation-specific investments,

¹ Other two theories identified by Gibbons are the incentive-theory of the firm and the adaptation theory of the firm, in which relation-specific investment does not play major roles.

² Description and comparison of the two theories presented below heavily rely on Gibbons (2005). See Holmström and Roberts (1998) for another excellent discussion on the theory of the firm.

pointing out the traditional procurement and subcontracting practices in the Japanese automobile industry as an example of such mechanism.³

The current study contributes to this literature by identifying group identity, which is present under integration, as a significant factor that influences incentives for relation-specific investment. Consequently, our finding implies that when one evaluates the costs and benefits of integration, the effects of group identity should be considered along with other important factors such as property rights and reputation effects.

2.2 The social psychology and experimental economics research on social identity

Social psychologists trying to understand the psychological basis of inter-group discrimination have developed so-called “social identity theory” (Tajfel and Turner, 1979) that describes an individual’s concept of self as being derived from perceived memberships of social groups (Turner et al., 1987). The early experimental psychology work tested and provided evidence for the main prediction of the theory, namely that group membership will produce an in-group bias at the expense of the out-group (e.g., Tajfel et al., 1971; Billing and Tajfel, 1973). These early studies were then followed by an extensive literature demonstrating effects of group identity on behavior and focusing on factors enhancing or diminishing in-group favoritism. Social psychology literature on social identity is reviewed in more detail by Charness et al. (2007) and Chen and Li (2009).

Economists have become increasingly interested in the notion of social identity, applying social identity models to various aspects of economic decision making (e.g., Akerlof and Kranton, 2000, 2002, 2005 and 2008; Basu, 2005 and 2010; Chen and Li, 2008; Benabou and Tirole, forthcoming; Chen and Chen, forthcoming). In recent years there have been a number of economic experiments studying interactions of group identities with human decision making. Some experimental designs rely on natural identities within existing social groups (e.g., Bernhard et al., 2006; Goette et al., 2006; Falk and Zehnder, 2007; Tanaka et al., 2008; List et al., 2009; Chen et al., 2010; Li et al., 2011) while others use priming techniques known from psychology, such as pre-game questionnaires (e.g., Brown-Kruse and Hummels, 1993; Cadsby and Maynes, 1998; Afridi, Li, and Ren, 2009; Benjamin et al., 2010; Cadsby et al., 2011) or group composition (e.g., Cadsby et al., 2010). A third category of experimental designs induce group identities along the lines of Tajfel et al. (1971) minimal group paradigm, rather than relying on existing ones.^{4,5} This approach allows the researcher to vary the strength of induced identity (e.g., Eckel and

³ Similarly, Gibbons (2005) argued that relational contracting is a promising area of future research for deepening the theory of the firm. These authors also discussed several other issues and concepts such as knowledge and its transfer as promising areas for future research.

⁴ Whether an experimental procedure satisfies all conditions of the minimal group paradigm will always be questionable, in particular with economic experiments that almost always involve a link between decision-maker’s self-interest and his choices. For a further discussion see Charness et al. (2007).

Grossman, 2005) as well as to make it more likely that all subjects recognize their own and others' group membership, resulting in more experimental control.

The previous experimental literature that uses induced group identity provides evidence that group membership can affect subjects' choices in both non-strategic and strategic environments. Chen and Li (2009) measure the effect of group identity on subjects' other-regarding preferences in simple allocation games and in a series of two-person sequential games selected from Charness and Rabin (2002). The subjects' choices display significant in-group favoritism in terms of (i) distributional preferences by giving more to an in-group member than an out-group member, (ii) preferences for reciprocity by rewarding an in-group member more often but punishing less than out-group member, and (iii) preferences for efficiency by more likely choosing an action that maximizes social welfare when paired with an in-group member. Chen and Li's study thus provides strong evidence that group membership affects other-regarding preferences – the underlying mechanism on which our conjecture that group membership mitigates the hold-up problem is based and which is also tested in our experiment.

Charness et al. (2007) study the degree of identification with the group in battle-of-sexes and prisoner's dilemma games by letting a player's own group observe as a passive audience as decisions are made and by making the payoffs of the other group members dependent on the player's decision. The authors find a strong effect of such manipulations: subjects who have their group members in the audience become more aggressive than subjects who have the other group members in the audience. Such change in behavior then leads to more coordination in the battle-of-sexes and less cooperation in the prisoner's dilemma.⁶ However, in contrast to the minimal group paradigm, they do not observe any effect of minimal groups on subjects' behavior, suggesting that in strategic interactions the effect of group membership on choices depends on the saliency of the group.⁷ While our experiment is not directly concerned with saliency of group membership, this finding has an important implication for our design by pointing out that a strong cohesion might be crucial for the group identity effects to manifest themselves in a hold-up problem scenario.

These general studies provide evidence that group influence and social identity can be important considerations in economic decision-making. The focus of our paper is more specific – we

⁵ An interesting experiment is presented in Hargreaves Heap and Zizzo (2009) who first induce group membership and then let the subjects play a series of trust games (Berg et al., 1995) with insiders and outsiders and trade their group membership. They find that in such setup group membership does not increase trust.

⁶ McLeish and Oxoby (2007) also find higher cooperation rates among group members in simple bargaining games as a result of group identity being reinforced by a negative out-group opinion. Their data also show that violation of in-group norms results in an increased use of punishment within the in-group, signifying different expectations from members of the group than from outsiders.

⁷ Sutter (2009) shows that salient group membership has strong effects on individual decisions also in a non-strategic environment even when no out-group exists.

apply the idea of social identity to the theory of the firm and focus on the importance of group membership in a particular strategic environment of the hold-up problem. Various aspects of the hold-up problem have already been explored experimentally, for example, the importance of threat points by Sonnemans et al. (2001) and reliance levels of breach remedies by Sloof et al. (2003), among others. Ellingsen and Johannesson (2004a and 2004b) present experimental evidence that communication mitigates the lack of efficiency-enhancing investment, and Hoppe and Schmitz (2009) study whether contracts can mitigate the hold-up problem when renegotiation cannot be prevented. One important aspect of the hold-up is the incompleteness of the contract (e.g., Charness and Dufwenberg, 2006 and 2010; Fehr et al., 2008; Dufwenberg et al., forthcoming), very common in labor markets. A nice and detailed survey of labor market experiments is presented in Charness and Kuhn (2010). However, to the best of our knowledge, no previous experimental studies on the hold-up problem or incomplete contracts investigated the effects of group identity.

3. Theoretical framework and hypotheses

Consider the following interaction between a seller and a buyer. At stage 1, the seller can make a fixed, non-contractible investment at cost F . If the seller does not invest, the payoffs of the seller and the buyer are both zero. Suppose the seller invested. Then there is a potential gain from trade $G (> F)$. At stage 2, the buyer makes a take-it-or-leave-it offer p to the seller to divide the gain G . If the seller accepts the offer p , the trade realizes and the total payoffs of the seller and the buyer are $p - F$ and $G - p$ respectively. If the seller rejects the offer, the trade does not realize and the total payoffs of the seller and the buyer are $-F$ and 0 respectively.

The simple model described above exhibits the hold-up problem, that is, inefficiency associated with non-contractible relation-specific investment, if agents care only about their own monetary payoff. To see this, suppose that the seller invested at the cost F at stage 1. The buyer would then offer $p = 0$, which would be accepted by the seller, yielding a negative total payoff of $-F$ to the seller. Anticipating this, the seller does not invest at stage 1. The no-investment outcome is inefficient because $G - F > 0$.

In reality, agents often behave in other-regarding ways.⁸ In what follows, we show that the hold-up problem may be resolved when agents exhibit altruistic behavior. Suppose that the seller invested in stage 1. In the presence of altruistic preferences, the buyer offers $p = p' (> 0)$ instead of $p = 0$ because of the buyer's altruistic consideration for the seller and the buyer's conditional altruism based on the seller's investment decision. This means that since the seller invested to create an opportunity for the buyer to make a positive net benefit, the buyer repays the seller's kind behavior by paying a higher price. Anticipating $p = p'$, the seller invests if $p' > F$. Also, even if $p' < F$, the seller still invests if p' is

⁸ See Camerer (2003) and Cooper and Kagel (2009) for nice surveys on distributive other-regarding preferences.

reasonably close to F because of seller's own altruistic consideration for the buyer. That is, by suffering from the negative net benefit $p' - F$, the seller can create the positive net benefit $G - p'$ for the buyer.⁹

Whether or not the holdup problem is resolved depends on the strength of the agents' altruistic preferences. Suppose that altruistic preferences are weak both for the seller and the buyer. Then the value of p' that the buyer offers upon the seller's investment is low, and hence the gap between p' and F (assuming $p' < F$) is large. Since the seller's altruistic preferences are also weak, the seller is not willing to suffer from the negative net benefit $p' - F$ to benefit the buyer and increase the social welfare. Under stronger altruistic preferences, the seller is more willing to suffer from the negative benefit in order to benefit the buyer and increase social welfare. At the same time, the stronger altruistic preferences of the buyer would increase p' , which in turn reduces the negative benefit that the seller suffers from.

The logic presented above suggests that the hold-up problem can be resolved when the agents' altruistic preferences are sufficiently strong. And, as mentioned in the introduction, we hypothesize that group identity strengthens agents' altruistic preferences. We then obtain the following two hypotheses.

Hypothesis 1: The seller is more likely to invest in the presence of group identity.

Hypothesis 2: Upon the seller's investment, the buyer's offer is higher in the presence of group identity.

4. Experiment design and procedures

The experiment took place in the New Zealand Experimental Economics Laboratory (NZEEL) at the University of Canterbury in 2010 with 258 undergraduate students serving as subjects. The participants were selected randomly from the NZEEL database using ORSEE recruitment system (Greiner, 2004). At the time of the experiment there were over 1000 undergraduate students in the database. The recruited subjects have never previously participated in an economic experiment at this university. On average, an experimental session lasted around 75 minutes including initial instruction period and payment of subjects. The subjects earned on average 10.33 New Zealand Dollars (NZD) from the game and up to 4 NZD from answering trivia questions. At the end of the session the subjects completed a short survey on the experiment for which they were paid 5 NZD. This was not announced to the subjects at the start of the experiment.

Upon entering the laboratory all participants were randomly divided into Orange Team and Yellow Team by drawing colored pieces of paper from a large manila envelope. The subjects were then seated in cubicles, Orange Team in the front two rows of the room and Yellow Team in the back two rows. They were free to choose any seat within their two rows. The experimenters then handed subjects

⁹ An alternative reason could be the seller's preferences for social efficiency, given that investment is an efficient decision. Arguably, preference for social efficiency includes some element of altruism as the decision maker puts a positive weight on the other person's payoff.

their respective color t-shirts, representing team uniforms – a centerpiece of our design – and asked everyone to put them on.¹⁰ After everyone put on a t-shirt, we asked the teams to get up, look at their teammates and verify that everyone on the team was wearing the same color t-shirt. Usage of jerseys or uniforms is a common way to strengthen group identity in the outside-the-lab world, and this is what prompted us to use the same color t-shirts in our experiment, rather than relying on some other visible signs.

Our experiment included two treatments based on pairing of subjects (Same-Team and Different-Team) implemented in an across-subjects design. Each treatment consisted of two tasks: (1) Answering two trivia questions and (2) playing the hold-up game. The two tasks were implemented as follows.

The subjects were first given Task 1 instructions and decision sheet that included two trivia questions. Prior to answering the questions, the subjects had an opportunity to communicate via computer chat for five minutes with their own team members (i.e., in both Same-Team and Different-Team treatments, a person on the Orange Team could chat with all remaining subjects on the Orange Team and a person on the Yellow Team could chat with all remaining subjects on the Yellow Team) about providing and receiving help.¹¹ After the chat was over, all subjects individually submitted their answers. The purpose of this task was to strengthen the team identity via chat. Social psychology research on generalized reciprocity (e.g., Yamagashi and Kiyonari, 2000) suggests that team identity can be formed through a common goal and through helping other team members and Eckel and Grossman (2005) and Chen and Li (2009) provide experimental support for this conclusion. Note that the conjecture tested in our experiment crucially hinges on a strong identification with the team. Our design therefore does not follow the quest for the minimal group cohesion producing a change in behavior but rather takes measures to strengthen team identity by including the team-building Task 1.¹²

In the instructions to Task 1 the subjects were told they would be paid 2 NZD for each correct answer, but would not find out the results until the end of the experiment. This was to control for the level of created social identity that could otherwise vary depending on whether a good or bad advice by team members was given to an individual. Once all subjects answered the trivia questions, the experimenters collected their answer sheets.

Then neutrally framed Task 2 instructions were handed out. In the Same-Team treatment, the subjects were informed that each person from the Yellow Team would be randomly paired with another person from the Yellow Team and each person from the Orange Team with another person from the

¹⁰ The subjects were also told they could keep their t-shirts after the experiment was over.

¹¹ The chat was programmed and conducted with z-Tree (Fischbacher, 2007).

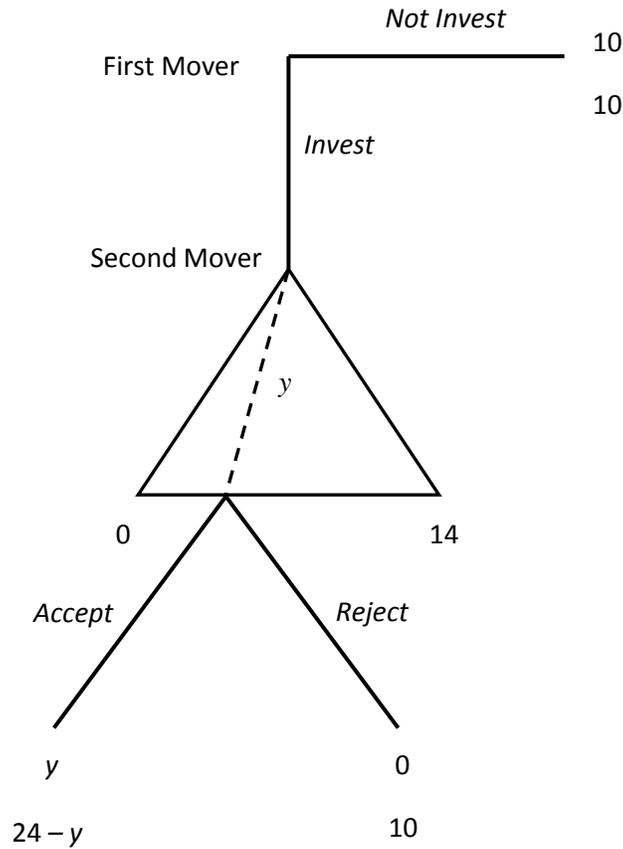
¹² The importance of team identity is evidenced by the amounts of resources spent on team-building exercises and company retreats every year.

Orange Team. It was emphasized that no one would learn the identity of the other person and that the experimenters would keep track of all decisions using ID numbers.

A coin was publicly flipped to randomly determine the roles depending on the row in which a subject was sitting. The allocation of a seller (referred to as the First Mover in the instructions in order to induce a context-free decision making environment, henceforth FM) and a buyer (the Second Mover, henceforth SM) to a particular pair was done by experimenter based on a pre-assigned matching that was unknown to the subjects. The decisions were divided into three stages. In Stage 1, the FM had to decide whether or not to invest his/her 10 NZD show up fee in order to create 14 NZD for the pair. If the FM decided not to invest the 10 NZD show up fee, then no money was created and both movers kept their show up fees. If the FM decided to invest, then 14 NZD was made available to split between the two paired persons. An offer of how to split the 14 NZD was determined by the SM in Stage 2. In Stage 3, the FM learned about the offer, and could either accept it or reject it. If the FM accepted, both movers received the respective amounts stated in the offer. If the FM rejected, the 14 NZD disappeared and both the FM and the SM received 0 NZD. (The SM still kept the show up fee of 10 NZD.) The parameterization of the hold-up game is presented in Figure 1. This game tree was *not* shown to the subjects.

In order to minimize confusion of subjects in this three-stage Task 2, we opted to include three control questions, provided in the appendix, which all participants had to answer correctly before proceeding to the decision-making part of Task 2. The SM's offers for the control questions were generated randomly for each session. After the subjects answered the questions, the experimenters verified their correctness by inspecting each subject's answers individually and if necessary, provided additional assistance and explanation until the subject calculated answers correctly. Then the three scenarios were reviewed publicly by the experimenter and correct answers projected on the screen.

Figure 1. The Hold-up Game



When the decision-making part of Task 2 started, the subjects were reminded about their pairing with another member of their own team or with a person from the other team, depending on the treatment. In order to transfer information between matched pairs, one of the experimenters collected and later redistributed all decision sheets, while the second experimenter copied the decisions from one sheet to another. This procedure was implemented with the aim to prevent the exchange of superfluous information during the game and aid in maintaining the anonymity of individual decisions.

At the end of the session we asked subjects to complete a short post-experiment questionnaire concerning their decisions and offered 5 NZD for doing so. This procedure ensured that no subject left the experiment with zero payoffs. Upon completion of the questionnaire, the correct answers from Task 1 were revealed and all subjects were privately paid their earnings for the session.

5. Results

Table 1 presents summary statistics from our two treatments. Forty-nine subject pairs participated in the Same-Team treatment. In Stage 1, twenty-one FMs invested, yielding an investment rate of 43.8%. Following an investment SMs offered on average 10.38 NZD in Stage 2. Only two of these offers (5 and 8 NZD) were rejected in Stage 3 by the respective FMs, resulting in a rejection rate of 9.5% and rejecting an average offer of 6.50 NZD.

Due to a lower investment rate in the Different-Team treatment we had to run more subjects in order to generate a sufficient number of observations on SMs' behavior. Out of eighty-one FMs who participated in this treatment, twenty-one invested while the remaining sixty did not, yielding an investment rate of 25.9%. Following an investment, the twenty-one SMs who got to make a decision offered on average 8.74 NZD. Four offers were rejected (2, 3.50, 6, and 7) resulting in a rejection rate of 19% and rejecting an average offer of 4.63 NZD. The distributions of all offers in both treatments are presented graphically in Figure 1.

Table 1. Summary Statistics

| | Same-Team Treatment | Different-Team Treatment |
|--------------------------------|---------------------|--------------------------|
| Number of subject pairs | 49 | 81 |
| Investment rate | 21/49 = 43.8% | 21/81 = 25.9% |
| Average offer | 10.38 | 8.74 |
| Median offer | 12 | 10 |
| Rejection rate | 2/21 = 9.5% | 4/21 = 19% |
| Average rejected offer | 6.50 | 4.63 |

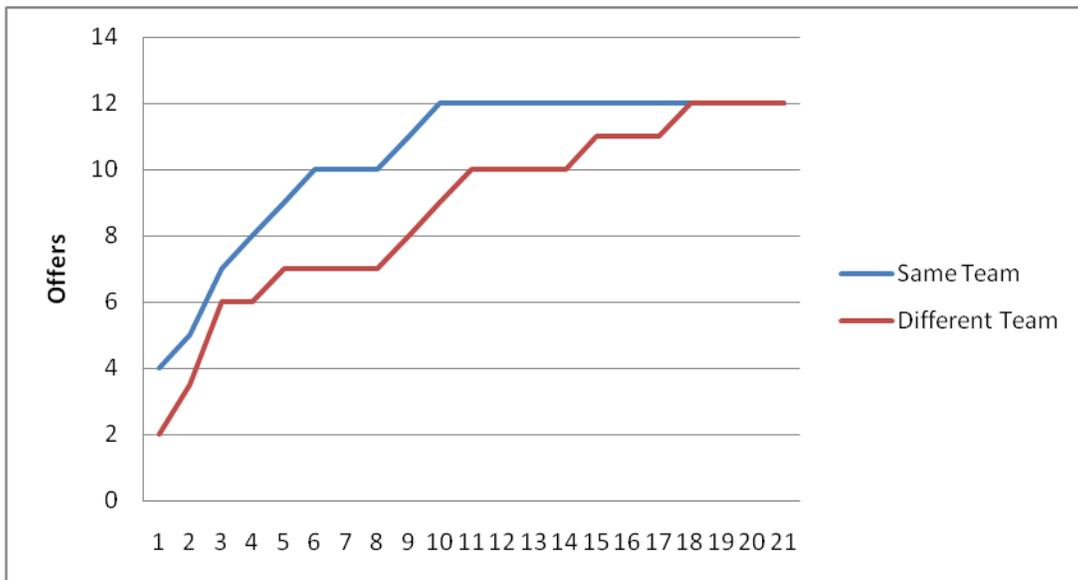
Hypothesis 1 states that the FM (seller) is more likely to invest in the presence of group identity. To test the hypothesis we compare FMs' investment rates in our two treatments. The one-sided Fisher's exact test reveals that the investment rate in the Same-Team treatment is significantly higher than in the Different-Team treatment ($p=0.036$), suggesting that group identity mitigates the inefficiency related to the relationship-specific nature of investment.

Hypothesis 2 is concerned with the channel through which group identity operates. It states that upon the FM's investment, the SM's (buyer's) offer is higher in the presence of group identity. The reason behind this increase is a higher level of SM's altruism induced by group identity. To test this

second hypothesis, we compare the offers made by SMs to their counterpart FMs in our two treatments. The one-sided Wilcoxon rank-sum test detects that the offers in the Same-Team treatment were significantly higher than in the Different-Team treatment ($p=0.012$). In the Same-Team treatment FMs who invested made an average profit of 0.38 NZD whereas in the Different-Team treatment they made an average loss of 1.26 NZD. This result justifies higher investment observed by FMs in the Same-Team treatment and provides further support for our conjecture that group identity mitigates hold-up by strengthening agents' other-regarding preferences.

Finally, we also test for a difference in rejection rates observed in the two treatments. One could imagine that the effect goes either way. On the one hand, if the FM invested and the SM from the same team responded with a low offer, the FM might reconsider his altruistic behavior and punish the SM by using harsher criteria for rejecting the offer than if the SM was from the other team. On the other hand, if the degree of altruism of the FM for his fellow teammate remained high, he might be more likely to accept the low offer from his teammate than from a person from the other team. While studying the reasons for different rejection rates might be an interesting examination of subjects' behavior, it is not our goal in this paper. Moreover, we have too few observations to draw any conclusions and thus we leave this question for further research.

Figure 1. Distributions of Offers



6. Concluding remarks

Group identity helps resolve or mitigate the hold-up problem by strengthening agents' altruistic preferences. We have presented experimental evidence that supports this conjecture, which in turn suggests that group identity should be an important consideration when one compares the costs and benefits of integration. In order to isolate effects of group identity, in this paper we have abstracted away from other important factors, such as property rights, that affect incentives for relation-specific investment. In our framework, integration can be beneficial when it creates and strengthens group identity, whereas we do not study the cost of integration. We also abstract from other psychological factors, caused for example, by a hostile takeover or conflict of corporate cultures which could affect the performance after integration and cause merger failure (Weber and Camerer, 2003).

The current paper does not discriminate between various theories and aspects of other-regarding behavior that could explain our result. In our setup, we can observe investment if the FM is unconditionally altruistic and cares about the final distributions of monetary payoffs (Fehr and Schmidt, 1999; Bolton and Ockenfels, 2000; Cox and Sadiraj, 2007), has preferences for social efficiency (Charness and Rabin, 2002), and/or trusts that the SM will split the created surplus in a "fair" way (Berg et al. 1995). The SM, on the other hand, shares the surplus if he is unconditionally and/or conditionally altruistic (i.e. reciprocal as in models of Dufwenberg and Kirchsteiger, 2004; Falk and Fischbacher, 2006; Cox, Friedman, and Gjerstad, 2007; and Cox, Friedman, and Sadiraj, 2008) or guilt-averse (Battigalli and Dufwenberg, 2007). Nevertheless, it is possible to design an experiment that would separate the effects of group identity on these various motivations (see Cox (2004)). We leave this exploration for future research.

We believe that an interesting extension of our work is a study of interaction between group identity and property rights that would shed some light on the costs and benefits of integration in the presence of group identity. Below we outline one simple way to incorporate the interaction based on the formulation devised by Baker, Gibbons, and Murphy (2002). Consider a model consisting of a seller, a buyer, and an asset. The seller may use the asset to produce a good. The buyer values the good, but the good also has an alternative use. Ownership of the asset conveys ownership of the good produced using the asset. That is, if the buyer owns the asset, then he could simply take the good, refusing to pay the seller anything, whereas if the seller owns the asset, then he could cosign the good to its alternative use. The asset is owned by the buyer when the two parties are integrated, while it is owned by the seller when they are not integrated.

In this set up, consider the interaction between the seller and the buyer similar to the one presented in Section 3. If the seller invests F , he produces a good that has value G ($> F$) for the buyer. Under integration, the good belongs to the buyer, who provides p to the seller. In contrast, under non-integration, the buyer makes a take-it-or-leave-it offer p to the seller. If the seller accepts p , then the buyer obtains the good, while if the seller rejects p , he sells the good to an alternative use at the price of A ($< G$). At the same time, assume that both the seller and the buyer have other-regarding preferences, which are stronger under integration.

The setup outlined above can potentially capture the costs and benefits of integration, which not only strengthens group identity between the two parties but also transfers the ownership of the asset (and the good produced upon investment) from the seller to the buyer. This trade-off can be incorporated in our experimental design by interpreting the Same-Team treatment as integration and the Different- Team treatment as non-integration, just as in the current paper.

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Appendix I. Subject Instructions and Decision Forms

[These instructions were handed out at the beginning of the experiment]

GENERAL INSTRUCTIONS

No Talking Allowed

Thank you for coming. The purpose of this session is to study how people make decisions in a particular situation. From now until the end of the session, unauthorized communication of any nature with other participants is prohibited. If you violate this rule we will have to exclude you from the experiment and from all payments. If you have a question after we finish reading the instructions, please raise your hand and the experimenter will approach you and answer your question in private.

Two Tasks

You will be asked to participate in two tasks during the experiment. The instructions for Task 2 will be given to you after finishing Task 1. Your earnings from both tasks will be paid to you in cash at the end of the experiment.

Two Teams

You have been divided randomly into two teams, called the Yellow Team and the Orange Team. People from both teams are wearing their respective team uniforms: The Yellow Team is wearing yellow t-shirts and the Orange Team is wearing orange t-shirts.

TASK 1 INSTRUCTIONS

Task 1 Earnings

Below you have received two trivia questions. For each correct answer, you will be rewarded with \$2. Meanwhile, you can use a computerized team chat program to get help from or offer help to other members on your own team. Except for the following restrictions, you can type whatever you want in the lower box of the chat program. Messages will be shared *only* among all the members from your own team. You will not be able to see the messages exchanged within the other team. People on the other team will not see the messages exchanged within your own team either. You will learn the correct answers and your earnings from Task 1 at the end of today's session.

Restrictions on Messages

1. Please do not identify yourself or send any information that could be used to identify you (e.g. age, race, professional background, etc.).
2. Please refrain from using obscene or offensive language.

How to Use the Chat Program

When asked by the experimenter, please enter the color of your team on the initial screen of the chat program. You will be given 5 minutes to communicate with your team members. Are there any questions?

TASK 1 DECISIONS

Please answer the following two trivia questions. For each correct answer, you will be rewarded with \$2. You can also use a team chat program to get help from or offer help to other members on your own team.

Trivia 1: *[text here]*

YOUR ANSWER:

Trivia 2: *[text here]*

YOUR ANSWER:

[These are Task 2 instructions that were handed out after completing Task 1.]

TASK 2 INSTRUCTIONS

Earnings

In Task 2, every participant will get \$10 as a show up fee. Your final experimental earnings will depend on your decisions and on the decisions of others.

Anonymity

Each person from the Yellow Team will be randomly paired with another person from the Yellow Team. Each person from the Orange Team will be randomly paired with another person from the Orange Team. No one will learn the identity of the person (s)he is paired with. Your role and your ID number will be written on the top of your decision sheet. The experimenters will keep track of your decisions and your paired person's decisions by your ID numbers. Because your decision is private, we ask that you do not tell anyone your decision or your earnings either during or after the experiment.

Pairing and Roles

Within each pair, one person is going to be randomly assigned to be the First Mover and the other person to be the Second Mover. The decisions are divided into three stages:

Stage 1: The First Mover's Investment Decision

The First Mover decides whether or not to invest his/her \$10 show up fee in order to create \$14 for the pair:

- If the First Mover invests his/her \$10 show up fee, then \$14 will be made available to split between the two paired persons. The split of \$14 will be determined by the Second Mover.
- If the First Mover does not invest, then no money is created and stages 2 and 3 are cancelled.

Stage 2: The Second Mover's Offer

If the First Mover invested in Stage 1, the Second Mover decides how much money out of \$14 to offer to the First Mover and how much of it to keep.

Stage 3: The First Mover's Acceptance/Rejection

The First Mover learns about the offer, and either accepts it or rejects it. If the First Mover accepts, both movers receive the respective amounts stated in the offer. If the First Mover rejects, the \$14 disappears and both the First Mover and the Second Mover get \$0. (The Second Mover still keeps his/her show up fee of \$10.)

Payment of Experimental Earnings

Once all participants have made their decisions, the experimenters will collect the decision forms and calculate the payoffs. Then you will be asked one by one to approach the experimenter in the hallway for the payment of your experimental earnings. Once paid, please leave using the stairs and do not gather in front of the elevator.

Are there any questions?

Practice Questions

Please answer the following questions:

1. If the First Mover invests and the Second Mover offers which is accepted by the First Mover, what are the First Mover's final earnings?
What are the Second Mover's final earnings?
2. If the First Mover invests and the Second Mover offers which is rejected by the First Mover, what are the First Mover's final earnings?
What are the Second Mover's final earnings?
3. If the First Mover does not invest what are the First Mover's final earnings?
What are the Second Mover's final earnings?

Stage 1: THE FIRST MOVER’S INVESTMENT DECISION

The First Mover makes his/her decision by circling (1) or (2):

(1) I choose not to invest my \$10 show up fee

OR

(2) I choose to invest my \$10 show up fee

Stage 2: THE SECOND MOVER’S OFFER

The paired First Mover chose to invest the \$10 show up fee. Therefore, \$14 is made available for the Second Mover to split between the two paired persons. The Second Mover makes his/her decision how much money out of \$14 to offer to the First Mover by completing both statements below:

I offer \$_____ to the paired First Mover.

Therefore, I will keep \$_____ for myself.

If no investment was made in Stage 1 the Second Mover writes “No investment” in the space below:

Stage 3: THE FIRST MOVER’S ACCEPTANCE/REJECTION

The First Mover makes his/her decision by circling (A) or (R):

(A) I accept the Second Mover’s offer.

OR

(R) I reject the Second Mover’s offer.

If no investment was made in Stage 1 the First Mover writes “No investment” in the space below:

Stage 1: THE FIRST MOVER'S INVESTMENT DECISION

The First Mover makes his/her decision by circling (1) or (2):

(1) I choose not to invest my \$10 show up fee

OR

(2) I choose to invest my \$10 show up fee

Stage 2: THE SECOND MOVER'S OFFER

The paired First Mover chose to invest the \$10 show up fee. Therefore, \$14 is made available for the Second Mover to split between the two paired persons. The Second Mover makes his/her decision how much money out of \$14 to offer to the First Mover by completing both statements below:

I offer \$_____ to the paired First Mover.

Therefore, I will keep \$_____ for myself.

If no investment was made in Stage 1 the Second Mover writes "No investment" in the space below:

Stage 3: THE FIRST MOVER'S ACCEPTANCE/REJECTION

The First Mover makes his/her decision by circling (A) or (R):

(A) I accept the Second Mover's offer.

OR

(R) I reject the Second Mover's offer.

If no investment was made in Stage 1 the First Mover writes "No investment" in the space below:

[The trivia questions for each session were selected without replacement from the following trivia bank.]

TRIVIA BANK

What is Oktoberfest intended to celebrate?

Hudson Bay is a large inland sea in which country?

What country was the 1986 Soccer World Cup held at?

What is the name of the three bones that make up a human finger?

Which art movement, founded in a Zurich café during World War I and consolidated at a meeting held

During the Cold War, what Eastern European alliance was the equivalent of NATO?

What does the "E" stand for in UNESCO?

In the southern hemisphere, the winds associated with a cyclone, a region of low pressure, blow in which direction?

In the northern hemisphere, the winds associated with a cyclone, a region of low pressure, blow in which direction?

What is the name of the index of average daily prices on the New York Stock Exchange?

What determines the sex of crocodile embryos?

What elemental event rejuvenates a prairie by causing more plants to grow taller, flower and produce seed?

Who was the first female to register 30 top ten hits?

What is Europe's most mountainous (in % of total area) country?

What's the second most populous continent?

What's the University of Paris more commonly called?

What European country uses its Latin name, Helvetia, on its stamps?

What city boasts the largest Greek population in the world outside of Greece?

What South American capital's name means "I saw the mountain"?

Croatia and Slovenia used to be part of which country?

Which country hosted the 1998 Winter Olympics?

What country is only bordered by Spain?

In which country was the Titanic launched?

The island of Rhodes belongs to which Mediterranean country?

Which country is also called the Hellenic Republic?

What weather phenomenon is measured by the Beaufort scale?