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When reciprocity becomes back-scratching: An economic inquiry

Cameron K Murray

M.Sci. (Business), B.Sci. (Property Economics)

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Abstract

This thesis reports four studies of a particular type of cooperation where the formation of coordinated groups through favour exchanges benefits the connected few at the expense of the many. This process is labelled *back-scratching*, and is a common feature of political decision-making where institutional powers allow for a large amount of discretion and the imposition of externalities in situations where property rights are not well-defined. Chapter 1 introduces the concept of back-scratching in as a coordination game with negative externalities, providing a common framework within which to incorporate the studies that follow.

The first study in Chapter 2 uses a natural experiment to quantify the gains from back-scratching in political decisions about value-enhancing land zoning. The effectiveness of a variety methods used to support implicit favouritism are examined, including political donations, employing professional lobbyists, and investing in relationships. Using micro-level relationship data from multiple sources, characteristics of landowners of comparable sites inside and outside rezoned areas are compared. ‘Connected’ landowners owned 75% of land inside rezoned areas, and only 12% outside, and captured \$410 million in value gains, indicating a trade in favours amongst connected insiders. Marginal gains to all landowners of connections in our sample were \$190 million. Engaging a professional lobbyist appears to be a substitute for having one’s own connections.

The second study in Chapter 3 offers a theoretical explanation for the unusual hedging and partisan patterns of political donations observed in Australia, Canada, UK and Germany based on a model of donations as reputation signals, and where reputation levels determine the political distribution of the economic surplus. Simulating optimal signal investments in a population of agents distributed within a reputation space results in a clustering of signalling strategies consistent with political donations data. The model shows how the entrenchment of interests can occur through exclusive access to a ‘social ladder’ for elites engaged signalling reputations, offering a potential underlying explanation of Mancur Olson’s (1982) *institutional sclerosis*.

To explore more closely potential institutional changes to curtail back-scratching a new experiment is introduced in Chapter 4 that allows for back-scratching between player pairs to arise within a group of four players. In each of the 25 rounds of the experiments, a player (the ‘allocator’) nominates one of three others as a co-worker (the ‘receiver’), which determines the group production that period to be the productivity of the receiver (which varies by round), but also gives the receiver a bonus and makes them the allocator in the next round. Alliances form if two individuals keep choosing each other even when their productivities are lower than that of others, causing efficiency losses; a situation that occurred in 84% of experiment groups. Males and business students were found to be more likely to form alliances. Random allocator rotation policies and low bonuses fail to significantly improve overall welfare: rotation policies significantly reduce the rate of formation of new alliances but do not lead to the breakdown of existing alliances, while low bonus policies are only found to be effective when alliances are well established. This points to the importance of the strength of existing alliances for the chances of institutional interventions curtailing back-scratching.

Institutional changes creating greater transparency are tested in the new experimental setup and reported in Chapter 5. The main treatment reveals photographs of each player in order to deter bilateral alliances and encourage cooperation with the group as a whole in the absence of punishment. Transparency does not affect the probability of alliance formation due to two countervailing forces; more rapid alliance formation due to the use social cues from the photos as a coordination device, and more pro-sociality at the group level that leads to shorter alliances. There are policy lessons about when transparency may curtail corruption, or facilitate it.

Declaration by author

This thesis is composed of my original work, and contains no material previously published or written by another person except where due reference has been made in the text. I have clearly stated the contribution by others to jointly-authored works that I have included in my thesis.

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Publications during candidature

None.

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None.

Contributions by others to the thesis

Melissa Vorster contributed to early drafts of the experimental design and in administering the experiments that comprise Chapter 5. Markus Schaffner was pivotal as a coach and research partner in the experiments in both Chapter 5 and 6, contributing coding expertise, iPad experimental kit, and funding to the experiments.

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Chapter 1

Back-scratching in groups and networks

Abstract

At the intersection of economics, political science, sociology, and evolutionary biology, is the study of groups and networks as meso-level elements of human cooperation. This thesis looks at a particular type of cooperation where the formation of coordinated groups is costly to those outside the group, or where relationships are used to support coordinated economic activities for the benefit of the connected few at the expense of the many. Such a process of implicitly exchanging costly favours is labelled *back-scratching*, and is a common feature of political decision-making and is an inherent feature of corruption. In this chapter I provide an introduction to the core economic elements involved in the study of the economics of back-scratching, including a classification of back-scratching types in terms of the relationship between internal group benefits and external costs, and also the use of reputation mechanisms to provide common knowledge about cooperative intentions that sustain group coordination. This provides a backdrop to later thesis chapters which address particular open questions, such as how big the losses from back-scratching might be, what patterns of political reputation signalling might be expected, and what sort of institutional designs might discourage back-scratching by encouraging cooperation at the broadest levels.

1.1 Introduction

In this thesis I look at a specific social process of favour exchange, or back-scratching, whereby discretionary favours are made to related others which come at a high cost to the non-favoured, generating losses in economic efficiency. It is a process that is both supported by, and a cause of, meso-level structures of groups and relationship networks. I bring an economic lens to the topic of back-scratching in a number of new ways: first by quantifying the payoff to relationship networks using a natural experiment where the social loss from political favouritism is clearly defined; second, by looking at how maximising behaviour through the use of signals to boost reputations can add to the explanation of the patterns of donations to political parties and the entrenchment of interest groups, and; third, by designing and implementing a new experiment

whereby costly back-scratching alliances are able to be formed within larger groups, and using that experiment to test which institutional designs can curtail back-scratching and promote the broader economically efficient and equitable outcome. This chapter provides the necessary framework of key ideas that underpin the analysis in later chapters.

A common view across the social sciences is that human societies as a whole, whether that whole be considered a country, State, or city, contain meso-level structures of either nested groups or relationship networks, or perhaps both (Coleman, 1990; Portes, 1998; Jackson *et al.*, 2012; Granovetter, 2005; Burt, 2000; Frijters & Foster, 2013; Jackson *et al.*, 2012). These structures allow for clustered cooperation within groups and between related individuals, while at the same time generating economic competition between groups and the unrelated.

Figure 1.1 shows a rudimentary conceptual diagram of these views of meso-level structures, and the potential complexity that arises due to the interactions of groups, or across complex relationship networks. The idea that society as a whole is comprised of loyal groups, which themselves might be nested within one or more larger ‘groups of groups’ is shown through the overlapping circles and the individuals marked by points within them. Here the individual labelled *A* is part of the same group as *B*, but not as *C*. Though at the broadest level they are all part of the same social group contained in the diagram.

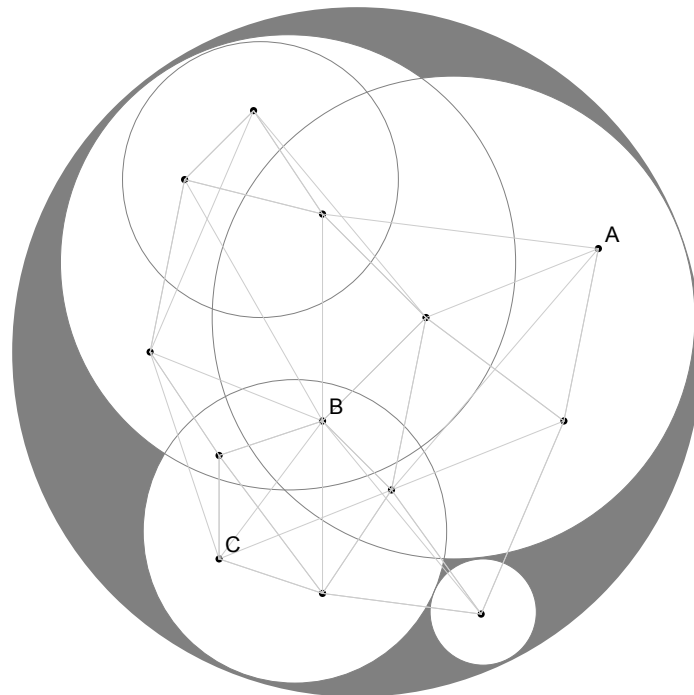


Figure 1.1: Conceptualisation of groups and networks as meso-level structures in the economy

Groups can represent any institutionalised loyalty, either families, companies, government departments, clubs, not-for-profit institutions and many more, as long as it captures the defining characteristic of loyalty to cooperate in the interests of joint outcomes above individual outcomes. In the language of utility, each member of a group internalises the payoffs to others in the groups in their own utility function, resulting in cooperate behaviours that maximise joint outcomes,

even if they conflict with pure selfish rationality.

Why should this behaviour come to predominate within groups? One answer is that acting out of pure loyalty towards groups norms is an evolutionarily successful default strategy under uncertainty. Rather than requiring the analysis of every possible consequential outcome from each decision in terms of individual self-interest, pro-social defaults towards own-groups side-step this impossible calculation yet result in dominant replication of members of cooperative groups above the members of other selfish groups. In the language of evolutionary biology this is simple multi-level selection between groups.¹

With this in mind, individual *A* in the Figure 1.1 example will have different expectations about the behaviour of *B* compared to that of *C* when facing a cooperative dilemma because they know that *B*'s behaviour will be directed towards maximising their joint payoff, while *C*'s behaviour will not. In a simple one shot prisoner's dilemma, for example, the loyalty to the group shared by *A* and *B* might enable them to mutually cooperate, while *A* and *C* would fear defection by the other and resolve to the instrumentally rational outcome.

The potential complexity of competing interests within the macroeconomy also arises when agents are members of more than one group, perhaps at different levels in the group hierarchy. Agent *B* in Figure 1.1 is required to juggle their common group interest with *A* as well as their group interests with *C*, even though *A* and *C* might often have conflicting interests.

The overlaid relationship network in Figure 1.1 shows how these same nested layers of group loyalties, and potential conflicting loyalties, can be characterised by a structure of relationships between individuals. Relationships represent unique individual-level knowledge about the loyalties between the connected individuals. In this view cliques and clusters of loyal relationships result in the emergence of what can be classified as groups. These two meso-level concepts can be seen as consistent ways of representing the same underlying concepts of cooperative and conflicting loyalties.

To be clear, meso-level structures of groups and networks co-evolve with the actions of individuals within them; no simple causal story adequately captures the complex system emerging from the circular flow of behaviour → loyalties → new behaviour. Where there is a possibility for sub-groups to form where the benefits of doing so improve mutual *and* individual interests of sub-group cooperators, and there is an environment in which individuals can identify who is likely to be trusted to cooperate at this sub-group level, then the formation of nested competing groups, and ultimately the splintering of larger groups into competing groups, can occur. A key example of this co-evolution of groups is from Zachary (1977), who analysed friendship networks in a university karate club in which there was disagreement in key pricing policies between the club president and the external instructor. Loyalties to the instructor or club president where in conflict with the higher level group loyalty to the club as a whole. By observing the degree of cooperation amongst club members outside of the club it could be predicted which members would follow the instructor, and which would follow the president, when the two parted ways. While loyalties are a characteristic of established groups, this study clearly documents how loyalties also contribute to the breakdown and reformation of group-level structures when conflicts arise at different levels in the social group hierarchy. Such patterns of group evolution have also been observed in legislator voting records of the U.S. House of Representatives, where loyalty to party lines has become more dominant over time under party-level selection pressures

¹A vast literature in evolutionary biology has covered the underlying debates surrounding multi-level selection which have in the past decades been brought into the realm of economics. Eldakar & Wilson (2011) provides a useful summary of group selection and the debates within evolutionary biology, while Bergstrom (2002) and Henrich (2004) provide clear explanations of how these ideas can be incorporated into economic analysis.

and hence decreasing congressional cooperation and increasing party-level conflict (Andris *et al.*, 2015).

Even though groups do evolve over time, in most societies major groups, such as firms, political parties, clubs and societies and so forth, are typically very stable over time even when there are opportunities for sub-groups to emerge that can increase their own relative payoffs. The main reason for this apparent stability is that groups develop institutions, or sets of rules and norms, that promote loyalty to cooperative behaviours, particularly when there is competitive pressure to coordinate against a group-level competitive threat. Such loyalty allows group members to trust other members to conform to cooperation in the interests of maximising group payoffs, and also to stymie behaviours like free-riding through costly punishment (van den Bergh & Gowdy, 2009; Frijters & Foster, 2013; Bowles & Gintis, 2011). Rules and norms within a group may themselves evolve over time as new ways to free-ride or to back-scratch emerge, yet as long as the group has an institutional structure for creating and enforcing new rules they may continue to protect themselves from back-scratching and free-riding from within, and reinforce the group as a coherent social structure.

Another avenue for ensuring compliance with group rules and norms is a process of indoctrination which can ensure the majority of group members internalise the idea that behaving in the interests of the group is in their own interests, even if it may not always be (Akerlof & Kranton, 2005). Internalisation allows for many members to invoke costly punishment or to report dissent, free-riding, corruption or back-scratching despite the fact that their own payoffs may be higher from joining the back-scratching alliance or sub-group. Such indoctrination of group identities occurs at many levels. The nation state ensures citizens identify by nationality through years of schooling, annual rituals and holidays, while many clubs and societies have ritual rites of passage. Military units often have mythically intense selection regimes involving both intense physical effort, and psychological challenges arising from elaborate punishments and humiliation which serve to highlight the futility of non-conformance. Indoctrination is one important, and often low cost, way that groups maintain stability and overcome threats from free-riding and back-scratching, particularly when there are few group-level competitive threats that would incentivise each individual to rationally choose cooperation at that group-level.

An economic understanding of these meso-level structures, and institutions that support them, is so far limited in comparison to other social sciences (Frijters & Foster, 2013; Bergstrom, 2002; Henrich, 2004). Perhaps this is because in a world of rational optimisers, market pricing and negotiation can appropriately organise all production rendering the existence of such structures superfluous. Indeed one of the great conundrums for economic theory is explaining the existence of the dominant meso-level organisation for production activities, otherwise known as a firm. A view first developed by Coase (1937) is that coordination through market prices has a cost, and that there may be more efficient ways to cooperate, based on loyalty, trust, and reciprocity, that emerges within firms as a result of selection mechanisms, which allow exclusion and inclusion into group rewards via a system of internal rules.

How these non-market group systems function, along with their associated costs and benefits both within and between groups, should be of considerable economic interest. While the potential applications of such meso-level analysis in economics are vast, this thesis looks specifically at the case of back-scratching, where loyal group (or sub-group) behaviours come with negative externalities to those outside the group, making them inefficient for society as a whole. Political rent-seeking, and corruption in particular, is likely to be prone to highly costly back-scratching due the power to set new rules outside of market forces that advantage one group over another. In economic analyses of political rent-seeking meso-level group structures that allow for political

favouritism are usually ignored, with favours instead conceptualised as a lottery in which political donations and lobbying activities are in effect the purchase of a lottery ticket (Lambsdorff, 2002a).

Armed with a framework of groups and networks, a better understanding of non-market coordination can help design institutional rules and guide market regulations to ensure hinder rent-seeking by ensuring that that intra-group cooperation and inter-group competition provide benefits that exceed their costs. This is the common thread that flows through the following Chapters, with each studying a specific element within this meso-level view of back-scratching. The remainder of this chapter provides a broad but brief background on the process of trusted favour exchange in groups and networks, narrowing down to the gaps in understanding of the potential economic costs of these processes. It concludes with a road map of how the remaining Chapters of the thesis contribute to filling some of these gaps in the particularly important context of political favouritism and corruption.

1.2 Knowing which groups and networks

Groups and relationships primarily function as a means of establishing the trust necessary for low-cost cooperation via reciprocation (Berg *et al.*, 1995; Buskens & Weesie, 2000; Mui, 2002; Jackson *et al.*, 2012; Gächter & Fehr, 1999; Fehr & Gächter, 2000; Fischbacher *et al.*, 2001; Fehr *et al.*, 2002; Efferson *et al.*, 2008; Fehr, 2009). Without offering a review of the debates around exactly what trust is or is not, the basic function of trust is to allow one individual to voluntarily make oneself vulnerable to incurring the costs or benefits arising from the discretionary choices of others (Fehr, 2009). In practice this occurs in settings where an individual, *A*, requires at one point in time to commit resources to another individual, *B*, who will then decide on the returns to *A* from their prior commitment, and where a potential conflict exists between their individual and joint interests. In experimental settings this dynamic occurs in many cooperative games, including the public goods and ultimatum games, and in all repeated cooperative games. In real life the cooperative settings requiring a degree of trust are even more pervasive, from dining at a restaurant (trusting that food will be delivered as promised, and trusting that customers will pay after eating), to financing a new business, to lending your car to a friend. Just about every cooperative arrangement requires a degree of trust that the others involved will act in your joint interests, in effect creating an ongoing gift exchange game.

How then do individuals identify who to trust, and who not to trust, in cooperative dilemmas? The best answer relies on the use of signals as a way to provide common knowledge to others about loyalties to competing reciprocal groups or relationships in cooperative settings involving many individuals. Signals contain predictive value about the expected reciprocal behaviour of others in a world where not everyone can observe the full history of past reciprocal behaviour amongst all others. They allow each person to classify others according to a level of expected reciprocity and sort their choices of cooperative partners based on those levels, which for the sake of simplicity are called reputation.² Typically it is understood that the costliness of signals is what makes them ‘hard to fake’, in that they are only affordable to those individual for

²Reputation levels come under a variety of names depending on the specific application, including tags (Masuda & Ohtsuki, 2007), reputation (Akerlof, 1980; Engelmann & Fischbacher, 2009; Ohtsuki & Iwasa, 2004; Bolton *et al.*, 2005), image-scoring (Nowak & Sigmund, 1998; Wedekind & Milinski, 2000; Milinski *et al.*, 2001; Bshary & Grutter, 2006), types (Ones & Putterman, 2007; Ambrus & Pathak, 2011), signals (Lotem *et al.*, 2003; Huttegger *et al.*, 2014), social capital (Fukuyama, 1999; Jackson *et al.*, 2012) or social approval (Gächter & Fehr, 1999). These same sorting effects from reputations also occur across species (Bshary & Grutter, 2006; Akçay *et al.*, 2010).

which the signal reflects true information. When it comes to reputation levels any signal can be considered costly if an individual's reputation level with one group creates material costs to signalling reputation with other groups. As a result populations will sort over time into loyal groups through selection of cooperative partners based on reputation signals (Wilson, 1974).

Reputation signalling as a way to evaluate the cooperative intentions of others, and hence choose cooperative partners, is a common theme across many social sciences. It is one potential mechanism leading to homophily in social networks, a property that well connected individuals share many common traits which they may use as signals (McPherson *et al.*, 2001; Masuda & Ohtsuki, 2007). An extreme example of this occurs in organised crime, where criminal gangs face the complex problem of trusting a partner in crime to be loyal to gang, but not loyal to the laws of society at large, reputation signalling can become an elaborate game itself, requiring hard-to-fake commitments such as facial tattoos which generate often insurmountable costs to leaving one group for another (Gambetta, 2009; Meier *et al.*, 2014). A similar dynamic is at play in the evolution of religious cooperation where rituals help identify cooperative groups on a large scale (Bulbulia & Sosis, 2011). In-group bias observed in social psychology is also consistent with the idea of identifying signals of group loyalty being a primary consideration in cooperative decisions, where in this case such identification leads to biases towards in-groups who exhibit common traits, than out-groups, regardless of the arbitrariness of these categorisations (Tajfel *et al.*, 1971; Hewstone *et al.*, 2002; Smith, 2011).

Reputation signalling is a consistent framework underpinning these findings, but it also allows for meso-level structures of groups and networks to coevolve over time as evolutionary selection processes favour particularly successful cooperative groups over others (Henrich, 2004; Efferson *et al.*, 2008). Indeed there is a strong evolutionary logic behind cooperation in groups, particularly the moral underpinnings of group selection. As Greene (2013) explains

Biologically speaking, humans were designed for cooperation, but only with some people. Our moral brains evolved for cooperation within groups, and perhaps only within the context of personal relationships. Our moral brains did not evolve for cooperation between groups (at least not all groups). How do we know this? Because universal cooperation is inconsistent with the principles of natural selection. I wish it were otherwise, but there's no escaping this conclusion

One important element within the signalling framework is the idea of an information threshold for cooperation, or a minimum reputation level above which cooperation occurs. Within a diverse population the general cooperative dilemma faced is whether individual i trusts individual j to cooperate where individual i is only able to gauge the probability of individual j 's reputation level based on observable signals. The probability of i making a cooperative choice is then $P(C|r_j)P(r_j)$, where the interpretation of signals generates expectations of reputation levels $P(r_j)$ which in turn determines the likelihood of cooperation. Individuals face such cooperative dilemmas both within and outside their own groups, and those with close or distant relationships. The resulting patterns of cooperative outcomes can be economically efficient when high reputation cooperation within groups is associated with positive externalities to those outside the group, or economically costly when the same cooperation is associated with negative externalities to outsiders.

This framework generalises a common view of trust as being either particularised or generalised.³

³Generalised trust is often taken to be an aggregate nation-level measure of trust, typically determined with the aid of survey questions such as In general, do you think that most people can be trusted, or cant you be too careful in dealing with people?. Yet the question is generally ambiguous in terms of the relevant reference group of trusted others (Bjørnskov, 2007). It is easy to imagine that respondents from small towns who have

Generalised trust is regarded as trust being extended to people where the parties have no direct information about each other, yet the basics of the signalling framework that underpin individualised trust based on direct relationships are still present. This is easy to see when living and travelling in foreign countries, where people often segregate into groups based on their country of origin, where their generalised trust is conditional on certain observable factors that indicate nationality. One could easily imagine a person with Thai parents, who grew up in Australia, being able to pass off as a native when in Thailand. This would provide them higher trust with Thai people, and lower trust with Australian tourists in Thailand. But by speaking English with an Australian accent, wearing typical Australian clothes for their age, and talking about their life in Australia, they could signal to others their membership of the "Australian group" and capitalise on the trust within that group.

Experimental evidence for this view of reputation-contingent cooperation comes from a number of sources. Wedekind & Milinski (2000) enacted a repeated donation game in which groups of eight players over six rounds could make a donation of 1 SFr to one other player which would increase the payoff of the receiver by 4 SFr, meaning the optimal group outcome arises from maximum donations by all players who earn their incomes from reciprocal donations in future rounds. The twist is that each player has an observable image-score, or reputation, that increases by one in a round where they donated, and decreases by one where they choose not to donate. The main outcome is that a player's image-score increased their chance of receiving a donation over the game as others began to use that score as a signal of expectations of future reciprocation. Higher average reputations increased group payoffs through increased trust which allowed for the exchange of favours. In later work Milinski *et al.* (2002) used a mixed public goods and donation game within groups to show how frequent interaction in donation games can foster a reputation for indirect reciprocity, which influenced cooperation in a later public goods game within the same group. In Pfeiffer *et al.* (2012), a repeated prisoner's dilemma game was implemented with an observable 'good' or 'bad' reputation score which is determined by a player's previous round cooperation. Adding just this score increased mutual cooperation from around 20% of rounds in the no-score baseline, to around 80% with scores. These experiments demonstrate that the degree to which individuals exhibit trust towards others is perhaps not an underlying individual preference, but rests more on the ability to signal trustworthiness in order to provide for mutually beneficial outcomes.

In these experimental studies it was clear to players in advance what meaning should be attributed to reputation levels, yet in reality a core puzzle is how a diverse range of potential signals can be interpreted as a reputation level in order to estimate $P(r_j)$ itself. Experimental evidence also suggests a wide array of otherwise arbitrary markers can become signals when they are routinely observed to be associated with certain behaviours. In an experiment by Efferson *et al.* (2008), players were given arbitrary symbolic markers, either ▲, or ●, which they kept for 80 rounds of an experiment where they were required to choose a partner from their group in order to play a coordination game either by i) a random other player, or ii) a random players with the same marker. Where players were able to choose a partner with the same marker they began to associate that marker with a particular coordination choice and greatly increased their joint payoffs. Over time the experience of a choice-marker association allowed the marker to develop into a reliable cooperative signal.

To summarise, trust is the missing economic ingredient for facilitating cooperation through the

regular face-to-face interactions with the majority of people in their town, which is the defining characteristic of particularised trust, answer positively to this question not because of trust towards unknown others, but because they most frequently encounter people with whom they have particularised trust.

exchange of favours through time. Without trust, strictly rational defection in pursuit of individual self interest would predominate in all cooperative dilemmas. Individuals communicate trust through reputation signals which acquire meaning through their observed ongoing association with particular cooperative choices, or identifiable groups who are observed to make such choices. A relationship network reflects a mapping of individual-specific reputations, which aggregate through others to create variation in observable reputations and hence patterns of cooperative action which rely on a specific meso-level network structure. Such a structure can also be represented by a nested pattern of group loyalties, where signals of group memberships perform the role of reputation signals. These patterns of coordination are a core interest of this thesis, particularly how it relates to aggregate patterns of signals in political environments, such as donations, and how these lead to entrenchment of overlapping groups. This is the focus of Chapter 3. Furthermore, the back-scratching situation where internal trust leads to inter-group conflicts and aggregate inefficiency is common in many institutional settings. In Chapters 4 and 5 new experiments are used to look at potential policy tools for improving cooperative outcomes in total where multiple conflicting sub-group outcomes are possible. The mechanisms of coordination are important in both of these settings, but so are the costs.

1.3 Costs and benefits of groups and networks

Cooperation over time on the jointly beneficial outcome within a group can be seen as a system of favour exchange via indirect reciprocity. Whether such exchanges are economically efficient in aggregate depends on whether they are associated with positive or negative externalities to those outside the group. Relationships often support efficient coordination with positive externalities, though more recently there has been a research focus on cooperation across relationship networks that is costly to others, often referred to as the ‘dark side’ of social networks, and obviously a key element in the study of criminal organisations (Boettke, 2008; Graeff, 2009; Gambetta, 2009). The same potential for positive or negative externalities from favouritism occurs in rent-seeking. If rent-seeking enables the use of trust and favour exchange to bypass cumbersome legal constraints it can lead to an efficient outcome, greasing the wheels of productive commerce. However most research finds that such political favours are purely a ‘grabbing hand’ method of gaining internal benefits at the expense of others (Cingano & Pinotti, 2013; Del Rosal, 2011), which in this thesis is called ‘back-scratching’.

Framing cooperative choices of groups in terms of the internal, external and aggregate economic costs and benefits can be done as follows. An individual, i faces the choice of whether to cooperate with individual j where that cooperation comes with an externality to individuals not chosen to participate in the cooperative game. Cooperation between i and j on mutual choices relying on a degree of trust, communicated through signals, creates a ‘group-like’ association between i and j , such that their payoffs can be jointly considered as internal to the group and compared to any externality imposed on others in order to judge the efficiency and distributive effects of that cooperation.

Table 1.1 shows the two archetypal back-scratching scenarios. Payoffs represent a change relative to an alternative cooperation option with no externalities. Two in-group players, i and j , are able to coordinate on either A or B where A has the lower joint payoff, though higher than the alternative, and B the highest, while mis-coordination decreases joint benefits below the alternative available cooperative outcome. If the group, i and j , are able to coordinate on A or B they are able to increase their own payoffs at a cost to others.

Table 1.1: Examples of Type 1 and 2 cooperation compared to reference

| Group | | j | | Ext. | | Total | |
|-------|---|-------|-------|------|----|-------|----|
| | | A | B | | | | |
| i | A | 1, 1 | -2, 1 | -1 | 0 | 1 | -1 |
| | B | 1, -2 | 2, 2 | 0 | -5 | -1 | -1 |

The cooperative choices shown in Table 1.1 represent two distinct classes of back-scratching. First is the *redistribution class* represented by cooperation on *A*. With an internal group payoff, g , and externality, e , this class occurs where $g > 0, e < 0, (g + e) > 0$. Total social payoffs are higher than the next alternative, though there is a degree of redistribution. Second is the *corruption class*, represented by cooperation on *B*, where $g > 0, e < 0, (g + e) < 0$. This type of cooperation is economically inefficient for society as a whole because the external costs outweigh the internal gains to the group. Such a situation was argued to be prevalent in economic and political matters by Olson (1982) who remarked that groups will impose external costs as they redistribute gains towards themselves that can “exceed the amount redistributed by a huge multiple.” In the absence of negative externalities, a cooperative outcome that increases within group payoffs *and* total payoffs could be classed as a ‘helping hand’ type of cooperation.

In light of the potential economic importance of back-scratching, researchers have adopted numerous approaches to quantifying the internal benefits and external costs in a variety of settings. Because counterfactual outcomes are rarely observable in reality, back-scratching classes of cooperation have also been extensively studied in experimental conditions. A selection of the more pertinent empirical and experimental studies from this vast literature are reviewed below with the intention of revealing some of the gaps in understanding of back-scratching processes.⁴

To identify winners and losers from back-scratching and quantify external costs in a corporate environment, Baker & Faulkner (2004) studies a white collar crime case involving 230 investors in the Fountain Oil & Gas Company which raised \$11.5million from its 230 investors in the two years prior to 1988. The company was subject to financial fraud by the owner Charles Fuentes and his brothers James and Kenneth who were also managers, and went bankrupt in March 1989 after drilling a number of dry wells. The researchers used a telephone survey of 31% (or 72) of the investors in 1998 to elicit information on relationship networks on investment decisions. While 67% of investors lost all their money, those who relied in interpersonal relationships to guide their decision to invest were far less likely to lose money. The protection from loss afforded to the well-connected investors arose from favourable *ex post* allocations of proceeds, despite investing in the same oil wells, “indicating illegal practice of preferential treatment of investors.” The gains to connected ‘in-group’ investors were a direct transfer from unconnected investors, indicating the presence of *corruption class* back-scratching.

In a similar vein Cingano & Pinotti (2013) evaluated the private returns and social costs of corporate political connections to Italian local governments over the 1985-97 period using a sample of longitudinal firm-level micro-data matched with the complete set of local politicians. This allowed for the estimation of productivity losses or gains arising from obtaining relationships to elected officials, thus quantifying whether back-scratching was occurring. The crux of their method is the estimation of two equations; one for the impact of political connections on firms

⁴The growing literature documenting reliable correlations between firm value gains and new political connections is also informative in terms of the cooperative benefits from relationships and common group memberships (Fisman, 2001; Faccio, 2006; Engelberg *et al.*, 2012; You & Du, 2012; Cingano & Pinotti, 2013; Hasan *et al.*, 2014; Amore & Bennedsen, 2013; Gray *et al.*, 2014)

revenues, which they find increases revenues by 3.2% per additional year of being connected to an elected official, and one for the impact of political connections on firm productivity, for which they find no significant effect. They conclude that the economic losses arise from distorting the allocation of public expenditure, though the scale of any losses will depend on the elasticity of substitution between public service inputs. There is hence clear evidence of *redistribution class* back-scratching, though not *corruption class* back-scratching, being sustained by these political relationships.

Two more studies are informative of the challenges facing identification of back-scratching classes due to the lack of a counterfactual. Faccio (2006) look at the probability of International Monetary Fund and World Bank bailouts to politically connected firms in 35 countries between 1997 and 2002, finding a 2.7% increase in the likelihood of a bailout from direct political connections.⁵ They note however, that “[t]racing through the ultimate beneficiaries of a bailout is difficult” and that lenders, borrower and politicians all appear to obtain some benefits. They find that the return on assets of bailed-out connected firms is significantly lower than for bailed-out non-connected firms two years after the bailout, suggesting a degree of inefficiency from the preference of bail-outs to connected firms. Engelberg *et al.* (2012) also evaluate the role of direct relationships in supporting back-scratching in the context of favourable lending conditions by banks to firms. Relationships between banks and firms come from overlapping periods at the same college or employer for firm executives and the bank managers who extended them commercial loans. They use US data on 20,000 commercial loans between 2000 and 2007, with 5,000 borrowers and 1,900 lenders along with 65,000 unique directors and executives, finding a strong correlation between the number relationships between the bank and borrower and lower interest rates. In terms of economic efficiency, their analysis of firm performance indicates that connected firms with favourable borrowing conditions perform better *ex post*. The authors conclude that there is hence little economic cost to favouritism due to this performance measure, though they do not fully consider the counterfactual world in which unconnected firms obtained lenient borrowing would therefore have had a greater chance of higher performance. These results are supported by those of Hasan *et al.* (2014) who find a positive correlation between recent political connections and access to bank financing in Poland. Together these studies are indicative of widespread *redistribution class* back-scratching, yet also highlight the identification problems of empirical verification of cost and benefits.⁶

Experimental approaches to back-scratching centre around the Repeated Bribery Game (RBG) first developed by Abbink *et al.* (2002), with a growing array of approaches are now taken to capture the economic elements of corruption under different institutional settings (see Abbink & Serra (2012) for an extensive review). The main differentiating feature of corruption experiments from other cooperative experiments is that increasing one’s own payoff requires cooperation of at least one other player, which increases those cooperative player’s payoffs while imposing costs on others. Shirking in a public goods game, for example, will increase payoffs for that player but requires no ‘partner in crime’ to do so, and hence does not capture the core element of corruption

⁵ “[A] company is defined as politically connected if at least one of its top officers (defined as the company’s chief executive officer, chairman of the board (COB), president, vice-president, or secretary of the board) or a large shareholder (defined as anyone controlling at least 10% of the company’s voting shares) was head of state (i.e., president, king, or prime minister), a government minister (as defined below), or a member of the national parliament, as of the beginning of 1997” (Faccio, 2006).

⁶ Other work quantifying the value of relationships within groups include You & Du (2012), which find a positive correlation between politically connected CEOs in China and their firm performance, and Amore & Bennedsen (2013), who find that even in the low-corrupt country such as Denmark family local council connections lead to higher firm values when those connections gain political power through the amalgamation of council areas. Both of these studies are also unable to provide a reliable quantification of the externalities.

as a group process.

The basic RBG stage game involves two players in the role of briber and public official, where the briber first makes a choice of how much to offer as a bribe (if any), after which the official makes the choice to accept the bribe (or not), and then makes an allocation decision from two alternative, one which favours the briber. A public official's allocation choice in favour of the briber triggers a negative externality determined by the experimenter, either by subtracting earnings from other subjects in the experimental session (Abbink *et al.*, 2002; Abbink, 2004), or by reducing the size of a charity donation by the experimenter (Lambsdorff & Frank, 2010; Schikora, 2011b; van Veldhuizen, 2011). In the original design of Abbink *et al.* (2002), where the externality is -3 experimental currency units on 16 other players in the experimental session. The joint payoff to the potential briber i and public official j is 72 (36 each) under the non-favoured choice with no externalities.

The change from this baseline with optimal bribing and reciprocation of favours between the briber-official pair is $g = 24$ and $e = -48$, providing a clear *corruption class* setup with a quantifiable counterfactual. Compared to the case where reciprocation is possible with no externalities ($g = 24$ and $e = 0$) there is no significant difference observed in bribery or cooperative favoritism. This result is supported in the later work of Büchner *et al.* (2008) and Cameron *et al.* (2009) who find that the size of the externality makes no difference to cooperation in the RBG and its variations, although Barr & Serra (2009) finds an effect in a one-shot version of the game. Cameron *et al.* (2009) found that even with the chance of punishment by a third player 78- 93% of players in the RBG will offer a bribe, with 77-93% of bribed officials reciprocating by making an allocation decision that favours the briber even with *corruption class* externalities.⁷

The basic RBG design has since been augmented to allow for whistle-blowing (Schikora, 2011a; Lambsdorff & Frank, 2010), an outside informed monitor (Schikora, 2011b), payoff variations that mimic high non-bribery wages (van Veldhuizen, 2011; Armantier & Boly, 2008), and 'citizen' and probabilistic punishment (Abbink *et al.*, 2002; Serra, 2012; Cameron *et al.*, 2009). Abbink (2004) cautions though that the fixed briber-official setup of the RBG, where the experimenter determines the only possible alliance pair, or in-group, does not fit situations where unobserved alliances already exist before policy interventions take place, nor where the composition of groups or alliances is completely indeterminate *ex ante* and where potential partners have to find each other rather than be paired by the experimenter.

A useful contrast to the RBG approach to back-scratching is in Smith *et al.* (2012) who use a loose experimental setup in which payers can devote their resources to the formation of groups, and to expend pooled group resources to capture the resources of other groups. This setup reflects *corruption class* back-scratching, where internal group benefits from capturing resources of others come with an external cost that exceeds the gains. In the treatment allowing the formation of groups, resources devoted to combative and defensive activities were lower (65%) than in the treatment where players could not pool resources (72%). While groups did form endogenously due to the cooperative advantages for members, stability of groups was not apparent and they often broke down through the formation of sub-groups. These results suggests that the stability of groups is an important element in the economics of back-scratching, and a potential focal point of policy interventions seeking to curtail it.

⁷Participants in India were on average 15 percentage points more likely to bribe than the participants in Australia, 9.9 percentage points more likely to bribe than participants in Indonesia, and 5.4 percentage points more likely than participants in Singapore.

1.4 Contributions

To improve understanding of back-scratching and the economic consequences of it, requires studying individual components in detail in particular circumstances. To that end, each chapter of this thesis studies a specific elements of this type of cooperation. Each of these chapters stands alone and they can be read in any order.

First is the quantification of the size of internal gains and external costs from *corruption class* back-scratching amongst political elites in routine policy decisions. Establishing that favours given to related insiders are in fact costly to society is a challenge of the empirical literature. In Chapter 2 I report an event study in Queensland, Australia, using value-enhancing land-rezoning as a political favour able to be given to selected landowners. Using relationship networks of landowners who were rezoned, compared to landowners of comparable sites immediate outside rezoned areas, I tease out the degree to which relationships determine rezoning and hence support a back-scratching type trade in favours amongst the well-connected. Moreover, using historical sales data of these inside and outside lots I estimate the size of the value gains from rezoning, which are transfers from the public at large who could have instead sold the additional rights to landowners. The peculiar shapes of the rezoned areas, which conflict with previous plans, indicate that these rezoning decisions not only involved a redistribution of value from the public at large to the connected landowners, but were also where inefficient compared to alternatives and hence a clean example of *corruption class* back-scratching. The size of the gains to connected insiders from rezoning are estimated at \$410million, suggesting that this type of political back-scratching can have high costs to outsiders even in relatively low corruption countries like Australia.

A second contribution is to frame political donations as public reputation signals, which is the focus of Chapter 3. Doing so provides a much better understanding the process of entrenchment of elite political groups, or *institutional sclerosis* in the vernacular of Olson (1982), whereby special interest groups incur great economic cost on the community as they reallocate wealth towards themselves. By incorporating the element of signalling as a group formation process, the model introduced in Chapter 3 also provides a useful interpretation for the hedging donation strategies commonly used in Australia, Canada and Germany, whereby political donors give money to two or more political parties, often in equal proportion. In the language of groups and networks these donors have reputations above a threshold value amongst multiple political parties, and like agent *B* in Figure 1.1, are able to cooperate within two or more identifiable groups. The predictions of the model are also tested by looking at corporate directorship roles as an alternative reputation signalling mechanism, with hedging donors also showing clustering in the corporate cross-directorship network in Australia.

Third, and perhaps the obvious next step, is to investigate the type of institutional designs that could discourage back-scratching by interfering with the ability to sustain implicit favour exchanges that are costly to outsiders. Chapters 4 and 5 report two experimental approaches to this problem, utilising a new experimental design that requires the selection of cooperative partners from a larger group and hence relies on some kind of signalling to sustain the group loyalty necessary for *corruption class* back-scratching. Chapter 4 reports the results on implementing a rotation system and a low rent policy in this new setup. The rotation system, much like common staff rotation procedures in sensitive matters such as auditing and customs, is designed to inhibit the ability to create loyalty with new partners through repeated favour exchange. The low rent policy decreases the value of discretion decisions, effectively reducing g below zero in a *corruption class* cooperative outcome, and reflects the implementation of bureaucratic rule-based institutions. As an example of this low rent idea, the rezoning event studied in Chapter 2 is one

where high value rezoning decisions are given to landowners at no cost. A policy that required additional development rights to be sold would decrease the value of the discretion about which areas to rezone, and hence reflect a low rent policy.

Chapter 5 uses the new experimental design to test the efficacy of transparency policies in curtailing *corruption class* back-scratching by interfering with group reputation signalling. In terms of the signalling framework presented earlier, enabling outsiders to see who is favouring who and the costs to them from it, may discourage the in-group from maintaining the alliance as it may cost them reputations at a higher level group in which they are nested. Two transparency methods are used. First players are merely notified of the group-optimal outcome after a decision to ensure that outsiders have full knowledge of the occurrence and cost of back-scratching. Second, player photographs are used to identify each player. The first information treatment does not break down back-scratching alliances. The second identification treatment using photos does not change the probability of alliance formation due to two countervailing forces; more rapid alliance formation due to the use of signals, or social cues, from the photos as a coordination device, and more prosocial forces at the group level that lead to shorter alliances. For policy makers there are lessons about when and where transparency may curtail corruption, and where it may in fact facilitate it.

Chapter 2

Clean money, dirty system: Relationship networks and land rezoning

Abstract

We use a unique regulatory event that occurred in Queensland, Australia, from 2007-2012, to examine the predictive power of landowner relationship networks and lobbying behaviour on successfully gaining value-enhancing rezoning. A State authority, the Urban Land Development Authority (ULDA), took planning control away from local councils in selected areas in order to increase the speed and scale of development in those areas, in the process increasing land values. Using micro-level relationship data from multiple sources, we compare the relationship-network characteristics of landowners of comparable sites inside and outside the ULDA areas, finding that ‘connected’ landowners owned 75% of land inside the rezoned areas, and only 12% outside, capturing \$410 million in land value gains out of the total \$710 million from rezoning. The marginal gains to all landowners of becoming connected in our sample were \$190 million. We also find that engaging a professional lobbyist is a substitute for having one’s own connections. Scaling up from our sample of six rezoned areas to the hundreds of rezoning decisions across Queensland and Australia in the last few decades, suggests that many billions of dollars of economic rent are being regularly transferred from the general population to connected land owners through political rezoning decisions.

2.1 Introduction

Land rezoning involves two distinct decisions, one is to rezone more land to be higher-density and the second is the precise area where new planning rules apply. Political pressure to expand higher value zoning areas is usually argued to come from owners of undeveloped land who directly benefit, in concert with a wide range of secondary beneficiaries who live in the wider region, such as banks and construction companies, in a type of ‘growth coalition’ (Molotch, 1976; Terhorst & Van De Ven, 1995; Strom, 1996; Grabowski, 2013). The secondary decision, where exactly to rezone, involves the allocation of property rights from the community to the owners of the land

within the rezoning boundary at the moment of rezoning. In the absence of mechanisms such as land value taxes or betterment taxes that recoup the value of the resulting price-differential, there is scope for bargaining between politicians and land owners of different areas, including the potential for corruption and bribery during the final determination of rezoning boundaries.

We study this secondary decision in Queensland, Australia, where we look at the influence of political connections on rezoning, documenting the relations that predict political favours and calculating the value of those favours. We look at six rezoning area decisions taken long after an announced intention to rezone, comparing the political connections of landowners on the inside with those just on the outside, where the inside areas differed greatly from areas that were flagged previously as subject to imminent rezoning, which is exactly what you would expect if political insiders were maximising their rents by rezoning in unexpected places.¹

Our method is to combine longitudinal data on land plot owners and sale prices with data on the connections between landowners and a large set of entities involved in rezoning.

One might think political influence goes via donations to political parties. Surprisingly, in our data the observed donations from landowners do not predict rezoning decisions, perchance because in Australia the role of campaign funds that pay for media exposure is very limited. To document how political influence is then attained, we combine a myriad of related data into a single network so as to find out whether positions in whole networks help explain political favours.

Our relationship network comprises corporate ownership and directorship connections of landowners and their companies; connections from employing professional lobbyists; property industry group membership; and many other connection types. We uncover marked differences in the network characteristics of the successful landowners and the unsuccessful ones, in accord with the idea that advantageous positions in relationship networks help to make implicit deals that take advantage of a missing formal market in political favours (Sobel, 2002; Jackson *et al.*, 2012; Coleman, 1990; Burt, 2000; Granovetter, 2005). This adds to the literature on urban development and zoning decisions, where very little is currently known about the role of such relationship networks in rezoning decisions, though the role of relationships has been widely argued to be important (Simon & Henneberry, 2000; Calabrese *et al.*, 2007; Solé-Ollé & Viladecans-Marsal, 2012; Dehring *et al.*, 2008; Hilber & Robert-Nicoud, 2013; Engle *et al.*, 1992; Solé-Ollé & Viladecans-Marsal, 2013).

Our findings are remarkably similar to those in a recent working paper by Mastrobuoni (2015). They looked at the relationship networks of US mafiosi from the 1950s and 1960s and found that those who were in close-knit cliques, as measured by network closeness centrality, had higher wealth in terms of the value of their property holdings. We find the same: the landowners who were part of close-knit cliques and hence had high closeness centrality were much more like to be favourably rezoned, even conditional on the contribution of more simple indicators of political connections such as donations and the use of professional lobbyists.

Using historical sale price data, we calculate the implicit transfer from the community to these favoured connected property developers to be 58% of the \$710 million of improved land value of the rezoning, which they received by owning 75% of the rezoned areas, implying that very little

¹Our paper mainly relates to the urban planning literature on political determinants of planning decisions, particularly event studies of political favouritism (Lubell *et al.*, 2005; De Figueiredo & Richter, 2013; Calabrese *et al.*, 2007; Solé-Ollé & Viladecans-Marsal, 2012; Dehring *et al.*, 2008; Hilber & Robert-Nicoud, 2013; Engle *et al.*, 1992; Solé-Ollé & Viladecans-Marsal, 2013; Schone *et al.*, 2013; Amore & Bannedsen, 2013; Ahlfeldt & Maennig, 2015).

of the price benefit of rezoning goes to the general public. At the margin, the value gains to all property holders from becoming connected were \$190 million. When scaled up from our sample to the national level, these results suggest that each year many billions of value gains are being redirected toward well connected land owners at the expense of the unconnected, which includes the general public that has the *ex ante* property rights over the rezoning decisions.

Whilst we do not directly observe the *quid pro quo* aspect within these relationship networks (apart from the publicly available political party contributions, which are relatively small), there have been many criminal cases and scandals that are informative about that *quid pro quo*. Several high-profile cases document how the property developers are often direct family members of the politicians involved² or how the politicians, either before they run for office or once out of office, join property developers as directors or co-owners (Dodson *et al.* , 2006).

The picture that emerges from our analyses is that property development and rezoning is one of the biggest rent-seeking activities for local and State politics in Queensland, with a small set of connected property developers getting the lion's share of the new property rights from rezoning, in a process involving politicians from both the major political parties over long periods of time. This favours a view of political rent-seeking as a process of entrenchment of insiders who are well-informed and well-connected to the bureaucratic procedures and work the system to their mutual advantage at the expense of outsiders. For instance, simply being connected to the main component of the relationship network in our sample increases the probability of being favourably rezoned by 19 percent, while a move from the minimal to maximal level of centrality in that network provides an additional 25 percent increase in rezoning probability. Employing a professional lobbyist increases this probability by 37 percent.

The paper proceeds as follows. Section 2 provides a brief summary of the related literature, followed by the institutional background to our event study in Section 3. Section 4 outlines our data and methods of analysis, with the results presented in Section 5. Section 6 discusses the result and potential policy options for pricing the political favors done in rezoning.

2.2 Related Literature

Our paper mainly contributes to the literature on social and political determinants of urban planning decisions and the use of event studies, or quasi-natural experiments, to tease out potential causal relationships in terms of political favouritism at sub-national levels of government (Lubell *et al.* , 2005; De Figueiredo & Richter, 2013; Calabrese *et al.* , 2007; Solé-Ollé & Viladecans-Marsal, 2012; Dehring *et al.* , 2008; Hilber & Robert-Nicoud, 2013; Engle *et al.* , 1992; Solé-Ollé & Viladecans-Marsal, 2013; Schone *et al.* , 2013). Additionally, the paper is a demonstration of how relationship networks, in addition to direct political connections, can enable valuable favour exchanges in local and State level politics in a relatively low corruption country. We briefly review the papers closest to ours.

Solé-Ollé & Viladecans-Marsal (2012) look at political determinants of the ratio of new land assigned for urban development within Spanish municipalities, using a data sample of 2,034 municipalities over the period 2003-07, which covers a single municipal political term. They ascertain that electoral margins are significantly related to the decision of how much land is rezoned for development, with tighter margins resulting in less rezoning. In later work, Solé-Ollé

²For example former Brisbane Mayor and Queensland Premier Campbell Newman's close school friends and father-in-law are property developers (Callinan, 2012).

& Viladecans-Marsal (2013) use this data to look at the influence of political parties on urban zoning using a regression discontinuity design that looks at party incumbency while controlling for the vote share, finding that left-wing governments rezoned 65% less than similar right-wing governments in their preferred model specification. These two studies primarily concern the decision to rezone in the first place. Where we differ from these studies is that our primary interest is the secondary decision of the precise locations of newly rezoned areas, which is where the winners and losers are ultimately determined and where relationships and organised interests perhaps play a greater role. We hypothesise that for the ‘growth coalition’ it is not so important where the precise boundaries are, but such knowledge is crucial for the individual property developer who has taken up an asset position prior to rezoning.

In a study of the role of these competing interests in urban planning decisions, Schone *et al.* (2013) look at the *taxe locale d’équipement* (TLE), a local development tax similar to North American impact fees in the 293 municipalities in the French Rhône Department. TLE is paid to the municipality by developers when they are granted a building permit and is levied at a politically determined rate of the estimated building value (which can be up to 5%). By examining variables capturing lobbies of aligned interests³ and controlling for interactions with neighbouring municipalities, they find that a larger homeowner lobby is related to a higher TLE rate, while a larger undeveloped landowner lobby is related to lower TLE rate, indicating that urban planning policies can be swayed by their direct beneficiaries. They found no effect on TLE rates from the size of the construction sector, indicating that the ‘growth machine’ alliance differs due to local circumstances: a lower TLE rate is beneficial only for owners of undeveloped land and may not affect the rate of new construction. Like our study, Schone *et al.* (2013) clearly identify the winners and losers of an urban planning decision, and look closely at the relative dominance of vested interests in planning outcomes. Where we add to these results is that we more directly measure both ownership of actual properties and the network characteristics of owners.

In terms of quantifying the payoffs from direct political connections to local government, Amore & Bennedsen (2013) use an event study of changes to municipal boundaries in relatively uncorrupt Denmark where the number of politicians-per-person exogenously decreased in some municipalities but not others, which the authors interpreted as an increase of the political power of the population in municipalities. They test whether this increase in political power had an effect on the profitability of firms with family ties⁴ to those politicians, finding an increase in operating return on assets for family-connected firms of 3.3%, reflecting an elasticity of firm performance to political power of family members approximating unity. This strong effect of family ties in a low-corruption country suggests that local level corruption in property zoning allocations is easier to sustain and harder to eradicate than corruption at the more visible national level. Our study too deals with relationships at a sub-national governments level, though we more directly observe the full set of winners and losers, as well as non-family relationships with others in the property market networks.

This clear evidence of payoffs from direct reciprocity between family members is broadly in line with many other findings of the payoffs to direct political relationships in other countries such as Italy (Cingano & Pinotti, 2013), China (You & Du, 2012) and Indonesia (Fisman, 2001), amongst

³Their variables are somewhat indirect since some the key variables are unobserved: they hence proxy ownership of existing developed land in a municipality by the home ownership rate; ownership of undeveloped land is proxied by the proportion of farmers in the population; and the ‘growth machine’ lobby is proxied by the share of employees in the construction sector.

⁴Parent, child, sibling and current or former spouse(s).

others⁵ (Hillman, 2005; Faccio, 2006; Faccio *et al.*, 2006; Chen *et al.*, 2011). A dominant focus of this literature is on stock market effects to changing connections, such as in Hillman (2005) and Fisman *et al.* (2012), while effects on direct policy variables are rarely observable. We therefore add to new elements to this literature by documenting the policy effect of indirect connections on policy outcomes that favour the connected.

At a more general level, these studies fit into a growing literature demonstrating the role of relationship networks in sustaining implicit favourable exchanges at the political level (Fischer, 2013; Dassen, 2010; Howlett, 2002; Jackson *et al.*, 2012). Typically an advantageous position in a relationship network is described by the term ‘social capital’. Yet, exactly which characteristics of the relationship network provide value remains contested (Burt, 2000; Durlauf, 2002; Svendsen & Svendsen, 2009; Chai & Rhee, 2010). Coleman’s (1990) view is that value arises from closure within a network, that is, the local density of relationships provide the mechanism for small groups to monitor and pressure each other to behave in a particular cooperative way. In contrast, Burt (1995) suggests that brokerage across structural holes, connecting otherwise disconnected parts of the network, provides a positional monopoly that has value for an individual as they are the sole broker across different parts of the network.⁶ By looking at multiple relationship network metrics we are able to provide some evidence on which underlying network characteristic appears dominant in terms of payoffs from rezoning decisions in Queensland: having close ties in a sub-group (‘closeness’) or being the common element across many sub-groups (‘betweenness’). These indirect network characteristics are particularly important because direct relationships between land owners and politicians arouse suspicion, and have the potential to lead to corruption complaints and prosecution (CMC, 2009).⁷

In sum, the main contribution of this paper is to look at the micro-mechanism of influence by vested interests in rezoning decisions, thus complementing previous work showing that indeed urban planning outcomes at municipal levels reflect local interests. As the mechanisms for influence we examine relates to the position of land owners in a relationship network, our study also provides evidence to discern between two major competing theories of network influence.

2.3 Institutions

2.3.1 Timeline and planning processes

In Queensland, property owners and property developers who want to change the use of their land have to go through an approval process with their local council. Approvals can be sought for increasing the building-density (floor area ratio), and/or building-type, to the maximum allowed for the zoning type the land falls within. Both the decision to approve land use changes within a zone, and the decision of what the zone and its associate development limits will be in an area, is mainly a matter for local councils, of which there are 77 in Queensland. Our focus is on the period 2004-12 in which the State took both these planning responsibilities away from local councils in a number of areas.

⁵Though in contrast, Gray *et al.* (2014) found that in Australia during the 2004-2011 period the appointment of a politically connected directors had no substantial direct impact on shareholder value for listed companies.

⁶This is a reformulated and extended view of the ‘strength of weak ties’ argument (Granovetter, 1985, 2005).

⁷Many direct relationships that exist in reality are likely to be concealed from the public records used to assemble our dataset. This is likely to bias results against an importance of centrality, since the single valuable bridging relationship, such as a family member with connections to both politicians and property owners, is the very type of relationship likely to be concealed from public records.

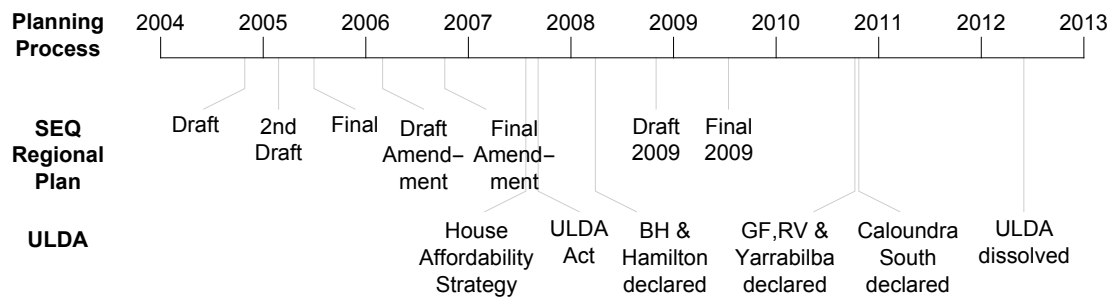


Figure 2.1: Timeline of Queensland's parallel planning processes

Following the early 2000s house price boom, the Queensland government implemented two parallel planning processes: first, in 2004, it published an overall plan establishing an intention to rezone, as well as an initial map of the relevant potential rezoning areas; second, it took planning powers away from local councils in designated areas by way of the Urban Land Development Authority (ULDA), set up in 2007 and in operation until 2012, during which the ULDA decided on 17 new rezoning areas. A decision by the ULDA on a rezoned area thus reset the area's zoning-type and simultaneously designated the rezoned areas as falling under the approval process of the ULDA, not the councils. A timeline of these two distinct and conflicting planning processes, including the various drafts and amendments, is provided in Figure 2.1.

The first of these planning processes was the South East Queensland (SEQ) Regional Plan 2005-2026, the purpose of which was to

...guide growth and development in SEQ to 2026. It also identifies areas that, subject to further investigation, may be suitable for medium to longer-term development. The extent to which this urban pattern is achieved will depend upon a number of factors, including future growth rates, community attitudes and behaviours, government regulation, the ability to provide infrastructure efficiently and technology (Mackenroth, 2004).

This State-level plan occupied the top of the planning hierarchy, meaning that local councils were to ensure their planning schemes were consistent with this overarching plan. Thus through this process the State indirectly controlled planning outcomes, but local councils still determined their own zoning areas and approved new developments. The plan itself evolved through time, with multiple drafts and amendments reflecting results of various consultation efforts, and an updated plan was finalised in 2009.

Alongside this supposedly technical planning process, the State government announced on 25 July 2007 a Housing Affordability Strategy which flagged the creation of a statutory body, the ULDA, via the *Urban Land Development Authority Act 2007*, which was passed just 6 weeks later on 6 September 2007. The stated intention was:

For sites nominated by the Queensland government, the role of the Authority will be to undertake land use planning, land amalgamation and acquisition, land improvement, development assessment and then on-sell land and development rights to private sector developers (DIP, 2007).

Nine areas were flagged for inclusion: Woolloongabba, Bowen Hills, Northshore Hamilton, Fitzgibbon, Mackay showgrounds, Yarrabilba, Caloundra South, Coomera, and Ripley Valley.

Of these areas, Woolloongabba, Fitzgibbon and Mackay showgrounds were fully State-owned or controlled sites, and Coomera never came under ULDA control. Of the 5 areas later declared under the control of the ULDA four of these, with the exception of Greater Flagstone, were also State-controlled sites. In the remaining areas, most land was privately owned, meaning that all benefits from the increased development densities that accompanied ULDA declaration would accrue to private land owners.⁸ It is thus these six areas that we focus on, since the determination of these exact rezoning areas may reveal the political influence of land owners in and around these areas. The exact rezoned areas were declared between 2008 and 2010: Bowen Hills (BH) and Hamilton Northshore (HN) - 28 March 2008, Greater Flagstone (GF), Ripley Valley (RV) and Yarrabilba - 8 October 2010, and Caloundra South - 22 October 2010. By law the ULDA was to take advice from the relevant Minister when considering the declaration of areas to fall within its planning power, providing an avenue for political influence.

Figure 2A.1 in the Appendix shows the evolution of the intended rezoning areas as identified in the SEQRP process, as well as the final ULDA areas. What is striking is how different the actual decisions are from the previously stated intentions: in all cases, the final decision is in another place and comprises a much smaller area than in the original SEQ Regional Plan, or even of the updated SEQ Regional Plans. For instance, for Greater Flagstone and Yarrabilba, the final rezoning in 2010 is in a completely different place to the intended rezoning area of 2009. For the Ripley valley and Caloundra South, the eventual zone is a small subset of the intended zone announced as late as 2009.

Since the councils were supposed to be preparing for the future based on the SEQRP plans, we consider the local Council planning process underway for each eventual ULDA area in turn, providing *prima facie* evidence of whether the councils were responsible for the eventual rezoned areas or whether other interests drove it.

First, the Ripley Valley area falls within the borders of the Ipswich City Council, which flagged this area for future development in their Ipswich Consolidated Planning Scheme, implemented in December 2005, which fed into the draft of the first SEQ Regional Plan. The eventual outcome was a subset of the area that the council had in mind, and had little to do with the area that the SEQRP had designated as an area worth investigating.

The Caloundra South area fell within the borders of the Caloundra Council prior to its amalgamation into the Sunshine Coast Regional Council in 2008. The eventual ULDA area at Caloundra South was first promoted as a location for urban development in 1988 by the Emanuel Group corporation, but even up till 2004, the Caloundra City Plan designated the area no more than a 'Further Investigation Area' with no firm plans for rezoning, essentially because of environmental protection concerns (the area was covered by flooding and wetlands protection legislation). Yet, in 2004, Stockland, a stock-exchange listed Queensland developer, acquired Lensworth Ltd, a Fosters Group company that had owned the site since 1998. In that same year, the site suddenly became a feature of State-level planning documents, including the first Draft SEQRP. When the site was declared by the ULDA, the local media reported that then State Premier Anna Bligh acknowledged she had received representations from the developer prior to taking the step of declaring the area under the control of the ULDA.

Yarrabilba and Greater Flagstone fell within the jurisdiction of Logan City Council. Prior to the ULDA declaration in October 2010, Logan City Council had adopted its own Yarrabilba Land

⁸While the ULDA did implement a variety of infrastructure charges, including a 'value uplift charge' that was an additional fee per lot designed to capture some of the value gains from the ULDA declaration, the net effect of the declaration was a windfall gain to landowners.

Use Structure Plan (LUSP) in March 2010 that complied with the SEQ Regional Plan and that in large part was consistent with its own 2004 plan. Yet, the eventual ULDA decision bore no resemblance to either the 2004 plan, or the March 2010 plan.

Importantly, at the time of the ULDA declaration, Yarrabilba contained a large tract of land held under option since 2003 by the Lend Lease company, which had already lodged a development application to override the Council planning scheme (zoning). A screenshot of internal Lend Lease documents in Figure 2A.2 of the Appendix details the long and complicated process that Lend Lease had gone through, unsuccessfully, to get approval from the Logan council. Where the company failed with the council, it succeeded with the ULDA, to the apparent surprise of the council.

The case of Yarrabilba shows a direct and successful attempt of a property developer getting the State to do its bidding, in the form of a ‘grabbing hand’ series of planning decisions by the State. Even as of 2015, there is likely to be continued influence by Lend Lease on the planning process, as their internal reports suggest a strategic goal to develop the whole area for urban development, even though most of the site remains outside of the urban footprint designated in the current SEQ Regional Plan.

The Greater Flagstone ULDA area included a relatively small area determined as suitable for urban development by the Logan City Council in 2009 following a ‘structure planning process’, and reflecting the March 2006 SEQ Regional Plan Amendment. The eventual ULDA area only contained previously announced areas in about 20% of the ULDA area, with 80% being outside of announced prior plans. Importantly, one large corporation owned the 20%: the MTAA Superannuation fund, which purchased 1,244Ha of land in March 2000, the majority of which falls within the ULDA boundary. That corporation had in fact already started construction prior to the ULDA announcement and was a recognised lobbyist and donor.

The timelines, land purchases, and evidence of direct lobbying, show the political importance of a few major and visible developers at the State level for three of the six ULDA areas. Whether this pattern systematically holds for less influential land owners and developers is crucial to understanding the complete picture of political influence in rezoning.

2.3.2 History of corruption in Queensland

The Queensland State government has a well-documented history of corruption, particularly in regards to property markets (Jackson & Smith, 1995; Williams, 1999; Dodson *et al.*, 2006).⁹ The biggest effort to make Queensland politics more accountable followed a high-profile inquiry led by former judge Tony Fitzgerald, whose 1989 report prompted the establishment of anti-corruption institutions and led to the imprisonment of several politicians.

However, Tony Fitzgerald had this to say twenty years later in 2009 about the state of corruption in Queensland: “Access to government can now be purchased, patronage is dispensed, mates and supporters are appointed and retired politicians exploit their political connections to obtain success fees for deals between business and government” (McCutcheon, 2009). Similarly, Dodson *et al.* (2006) provides a coherent summary of the extensive criminal investigations into misconduct surrounding building and planning permissions in Australia, and a selection of cases where criminal misconduct was found to occur. They note that

⁹One potential reason for this is the lack of democratic control: Queensland only has one house of parliament, with the ruling party being in near total control of the state. Queensland has also seen long periods of one-party rule: 32 years by the Nationals from 1957 to 1989, and then 22 years by the Labour government till 2012.

[t]here is barely a week that passes without a media report somewhere in Australia alluding to an improper governance or procedural action in the land development. Queensland is particularly renowned as a place where corrupt land development practices were allegedly allowed to flourish for decades... (Dodson *et al.* , 2006).

The incidents referred to include corruption from local councils, who typically control the majority of planning decisions. A recent example is given by Campbell Newman who failed to declare his wife Lisa Newman's stake in a property that won high rise development approval from local Brisbane City Council at the time that he was Lord Mayor of Brisbane, providing his wife windfall gains of millions of dollars (Wardill & Helbig, 2011). In Queensland such connections are not strictly illegal, and there were no adverse consequences to Newman from this incident.

Similarly, the former Minister for Planning and Infrastructure, Terry Mackenroth, was investigated by the Crime and Misconduct Commission (CMC) following allegations he had "improperly influenced a review process by which certain land came to be included in the urban footprint contained in the 2009 SEQ plan" (CMC, 2009). Upon retirement he became a board member of Metro, a local property development company run by industry heavyweight David Devine. He was later criticised in the media for abusing his personal connections to gain development approvals for Metro beyond the scope of zoning limits (Hele & Stolz, 2006).

Other evidence of the importance of connections in the property markets in Australia comes from a recent inquiry by the New South Wales Independent Commission Against Corruption (ICAC), Operation Spicer, that led to the resignation of over a dozen politicians. This inquiry exposed the repeated circumvention of political donations laws prohibiting property developer donations. Such laws restricting developer donations have never existed in Queensland, and were only introduced in the state of NSW by amendments to the NSW *Election Funding, Expenditure and Disclosure Act 1981* in 2009 due to the ongoing suspicion that rezoning decisions were being bought through political donations.

Additionally, 44 of Queensland's top 100 wealthiest families made their money in the property and construction industry.¹⁰ From an economic perspective this should be surprising since these industries appear competitive, with low barriers to entry and stable technologies. However, their reliance on discretionary government decisions in the form of land zoning, development approvals, and tendering construction contracts, makes them prime candidates for political rent-seeking. Relatedly, property developers and construction companies dominate the registers of political donors in Queensland and elsewhere in Australia.

The ULDA itself builds on this history, with their CEO Paul Eagles being a previous Director at the development company Lend Lease, which owned the land at Yarrabilba which was rezoned. Interestingly Eagles biography in the ULDA Annual Reports does not disclose this previous role, merely noting the fact that he has "held senior positions with national development companies working on large master planned communities in south-east Queensland."

2.3.3 The other ULDA re-zoned areas

One might think that our selection of privately owned ULDA areas implies the absence of political rent-seeking problems in the other areas that were exclusively State-owned. This, however, is not necessarily true.

Take the example of the area of Fitzgibbon. Robertson (2011) notes that

¹⁰Based on News Corp Australia's Richest 100 List (The Sunday Mail, 2008).

Land is not available to be purchased by individuals, only by preferred developers and builders. These preferred developers and builders then on-sell land to purchasers. The developers are selected through an open tender process “to become partner builders.”

Hence, again, the political process created clear discretion to select the politically connected preferred developers on favourable terms. There is thus little *a priori* reason to expect the political favouritism in land development for these State-owned areas to be qualitatively different than for the privately-owned areas. It is only because we are unable to know which builders and developers lost out in this selection process, that we focus on the ULDA areas where the majority of the land was privately owned prior to rezoning. We can add that the Lend Lease company was chosen as the preferred partner developer for some of the State-owned land at Bowen Hills, which is not surprising given that the company’s former director Paul Eagles was the CEO of the ULDA.

2.3.4 Identification

In general, a correlation between land owner relationships and rezoning success does not imply causation. The main alternative hypothesis is that well-connected land owners may simply possess expertise that allows them to better predict which areas will be suitable for urban expansion.

Our land owner sampling method controls for this possible causal relationship by ensuring our control group of non-rezoned land owners possess close to identical locational and land size characteristics. We discuss in detail the sample selection criteria in Section 2.4.1, but here note that our procedure of selecting the ‘losers’ from rezoning as landowners immediately outside the ULDA boundaries, controls for land size and location relative to natural boundaries such as rivers, rail lines and highways. This method is illustrated by examining the Greater Flagstone and Yarrabilba ULDA areas shown in Figure 2A.1 of the Appendix. In the early versions of the SEQRP a large Beaudesert Investigation Area encompassed both of the eventual two rezoned areas. Our sample of land owners just outside the ULDA areas are contained within the investigation areas, and as such, control for locational characteristics and the previously best public information about future rezoning intentions.

The regression discontinuity assumption we now rely on is that the boundary location decision should have been exogenous to political connections from the hypothesis that rezoning follows the legal framework around it. That legal framework directly presumes that rezoning should be for economic efficiency reasons, which we assume are identical on the boundaries of the rezoned areas.¹¹

2.4 Data and Methods

We assemble two types of data: core data on land, land prices, and rezoning status over time; and a database of all elements we can measure that will co-determine the political connectivity

¹¹Informal interviews with public servants, developers and former politicians also point to a widely held view within the industry that selectively rezoning land owned by developers is better at promoting development than rezoning land ‘owned by grandmas’. Not only does this suggest that indeed there is favouritism occurring, but even if this rationale had merit on efficiency grounds there would be no justification on welfare grounds to refrain from pricing the value gains from rezoning rather than giving them to particular landowners for free, and not giving such favours to unconnected landowners.

of a large set of individuals and entities (corporations, politicians, bureaucrats, landowners). We then use network techniques to extract measures of political connectivity of the landowners in our core database, which is subsequently used for our main analysis on who gets the political favours and how much those favours are worth.

2.4.1 Data

Land

Land records for the sample come from the database of Queensland land titles reseller, RP-data.com. We use a custom map logging tool to capture land ownership and sales details of land lots that fell inside and immediately outside each of the six ULDA areas of interest. The outside control group includes sites between the zoning boundary and the next ‘natural’ boundary, which we consider to include major watercourses, highways and railways. Ownership of land parcels that had been developed between the ULDA declaration date and the time of the data gathering was tracked back through titles searches from the Department of Environment and Resource Management (DERM), and company records where available.

From this initial data of 1,997 lots, land parcels outside ULDA boundaries were excluded if they were owned by a public entity, already developed¹², or if the lot size was smaller than the smallest lot inside that ULDA area which may also indicate prior subdivision or development¹³. This filtering ensured that outside lots remaining in our sample were comparable in terms of location, size and level of development, with the inside rezoned lots. This procedure resulted in a sample of 1,192 land parcels, 274 of which were inside ULDA boundaries. These 1,192 parcels had 1,137 different registered owning entities. Details of the land and owner sample are in Section 2.5.2, and an example of the sample of landowners is shown in Figure 2.2.¹⁴

For each lot, we record historical sales dates and prices in order to test for differences in price paths generated by the ULDA declaration, enabling us to estimate the likely size of the rent allocation towards the rezoned landowners.

Political donors

Two data sources were used to generate a list of political donors that was then merged with the landowner data: the Electoral Commission Queensland (ECQ) records of political party fundings, which covers all transactions from party accounts above \$1,000, and the Australian Electoral Commission (AEC) records of all donations above \$10,000.¹⁵ Records from the ECQ for the period 2007-2012 were manually transcribed into a database from ECQ archives, including donations that were being funnelled through associated entities, such as Labor Holdings Pty Ltd and Forward Brisbane Leadership, providing a list of 1,537 donors and the amount donated, of which 613 were donors to the Labor party which held power during this time.

¹²Land titles in Queensland are recorded under a number of codes (e.g. RP, BUP, GTP, VP) which reflect the type of use. For example, BUP is a building unit plan that indicates that the plot has been subdivided, usually in strata, for a multiple unit dwelling. All title codes except RP indicate some kind of intensive development and are hence excluded due to the gains from rezoning accruing primarily to landowners with undeveloped lots. This excluded 573 lots from the sample.

¹³This filter excluded an additional 232 lots from the sample

¹⁴Clockwise from top left: Ripley Valley, Northshore Hamilton, Yarrabilba, and Greater Flagstone.

¹⁵The threshold for declaration was set at \$10,000 in 2005 and has incrementally been increased to \$12,800.

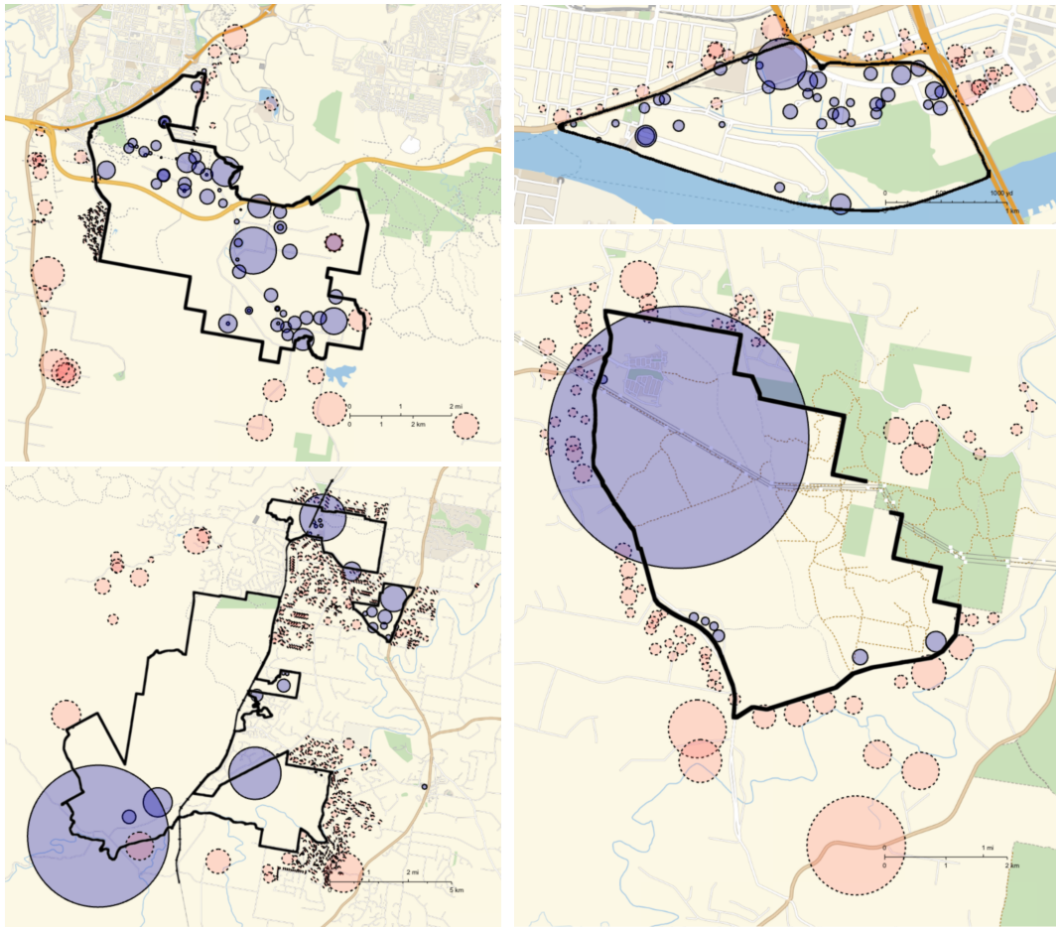


Figure 2.2: Land sample (solid blue/dashed red disks are inside/outside lots, sized by area)

Lobbyist clients

Since 2010, following the passing of the *Integrity Act 2009*, the Queensland Integrity Commissioner has maintained a register of Queensland lobbyists, their staff and clients, both current and historical. The full register was included in our database in July 2012. These records cover entities that carry out lobbying activity to a third party for “a fee or other reward”, which means it very narrowly covers some professional lobbyists, many of whom are former politicians or senior government employees. It does not include industry groups or professional bodies whose main role is to lobby government in the interest of its members. Since the records match clients to lobbyists, these records provide a landowner characteristic variable to the data in the form of whether the landowner is a client of a professional lobbyist, and also provides a link from client to lobbyist in the construction of a relationship network.

Industry associations

The Property Council of Australia (PCA) and the Urban Development Institute of Australia (UDIA) are the two major property development industry groups in Queensland. The existence of such professional groups provides another potential avenue to generate corporate and political connections. Online records of individual and corporate members of these respective groups were compiled in March 2012, with additional records for the PCA obtained from 31 July 2008 via the WayBack Machine internet archive. This produced 1,065 individual and corporate entities associated with the PCA, and 253 entities associated with the UDIA, with 1,283 unique entities altogether. The data are used to both generate UDIA and PCA industry group dummy variables for land owners, but also to create a core network of relationships between members; that is, all members of each industry group in our network are connected to all other members.

Politicians

Queensland Parliament publishes a Re-Member Database of biographical information on current and former members of Parliament. We use this database to generate a list of elected parliamentarians from 1998 to 2012. These names were included in the relationship network, connected to other entities through lobbying activities, industry groups membership, or corporate connections. Because family member names were only sporadically available in this database, such relationships are not used in this paper.

ULDA staff

All ULDA staff and board member names were sourced from published annual reports till 2012 and included in the data set, with network connections to their published previous employers.

Corporate relations

For the 174 corporate land owners in the sample, records from the Australian Security and Investment Commission (ASIC) of current and historical office holders, senior staff and related entities were compiled. This data generated network links between corporate land owning entities, their directors and principle owners in the combined data set. In all 1,795 entities were linked by the resulting networks of corporate connections.

Data were cleaned and matched. Following basic automated name matching, manual matching was undertaken to unify the data using web-search checks to identify companies and institutions that had new and old names recorded from different data records, and to merge individuals where they sometimes recorded common nicknames.

Matching our data created a network of 13,740 entities with 272,810 edges, consisting of all entities, individual and corporate, from all the above mentioned datasets combined. Edges in the network arise from corporate connections, industry connections, lobbyist connections and former employers of lobbyists, and the corporate and internal connections of the ULDA board of directors and senior staff.

2.4.2 Methods

Rezoning success model

Our main outcome of interest is whether landowner i gets a favourable rezoning decision or not, depending on landowner characteristics, using the following linear probability model

$$I_i = X_i' \beta + PolC_i \gamma + e_i \quad (2.1)$$

where I_i is the share of land of each landowner i that fell within the rezoned area; X_i is a matrix of characteristics of the land in the sample; $PolC_i$ is a measure of the political connectivity of each landowner, implying that γ denotes the increase in the chances of getting favourable land rezoning due to political connections; and e_i is the error term. $PolC_i$ includes whether or not a landowner uses a lobbyist, makes donations, is well-connected in the relationship network and so on. The construction of the variables in it are revisited later.

Price model

To identify the price effects of the rezoning decisions, which enables an estimate of the size of the economic rents allocated to rezoned land owners, we model lot prices using historical sales records, and include a number of control variables, such as lot size, a Brisbane house price index, and ULDA area dummies in the form

$$\ln(P_{it}) = X_i' \alpha + aW_{it} + bL_{it} + e_i \quad (2.2)$$

where $\ln(P_{it})$ is the logarithm of the sale price per hectare of lot i and time t , X_i is a vector of control variables for each lot, W_{it} is dummy variable for lots i at time t that fall within ULDA areas after the time of their declaration, and L_{it} is the dummy variable for lots outside the ULDA declared area but that could have been inside in terms of proximity and land characteristics. In this linear probability model, the price variable is a log price per area, meaning that the estimated coefficients can be used to discern the price impact of the ULDA decision to rezone in the form $(e^{\hat{a}} - e^{\hat{b}})$. This relationship is also tested with a number of leads and lags around the declaration date in order to better understand the price path: if rezoned land owners possess political privilege then it could be expected that other speculators move in to the area in anticipation of favourable decisions, bidding up land prices prior to the actual declaration.

Using the estimated parameter coefficients from Equation 2.2, along with a vector of land sizes, A_i , we can for each plot of land calculate the expected price as

$$\begin{aligned} E[P|X_i'] &= \int [\Pr\{W = 1, L = 0\} e^{X\hat{a} + a + e_i} + \Pr\{W = 0, L = 1\} e^{X\hat{a} + b + e_i}] dG(e_i) \\ &= e^{X\hat{a} + \hat{\sigma}^2/2} \times [e^{\hat{a}} \Pr\{W = 1, L = 0\} + e^{\hat{b}} \Pr\{W = 0, L = 1\}] \end{aligned}$$

where $G(e_i)$ is the distribution of e_i , \hat{a} is the vector of coefficients estimated from Equation 2, \hat{a} and \hat{b} are now the coefficient estimates from Equation 2.2, and $\Pr\{W = 1, L = 0\}$ denotes the probability of successful rezoning. If we first look at potential rents available had all lots in our

sample been rezoned, R , we can calculate this as the expectation of the price-difference inside and outside the rezoned areas for all lots using the point-estimates of the coefficients, and taking the expectation over the error term in Equation 2.2 as

$$R = \sum_i e^{X\hat{\alpha} + \hat{\sigma}^2/2} \times (e^{\hat{a}} - e^{\hat{b}}) \times A_i \quad (2.3)$$

where X now is used to denote the matrix of the control variables used in Equation 2.2 for our sample of landowners, and A_i is the area of land for each i landowner in the sample.

To calculate the size of the actual rent allocation in our sample from the rezoning boundary decisions, we can premultiply A_i by a vector of land-shares falling inside the rezoned areas for each owner, I_i . Of those actual gains we can estimate the share that went to rent-seekers by premultiplying $A_i \times I_i$ by a vector of $\{0, 1\}$ dummies that denote our classification of being a rent-seeker in terms of being connected or undertaking any lobbying and donation activity.

In terms of the marginal gains to political connectivity for all landowners, R_c , we premultiply R by $PolC_i\hat{\gamma}$, which is a direct measure of the gains to successful rezoning by political connections in these areas, i.e. it is

$$R_c = E \sum_i A_i (P[PolC_i] - P[PolC_i = 0]) \quad (2.4)$$

$$= \sum_i e^{X_i\hat{\alpha} + \hat{\sigma}^2/2} \times (e^{\hat{a}} - e^{\hat{b}}) \times A_i \times PolC_i\hat{\gamma} \quad (2.5)$$

where the only difference between $P[PolC_i]$ and $P[PolC_i = 0]$ is due to the higher probability of getting favourable rezoning.

Network measures

There are a large number of ways in which we can use our network data to generate landowner specific measures of connectivity. Since we have little *ex ante* theory to guide our choice of measure, we adopt the measures used by previous scholars that arguable match the competing conceptions of social capital.

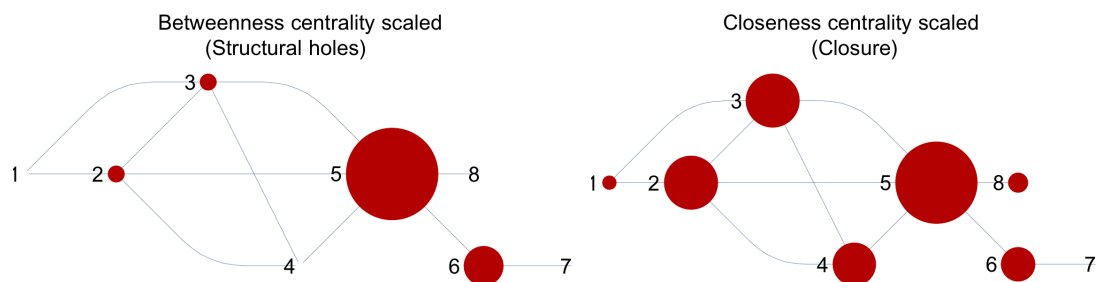


Figure 2.3: Conceptual diagram of network measures

Our closeness centrality (or closure) measure of land owners in the relationship network is derived from the mean length of all shortest paths from them to every other node connected in the network, providing an measure between 0 (completely disconnected) and 1 (directly connected to every node in the network).¹⁶ In previous studies, this measure has been shown to predict evaluated individual job performance, and is argued to be the primary measure of mutual supervision and ability to coordinate (Brass *et al.* , 1998; Sparrowe *et al.* , 2001).

To proxy for Burt’s (2000) view of social capital as bridging structural holes, we also include a measure of betweenness centrality¹⁷, which is a measure of the centrality of a node in a network based on the number of shortest paths that pass through it, indicating a positional monopoly on information flow through the network.

To clarify the intuition behind these two measures we use the example network in Figure 2.3 with node (or vertex) size scaled by each centrality measure. Notice that in terms of betweenness centrality, node 5 has by far the largest measure. This is because all paths between nodes 6, 7 or 8, and nodes 1, 2, 3 or 4 must pass through it, meaning that for any information to flow from the nodes on the left to those on the right relies on node 5 having access to that information. This monopoly on the information flow provides the underlying logic of taking the ‘bridging of structural holes’ as a measure of connectedness.

Closeness centrality on the other hand represents, in economic terms, having a large closely connected network which can sustain and reinforce norms of behaviour due to intensive monitoring ability (everybody is well connected enough to observe most other’s behaviour). Node 4 has a well connected clique¹⁸ involving nodes 2, 3, 4 and 5. Hence, while node 4 has no monopoly in information flow (a zero betweenness centrality because of the shorter substitute paths through their clique from nodes 1 to 6, 7 and 8), it forms a critical element of the formation and enforcement of norms within its clique and thus has a high closeness centrality measure. These two network measures hence capture different elements of coordinating behaviour that may comprise social capital.

2.5 Results

2.5.1 Political connectivity

We first analyse the relationship network data in order to look at political connectivity. The main component in our network is made up of the largest set of connected nodes, which in our network contains 6,729 entities which are either individuals or companies. The next largest connected component in the network comprises just 44 entities and hence is only of marginal relative interest.

Only one politician is in the main component while 56 landowners are. This is surprising, given the widespread media focus on the revolving-door between politics and property developers. One reason for this is the difficulty of tracing suspicious relationships. For instance, we know from the corporate website at the time that the former Minister for Planning Terry Mackenroth was on

¹⁶Closeness centrality for vertex i in a graph is given by $\frac{1}{l_i}$ where l_i is the average distance from vertex i to all other vertices connected to i .

¹⁷Betweenness centrality for a vertex i in a connected graph is given by $\sum_{s,t \in v \wedge s \neq i \wedge t \neq i} \frac{n_{s,t}^i}{n_{s,t}}$ where $n_{s,t}$ is the number of shortest paths from s to t and $n_{s,t}^i$ is the number of shortest paths from s to t passing through i .

¹⁸A grouping of nodes with all possible edge combinations.

the Board of Directors for Metro Properties, a land owner in our sample. Yet, because we cannot observe such connections with the same degree of certainty for all the politicians and others in our network sample (simply because the data is unavailable and subject to privacy legislation), we cannot use this type of information. We thus have to rely on the assumption that what is important about the observed relations (betweenness or closeness) is also what matters for the unobserved relationships.

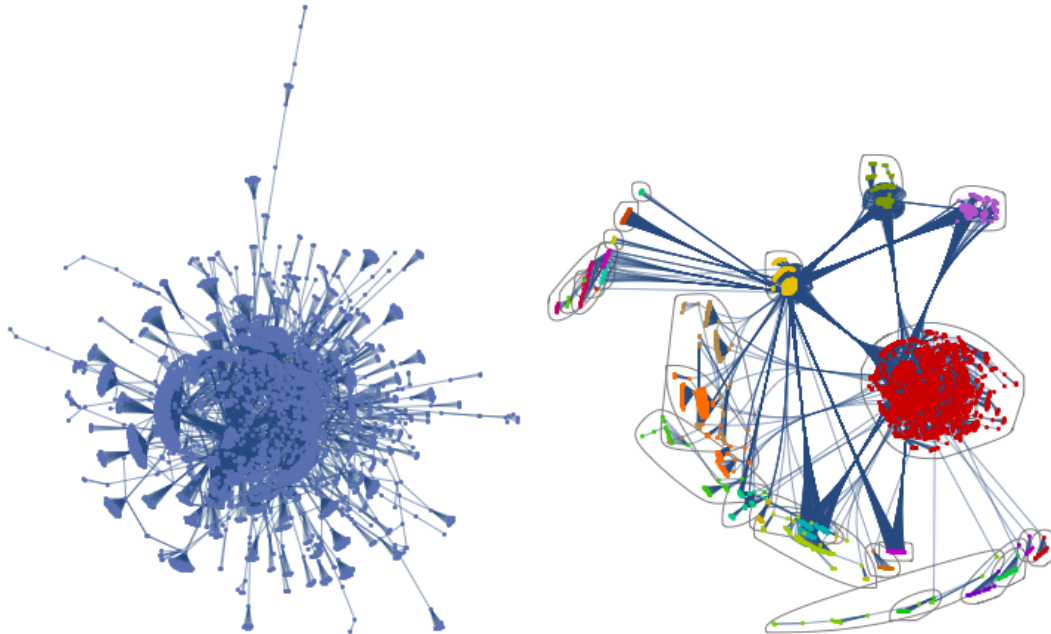


Figure 2.4: Relationship network main component (clustered on RHS)

Table 2.1: Network clustering characteristics

| Cluster | Nodes | Edges | Average close. cent. | Average between. cent | Land owner node share | Lobbyist client node share | Industry group node share | Corp. edge share | ULDA staff edges |
|---------|-------|---------|----------------------------|-----------------------------|--------------------------|----------------------------------|---------------------------------|------------------------|------------------------|
| ● | 4,016 | 12,953 | 0.22 | 1.1 | 0.0230 | 0.77 | 0.01 | 0.07 | 1 |
| ● | 653 | 170,770 | 0.32 | 3.3 | 0.0026 | 0.25 | 0.62 | 0.01 | 6 |
| ● | 463 | 62,894 | 0.25 | 0.32 | 0.0088 | 0.02 | 0.81 | 0.12 | 105 |
| ● | 426 | 447 | 0.21 | 0.80 | 0 | 0.95 | 0 | 0 | 0 |
| ● | 279 | 25,526 | 0.27 | 0.44 | 0.0018 | 0.16 | 0.64 | 0.20 | 0 |

Betweenness centrality rescaled by 1/10000

The main component in the network can be subdivided in 5 main clusters¹⁹ shown in Figure 2.4 and also in Table 2.1. The figure shows the rather high degree of connectedness of the main component, with 268,233 edges. The red cluster contains 4,016 entities, of which 26 are land

¹⁹Modularity clustering algorithm used based on Newman (2006) and implemented in Mathematica 10.0.1

owners, and the majority of connections arise from connections through professional lobbying activity. The central yellow cluster comprises 653 entities with the majority of edges formed by industry groups connections. The third largest cluster is the top right purple cluster consisting of 463 entities connected by a mix of lobbyist, industry and corporate edges, and many of the ULDA board members and senior staff.

As Table 2.1 further shows, the clusters largely reflect the data sources used to generate the network: the third cluster is largely from PCA membership and the fifth cluster largely from UDIA membership. We do find though that employing a lobbyist and being a member of an industry group seem substitutes, with very rare cases of overlap. The second and third largest clusters (yellow and purple) display the closeness one needs for mutual monitoring: these clusters have relatively few nodes (653 and 463), yet an exceptionally high number of relationship edges (170,770 and 62,894) in comparison to other clusters in the main component. If members of these clusters are hence particularly often successful in terms of favourable rezoning decisions, then that would show up in our analyses as a high importance of closeness centrality.

2.5.2 Summary data on ULDA areas

Table 2.2: Land lot sample summary

| ULDA area | | Lot Area Details (Ha) | | | | Total | Total lots |
|----------------|---------|-----------------------|--------|---------|---------|--------|------------|
| | | Mean | Median | Maximum | Minimum | | |
| Bowen Hills | Whole | 0.11 | 0.05 | 3.3 | 0.03 | 20.9 | 191 |
| | Inside | 0.12 | 0.06 | 3.3 | 0.03 | 14.4 | 124 |
| | Outside | 0.10 | 0.05 | 1.3 | 0.03 | 6.5 | 67 |
| Caloundra Sth. | Inside | 1,040 | 107 | 2,984 | 29.5 | 3,120 | 3 |
| Hamilton Nth. | Whole | 0.68 | 0.40 | 8.9 | 0.08 | 53.0 | 78 |
| | Inside | 0.75 | 0.41 | 8.9 | 0.08 | 30.2 | 40 |
| | Outside | 0.60 | 0.35 | 2.5 | 0.12 | 22.8 | 38 |
| Gr. Flagstone | Whole | 14.4 | 2.02 | 3,723 | 0.28 | 8,900 | 614 |
| | Inside | 193.5 | 4.02 | 3,723 | 0.28 | 6,384 | 33 |
| | Outside | 4.3 | 2.02 | 293 | 0.40 | 2,501 | 581 |
| Ripley Valley | Whole | 10.5 | 0.8 | 210 | 0.22 | 2,270 | 212 |
| | Inside | 16.3 | 10.5 | 210 | 0.22 | 1,134 | 67 |
| | Outside | 7.9 | 0.5 | 110 | 0.40 | 1,136 | 145 |
| Yarrabilba | Whole | 31.6 | 4.02 | 2,015 | 1.8 | 3,056 | 96 |
| | Inside | 255.8 | 3.24 | 2,015 | 1.8 | 2,046 | 8 |
| | Outside | 11.4 | 4.02 | 288 | 1.9 | 1,010 | 88 |
| Whole sample | Whole | 14.6 | 1.8 | 3,723 | 0.03 | 17,351 | 1,192 |
| | Inside | 46.3 | 0.3 | 3,723 | 0.03 | 12,675 | 274 |
| | Outside | 5.1 | 2.0 | 293 | 0.03 | 4,676 | 918 |

Areas are totals for the sample of properties that met our criteria for entry into the data set, not the whole ULDA declared areas.

Tables 2.2 and 2.3 give the key statistics on the land sample inside and outside of the ULDA rezoning decisions. A key point in the construction of the outside area was to ensure all lots are

at least as large as the smallest lots from the sample inside the ULDA area. For the Caloundra South area it turned out that no adjoining lots are at least the size of the three lots within the ULDA area, which means the Caloundra area only has an internal area treated on a par with the other five internal areas. The main point of the Tables 2.2 and 2.3 are that the inside lots are usually larger than the outside lots, meaning that lot size is an important variable to account for in regressions.

In Table 2.3 we see some of the key distinctions between the characteristics of land owners who own land parcels inside and outside the ULDA declared areas. Corporate ownership is far more common within rezoned areas, as are other connectivity characteristics we capture in our data. Industry group members owned almost 40% of the rezoned area combined, but only 1.2% of the comparable areas outside rezoned areas. Critically, lobbyists appear to be extraordinarily effective at ensuring land is rezoned, with no Queensland lobbyist clients owning lots that fell outside rezoned areas while lobbyist clients owned around 30% of the rezoned land.²⁰

In terms of the political connectivity network variables, we see that those in the main component of the network own very little of the outside area (3.9%) but much of the inside area (41.2%). Similarly, those with above-median (above zero) closeness connectivity own 75.4% of the inside land area, and only 12.2% of the outside land area, with a similar pattern for betweenness centrality (40.9% inside land and 2.5% of outside land in the sample). Landowners we classify as rent-seekers bought land inside ULDA areas on average 7 years prior to rezoning, compared to 10 years on average for other landowners.

2.5.3 Land owner characteristic correlations

We then look at the correlations between various land owner characteristics including those derived from this relationship network in Table 2.4. We see that most of the landowner characteristic variables show a high degree of correlation with each other, even more so than with the rezoning indicator variable in the bottom row. Liberal party donations, though only a characteristic of ten of the 1,137 land owners, highly predict whether a land owner is also a) a Labor party donor, b) a client of a professional lobbyists, c) a member of the PCA industry group, or d) a part of the main component of the corporate network. Political donations are often regarded as ideologically motivated, yet we see in this data a pragmatic hedging strategy adopted by landowners who donate to politics: seven out of the 14 political donors donate to both sides of politics, and donations to both sides of politics are equally correlated with rezoning success, which is unexpected in light of the long term political dominance of Labor at the time.

Some of the correlations between the variables are not surprising when understood in the context of the methods used to assemble the data. For example, the corporate network is produced by using edges from common membership of industry groups. Hence, the high correlation between PCA membership and membership of the main connected component of the network should be expected, since a large proportion of the relationships (edges) in the main component of the network arise from common membership of the PCA. The same logic applies to the relationship between lobbyist clients and the main component variable.

We highlight in Table 2.4 the very low correlation (0.07) between whether the land owner is a lobbyist client, and the closeness centrality of the land owner. It is somewhat surprising that these variables are uncorrelated, since connections to lobbyists, and as a consequence, to other

²⁰Only one lobbyist client land owner had a portion of their land outside the area, and that portion is included in the area share in Table 2.3.

Table 2.3: Summary of land ownership characteristics

| | Mean lot | % of Sample | | % of Inside | | % of Outside | |
|------------------------|-----------|-------------|------|-------------|------|--------------|------|
| | size (Ha) | Owners | Area | Owners | Area | Owners | Area |
| Corporate | 59.9 | 14.9 | 0.55 | 40.6 | 75.3 | 8.4 | 12.5 |
| Asso'n / Union / Trust | 3.0 | 1.1 | 0.2 | 2.9 | 0.3 | 0.7 | 0.1 |
| Individual | 7.5 | 84.3 | 17.8 | 57.0 | 24.5 | 91.1 | 87.5 |
| PCA member | 851 | 0.5 | 29.5 | 2.1 | 39.9 | 0.1 | 1.2 |
| UDIA member | 1,013 | 0.3 | 17.5 | 0.8 | 23.5 | 0.1 | 1.2 |
| Liberal donor | 515 | 0.9 | 29.7 | 3.3 | 40.1 | 0.2 | 1.4 |
| Labor donor | 468 | 1.0 | 29.7 | 3.3 | 40.1 | 0.3 | 1.4 |
| Any Donor | 368 | 1.2 | 29.7 | 4.1 | 40.1 | 0.4 | 1.5 |
| Lobbyist Client (Qld) | 565 | 0.8 | 29.3 | 3.7 | 39.7 | 0* | 1.2 |
| Lobbyist Client (Any) | 465 | 1.0 | 29.5 | 4.1 | 40.0 | 0.1 | 1.2 |
| In main component | 96.6 | 4.9 | 31.1 | 13.5 | 41.2 | 2.6 | 3.9 |
| Closeness cent. > 0 | 59.2 | 15.0 | 58.4 | 40.6 | 75.4 | 8.1 | 12.2 |
| Betweenness cent. > 0 | 311.6 | 1.5 | 30.5 | 5.7 | 40.9 | 0.3 | 2.5 |
| 'Rent-seeker'* | 58.6 | 15.2 | 58.4 | 40.9 | 75.4 | 8.2 | 12.2 |

Total sample size is 1,137.

* Defined here as a landowner that exhibits any positive values for rent-seeking activities; either being the main component of the relationship network, having a closeness centrality > 0, having a betweenness centrality > 0, or being a lobbyist client or political donor.

clients of that lobbyist, is one input into the generation of the network. It lends weight to the idea that employing a professional lobbyist is a substitute to being well connected oneself.

2.5.4 Landowner rezoning success

We now turn to the results for the estimations of Equation 2.1 in Table 2.5, which includes five model variations for the construction of $PolC_i$. Outside of owner characteristics, land size is an important factor in determining rezoning success, but in a non-linear way. Extremely large land lots are highly predictive of successful rezoning, though at the lower end of the land size spectrum, the relationship between land size and successful rezoning is reversed. We caution that our land size variable may pick up part of the effect of political connectivity in that those who know that they can change rezoning decisions buy very large plots, or 'land banks', strategically on the urban fringe. Differences in lot sizes might also pick up artefacts of our sampling methodology; plots outside the zoning border to the next barrier are relatively smaller, something we need to control for. Thus we are likely to underestimate the full effect of political connectivity by controlling for land area.

Comparing Model 1 to Model 2, we can see that the inclusion of political donations and industry group membership increases the size of the lobbyist client coefficient from 0.23 to 0.38, indicating that employing lobbyists and direct donations or industry group membership are not complements (collinear), but are more likely to be substitute methods for gaining political favour. However, the large standard errors of the coefficients for each industry group and political dona-

Table 2.4: Correlation matrix for variables of interest

| | Liberal Donor | Labor Donor | Lobby. Client | PCA Mem. | UDIA Mem. | Main Comp. | Close. Cent. | Betw. Cent. | Land Size | Ln(L. Size) | Inside Share |
|---------|---------------|-------------|---------------|-------------|-----------|------------|--------------|-------------|-----------|-------------|--------------|
| Liberal | 10 | | | | | | | | | | |
| Labor | 0.66 | 11 | | | | | | | | | |
| Lobby. | 0.38 | 0.27 | 11 | | | | | | | | |
| PCA | 0.64 | 0.61 | 0.24 | 6 | | | | | | | |
| UDIA | 0.36 | 0.17 | 0.17 | 0.23 | 3 | | | | | | |
| Main | 0.33 | 0.23 | 0.39 | 0.32 | 0.23 | 56 | | | | | |
| Close. | 0.08 | 0.15 | 0.07 | 0.06 | 0.04 | 0.10 | All | | | | |
| Betw. | 0.56 | 0.50 | 0.48 | 0.66 | 0.45 | 0.27 | 0.05 | All | | | |
| Land | 0.11 | 0.10 | 0.28 | 0.38 | 0.32 | 0.12 | 0.07 | 0.62 | All | | |
| Ln(L) | 0.12 | 0.12 | 0.08 | 0.12 | 0.06 | -0.02 | -0.20 | 0.17 | 0.31 | All | |
| Inside | 0.12 | 0.12 | 0.16 | 0.11 | 0.06 | 0.20 | 0.32 | 0.11 | 0.12 | -0.19 | 243 |

N=1,137. Diagonals are counts of non-zero variables,
Darker highlighted cells show variables highly correlated with rezoning but not each other.
Bold indicates correlation coefficient greater than 0.50.

tion type in Model 2 arise partly of due to the high collinearity of these variables in the dataset, which is evident in the Table 2.4 correlation matrix.

Model 3 looks to overcome the collinearity of the political donations and industry group membership patterns by combining all donor relations into a single variable, and likewise for all industry group members, as well as removing the main component variable that is correlated with industry group membership. This does not reveal any reduction in standard errors for industry group (coeff. -0.6, s.e. 0.16) and political donor (coeff. 0.04, s.e. 0.12) variables, suggesting that it is not a raw characteristic of being in an industry group that is advantageous, but how that membership translates to positional gains in the broader relationship network. This lack of predictive power of political donations is also a quite interesting result in light of the institutional background and public focus on donations as methods for buying political favours.

Model 4 includes only variables capturing positional characteristics of the relationship network. The coefficients change little from Model 1 with the removal of the lobbyist client variable and the inclusion of the betweenness centrality variable, confirming previous suggestions in the data that employing a lobbyist is a substitute for advantageous position in the relationship network in terms of being connected to the main component, and in terms of closeness centrality (how well connected to each other your own connections are). Betweenness centrality shows a small insignificant negative coefficient level in Model 5 where all main variables are included. While the raw correlation of betweenness centrality with rezoning success is positive, as seen from Table 2.4, this type of network position appears of relatively low value compared to other variables for gaining political favours in our setting, or is perhaps costly for those with many other political advantages due to connections to competitor cliques in other parts of the network.

The picture emerging from these models is that one’s position in the relationship network is the underlying mechanism that allows for implicit favouritism, and that political donations may be of secondary importance in that they may be merely a way of signalling loyalty in order to improve one’s relationships. In general we see closeness centrality, reflecting the Coleman (1990) view

Table 2.5: Models of rezoning success

| Share of land inside | Model 1 | Model 2 | Model 3 | Model 4 | Model 5 |
|-----------------------|--------------------|--------------------|--------------------|--------------------|--------------------|
| Labor donor | | 0.08 (0.18) | | | 0.05 (0.18) |
| Liberal donor | | 0.16 (0.16) | | | 0.10 (0.16) |
| Any donor | | | 0.04 (0.12) | | |
| Lobbyist client | 0.23* (0.12) | 0.38*** (0.12) | 0.22* (0.12) | | 0.37*** (0.14) |
| PCA member | | -0.08 (0.21) | | | 0.16 (0.23) |
| UDIA member | | -0.13 (0.23) | | | 0.02 (0.24) |
| Any industry group | | | -0.06 (0.16) | | |
| Main component | 0.20*** (0.05) | | | 0.25*** (0.05) | 0.19*** (0.06) |
| Closeness centrality | 0.26*** (0.04) | | 0.26*** (0.04) | 0.26*** (0.04) | 0.25*** (0.04) |
| Betweenness cent. | | | | -0.004 (0.002) | -0.01** (0.00) |
| Ln(area) | -0.05*** (0.01) | -0.07*** (0.01) | -0.05*** (0.01) | -0.05*** (0.01) | -0.05*** (0.01) |
| Ln(area) ² | 0.02*** (0.00) | 0.03*** (0.00) | 0.02*** (0.00) | 0.02*** (0.00) | 0.02*** (0.00) |
| R^2 | 0.24 | 0.21 | 0.24 | 0.24 | 0.25 |

Standard errors in parentheses below coefficients. N = 1,137

p values * < 0.10, ** < 0.05, *** < 0.01

of social capital, as a key mechanism at play in predicting favours in the Queensland property industry.

2.5.5 Robustness checks

The main concern with the results is whether there are unobserved characteristics of land which attract well-connected institutional landowners and independently determined the rezoning decisions.

One such objection is that it might have been the process of rezoning that attracted the politically connected landowners and that they were simply better able to spot the prime pieces of land than others. If that was the case, then it should be true that the more recent buyers of land should be more connected, with no particular affiliation amongst landowners who owned their plots before the whole rezoning process started in 2004. To check this we divide our sample into land owned

less or more than six years ago, which denotes the time between the first SEQ Regional Plan and most of the ULDA rezoning decisions, and re-estimate Model 1, with the results in Table 5.4.7. Of the three main variables - lobbyist client, main component and closeness centrality - the direction and magnitude of the estimated coefficients are very close, indicating that connected landowners were not responding to the intention to rezone indicated by the SEQ Regional Plan, and that rezoning was more likely responding to landowner connections.

The second way we partition our data is by distance to the geographic centre of our sample areas. If connected landowners had bought into the area on the expectation of potential future development, then lots further from the centre of the region may have merely had a lower probability of rezoning and attract fewer informed developer buyers, who are likely to be more connected. To control for this potential effect, we exclude land parcels near the centre and at the furthest parts of each area. We thus take the middle 30% and 70% of land by distance to the centre of the rezoned area to see if the results are sensitive to how closely we select properties on the boundary. The results of these models also reported in Table 5.4.7. Again the sign of the coefficients is preserved and the network measures are again significant when we select the middle 70% of the sample. If we only select the middle 30% then we are down to only 353 land parcels and even though the coefficients remain similar, significance is lost.

Another robustness check is to match the sample of inside lots with the nearest outside lot to create a dataset with more balanced location dispersion in order to reduce the danger of selection bias on the outside plots. Matching greatly reduces the sample size and diversity of outside lots, yet as we can see from the results in Table 5.4.7, the lobbyist client and closeness centrality retain significantly large effects of 0.31 and 0.16 respectively, while the main component dummy becomes insignificant. We did a similar matching exercise on the basis of size, which results in the closeness centrality measure remaining significant at 0.14, while the two other main variables of lobbyist client and main component have smaller and insignificant coefficients.

A final check is to see whether our network has added value over simpler measures of connectedness. We thus create a new ‘developer’ variable that captures whether an owner is a lobbyist client or in the main component, representing all activities potentially related to being a professional developer, including membership of industry groups. When this new variable is regressed alongside the closeness centrality measure the developer coefficient is 0.38 ($p < 0.01$), but the closeness centrality coefficient is still large and significant at 0.42 ($p < 0.01$), indicating that both capture important variation.

Summarising, though we can lose significance if we reduce the sample enough, the results are remarkably robust to how long ago the property was bought, to how close the property is to the boundary of the rezoned area, to whether we select only those outside plots that are the best match to the inside plots, and to the inclusion of additional simple measures of connectedness.

2.5.6 Rent transfer

To estimate the value of the rent-transfer from ULDA rezoning decisions, we estimate the price model of Equation 2.2 over a number of leads and lags and summarise the results in Table 2.7. Since there are only a few sales in some years, the errors around the a and b coefficients of the W and L dummy variable are quite large. All models have high explanatory power, with an R^2 of around 0.90, and consistent directional estimates of a and b coefficient through all time periods. The general interpretation from this exercise is that land prices increased more rapidly for land inside the ULDA boundaries, with a particularly large change immediately following the

Table 2.6: Robustness of success models

| Share of land inside | Time owned | | Distance from centre | | Nearest matched | |
|-----------------------|--------------------|--------------------|----------------------|-------------------|-------------------|-------------------|
| | > 6yrs | < 6yrs | Middle 30% | Middle 70% | Location | Size |
| Lobbyist client | 0.18 (0.14) | 0.27 (0.24) | 0.19 (0.45) | 0.13 (0.16) | 0.31* (0.17) | 0.16 (0.17) |
| Main component | 0.23*** (0.07) | 0.13 (0.09) | 0.15 (0.11) | 0.22*** (0.06) | -0.04 (0.07) | 0.12 (0.08) |
| Closeness centrality | 0.27*** (0.06) | 0.26*** (0.06) | 0.12 (0.08) | 0.17*** (0.05) | 0.16*** (0.06) | 0.14*** (0.06) |
| Ln(area) | -0.06*** (0.01) | -0.05*** (0.01) | -0.07*** (0.02) | -0.02* (0.01) | 0.03*** (0.01) | 0.0 (0.01) |
| Ln(area) ² | 0.02*** (0.00) | 0.03*** (0.00) | 0.03*** (0.01) | 0.06*** (0.00) | 0.00 (0.00) | 0.00 (0.00) |
| R^2 | 0.23 | 0.27 | 0.29 | 0.30 | 0.05 | 0.03 |
| N | 726 | 411 | 353 | 803 | 474 | 474 |

Standard errors in parentheses below coefficients.

p values * < 0.10, ** < 0.05, *** < 0.01

rezoning, reflecting the value of increased possible development density. For clarity, we present this analysis graphically in Figure 2.5, showing deviation from predicted price paths estimated due to the W and L dummy variables.

One might wonder why the price of the areas does not increase immediately in the year of declaration. This is partially by construction of how the ULDA worked, in that they did not merely rezone the areas but also provided a conduit for land re-use permissions to those who owned properties inside the zone. Hence the property developers who bought land may have used their connections to get favourable permissions, selling the redeveloped land in future years. This is probably why the price increase is so pronounced in the year after the declaration as it denotes the moment at which there is true resale to the general public.

Using these regression results, we are able to estimate the size of the rent transfer to land owners in the ULDA areas using Equation 2.3. We use the one year lag results from Table 2.7 as most likely to reflect the cumulative gains from this rezoning decision,

We estimate the gains in terms of economic rent transferred to land owners within the ULDA areas, R to be \$710 million (or \$56,000 per hectare) of which the 100 land owners who qualify as rent-seekers as per Table 2.3 captured \$410 million, or 56% of the total rents allocated due to owning 75% of the rezoned land. In contrast, by the same rent-seeking classification we use, such land owners held only 12% of land outside rezoned areas. The marginal gains to political connectivity, as per Equation 2.4 and using $\hat{\gamma}$ estimates from the Model 5 implementation of $PolC_i$, is \$190 million. We consider this as a return for land owners from becoming connected to the relationship network in the case of the ULDA rezoning in Queensland, i.e. the gain of becoming connected over and above merely ‘being in the game’ and thus speculating on property rezoning without being connected.

Table 2.7: Price model

| Ln(price/hectare) | Model 1 | Model 2 | Model 3 | Model 4 | Model 5 |
|-------------------------------------|--------------------|--------------------|--------------------|--------------------|--------------------|
| | Three yrs | Two yrs | Year prior | Declaration | Year after |
| Time | 1.05*** (0.40) | 1.07*** (0.40) | 1.04*** (0.40) | 0.95** (0.40) | 0.92** (0.39) |
| Bris. house price index | 1.08*** (0.18) | 1.06*** (0.18) | 1.10*** (0.17) | 1.15*** (0.16) | 1.17*** (0.16) |
| Vendor relationship | -0.60*** (0.09) | -0.61*** (0.09) | -0.61*** (0.09) | -0.62*** (0.09) | -0.60*** (0.09) |
| Declared inside dummy (<i>a</i>) | 0.19* (0.11) | 0.27** (0.12) | 0.29** (0.13) | 0.36 (0.23) | 0.94*** (0.32) |
| Declared outside dummy (<i>b</i>) | 0.06 (0.07) | 0.07 (0.08) | 0.04 (0.09) | 0.15 (0.14) | 0.12 (0.16) |
| R^2 | 0.91 | 0.91 | 0.91 | 0.91 | 0.91 |
| N | 822 | 822 | 822 | 822 | 822 |
| N, inside dummy, $W = 1$ | 47 | 35 | 27 | 8 | 4 |
| N, outside dummy, $L = 1$ | 151 | 151 | 75 | 26 | 16 |

Dependent variable for each i lot is $\ln(\frac{P_{it}}{a_i})$. Standard errors in parentheses below coefficients.

All models include dummy variables of each ULDA area, and control for $\ln(\text{area})$ and $\ln(\text{area})^2$.

2.6 Discussion and conclusion

In this paper we utilised a unique regulatory change in Queensland, Australia, that allows us to disentangle the political intention to rezone as a growth imperative from the politics of precisely where the rezoning takes place. Following a prior decision to coordinate large scale regional rezoning, the state of Queensland decided in 2007 to create a new institution that would decide on the precise areas to be rezoned, which in reality turned out to have little bearing on the intended rezoning areas that followed previous technical assessments, such as suitability and accessibility. This allows us to look at the importance of the political connectivity of the various landowners in getting favourable rezoning decisions and hence obtaining a valuable new property right.

We combined a number of disparate datasets in order to compile a relationship network containing connections deemed relevant to supporting the allocation of mutual favours within a network, and showed that the network characteristics of landowners strongly determined rezoning success. Being in the main component of the relationship network increases the chance of favourable rezoning by 19%, while improving one's network position in terms of closeness centrality offers a 25% increase in the chance of rezoning success. Network variables provided far greater explanatory power of rezoning decisions than more simple observable characteristics, such as political donations and being a member of an industry group; showing that it matters to have information on the whole network of relations rather than simply binary indicators of political connectedness. Yet, our network measures were still not able to capture many direct links to politicians because such information is not publicly available, meaning that our results are probably an underestimate of the true importance of political connectivity. For example,

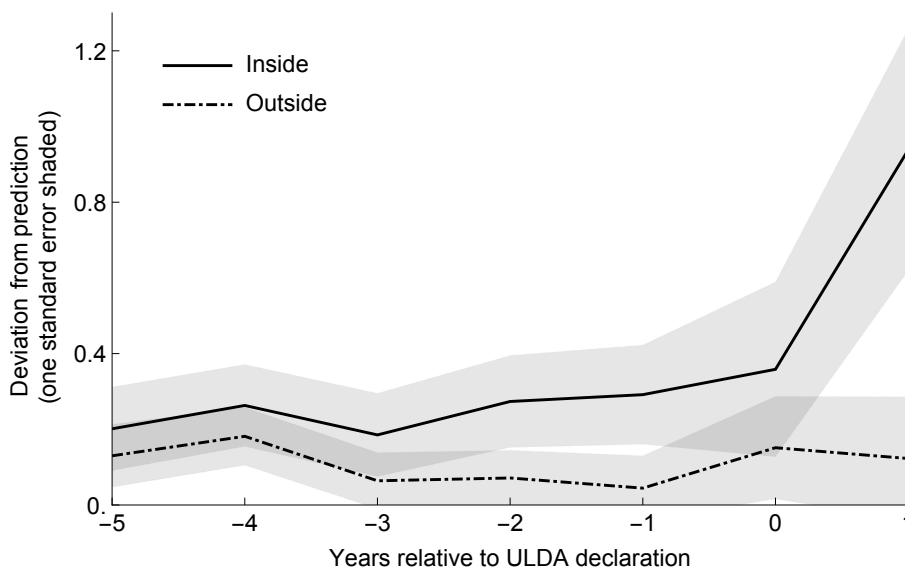


Figure 2.5: Deviation from predicted price for land inside and outside ULDA areas

records of politicians’ family members are not widely and consistently available, yet previous research suggest that such connections are highly valuable in sub-national politics even in low corruption countries (Amore & Bennedsen, 2013).

Using land sales data we estimate that the value of the additional development rights granted by the ULDA declarations is \$710 million, of which \$410 million was captured by landowners we are able to classify as rent-seekers; that is, landowners who exhibit some degree of connectedness in our observable relationship network. At the margin, the gains to becoming connected in our scenario is estimated to be \$190 million.

While the scale of the value transfer from this process may appear modest in relation to aggregate wealth in cities in Queensland, we must keep in mind that this represents a tiny sample of planning activities Statewide. Indeed, we have investigated just a 12,675Ha sample of single planning decision, much of which remains relatively low value land on the urban-rural boundary. Given the additional historical evidence in Section ??, the thousands of rezoning decisions over the last decades are likely to be an avenue for allocating many billions of dollars in development rights to connected landowners annually across the country.

Our results are consistent with a number of previous estimates of the payoff to political connections and returns to social capital (Faccio *et al.* , 2006; Cingano & Pinotti, 2013; Bertrand *et al.* , 2011; Engelberg *et al.* , 2012; Hillman, 2005; Faccio *et al.* , 2006; Chen *et al.* , 2011; You & Du, 2012). Where we differ is that we do not look at specific relationships to politicians, but the nature of positions within a larger network of relationships which reflects a broader view of social capital. We find that it is more important to be part of a close-knit group that all have strong ties with each other, i.e. to have ‘closeness centrality’ (a concept due to Coleman (1990)), than it is to bridge many different groups. Specialisation of relations matters more for getting favourable rezoning than knowing lots of people. Corruption investigations by media and state prosecutors suggest that the actual *quid pro quo* mechanism works via a revolving door where property developers and the key political/bureaucratic positions are the same people, exchanging

ing positions over time. Employing professional lobbyists, who are effectively selling their own advantageous position in the relationship network, appears a substitute to this revolving door.

Whilst we cannot say for certain whether the rezoning decisions imply efficiency losses, rather than just representing an economic transfer from the population to connected landowners, we can note that the rezoned areas are highly disjointed and irregularly shaped, not what one would expect from an efficiency point of view (see the rezoning areas in Figure 2A.1 of the Appendix). The rezoning decision clearly appears to have incurred efficiency losses as the eventual rezoned areas were very different from the previously announced areas that councils were forced to plan for, incurring unnecessary expenses. Furthermore, we cannot claim that the political influence of landowners is greater at the State than the local level. One barrier to studying rent-seeking at the local level is that in Queensland there are fewer disclosure requirements for councils. The *prima facie* view is that the greater ability to conceal favouritism would result in significant, perhaps greater, favouritism occurring at this level of government, in keeping with findings of Mookherjee (2014).

From a standard economic point of view, rezoning transfers new property rights from the community to specific individuals; rights that could be priced in a market rather than allocated politically and incurring the associated costs of rent-seeking. One option for pricing rezoning decisions is to tax either the increased value of land (a betterment tax), tax land values completely (a 100% land value tax), or sell additional development rights to landowners through a local auction process. Alternatively, democratic mechanisms for directly deciding new development areas could allow for competing interests to be better balanced, and perhaps also ultimately lead to pricing of rezoning decisions. While much research remains to be done to see just how these options might be implemented in Australia and elsewhere, the same relationship networks that allow current favouritism to thrive in rezoning decisions will surely hinder any systematic reform of the rezoning process.

Appendix

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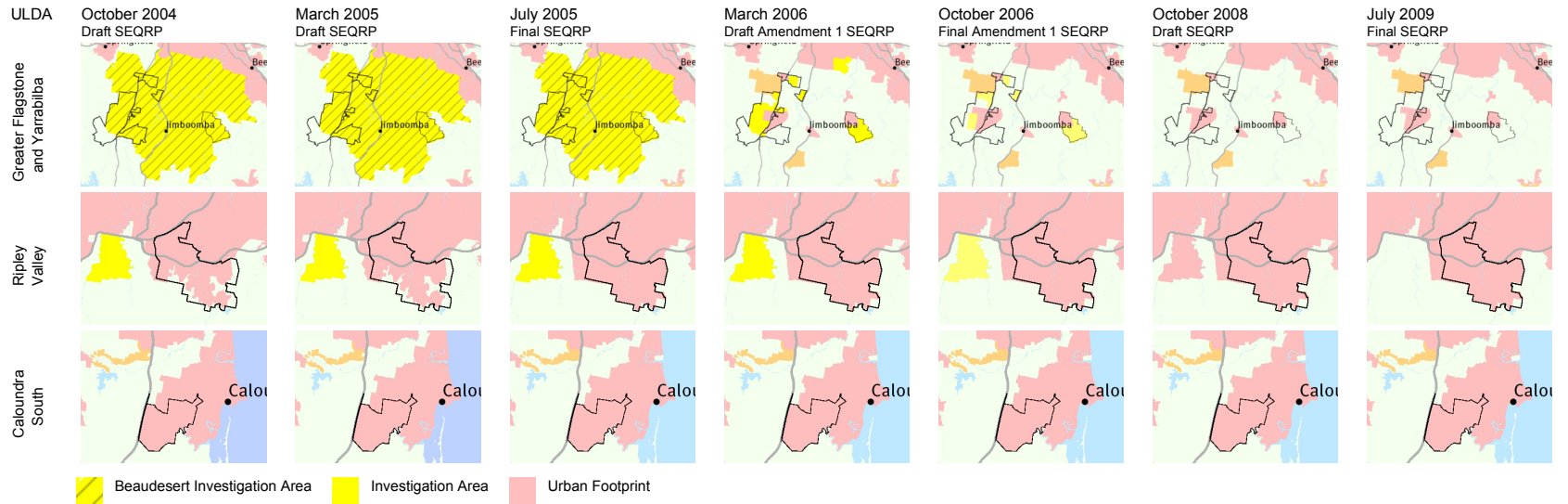


Figure 2A.1: Comparison of SEQRP (shaded areas) and ULDA areas (bold outline, Yarrabilba is right side area of top panels)

Yarrabilba Planning Application Process 2003 – 2010 (Pre-ULDA)



| Date | Item |
|------------|---|
| Dec 2003 | Lend Lease sign Yarrabilba Land Agreement; prepare MCU Preliminary Approval DA |
| June 2004 | LL Lodge MCU Development Application with Beaudesert Shire Council |
| Oct 2004 | Draft SEQ Regional Plan released (OUM) – Yarrabilba not included in Urban Footprint |
| Dec 2005 | Beaudesert Shire Council 'Whole of Shire Planning (WOSP) established / Dept of Main Roads & Dept of Transport unsupportive of project |
| Oct 2006 | SEQ Regional Plan Amendment 1 released – Yarrabilba (Part) included in Urban Footprint |
| June 2007 | BSC advise unlikely to support DA for whole site – agree to support determination of Partial Approval (800 lots) + Planning Scheme Amndt over whole. |
| July 2007 | Local Government Reform Commission – site included in expanded Logan City LGA |
| Aug 2007 | LL request State Call-in (lack of progress with determination of DA + EBC opportunity of State Significance) – not supported by State. |
| Sept 2007 | LL sign Second Variation – recognising Partial Approval + Planning Scheme Amendment. |
| March 2008 | LCC take responsibility for Yarrabilba + commence review to determine position. |
| June 2008 | LCC advise not willing to proceed with DA; to be progressed via Council-initiated statutory Structure Planning process. |
| July 2009 | SEQ Regional Plan Amendment 2 released – Yarrabilba recognised for start in 'short term' |
| Nov 2009 | LCC revised position – DA to be progressed over Urban Footprint part + structure planning over balance; State Infrastructure Agreement negotiations progress. |
| May 2010 | Premier announces intent for 3 major SEQ Greenfield projects (incl Yarrabilba) to be 'fast-tracked' under Urban Land Development Authority (ULDA). |

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Figure 2A.2: Copy of Lend Lease document with timeline of planning amendments sought for Yarrabilba

Chapter 3

Gifts to power as a mechanism for *institutional sclerosis*

Abstract

The entrenchment of favoured elites in political processes is best understood as a repeated cooperative game. In this game reputations sustain mutually beneficial outcomes at the expense of others, and additional reputation can be gained via costly signals or gifts. Here a key element of such a game is considered; the optimisation of signalling efforts in order to maximise returns to reputation. Simulating this optimisation game with agents distributed within a reputation space results in a clustering of signalling strategies consistent with patterns of political donations data in the UK, Germany and Australia. The simulations also demonstrate the entrenchment of interests over time occurring through exclusive access to a ‘social ladder’, highlighting a potential process underpinning Olson’s (1982) idea of *institutional sclerosis*. Framing political processes in this way is consistent with other puzzling aspects of political favouritism, such as loyalty, exclusivity, and low rent-seeking costs, and offers a new lens through which to view anti-corruption policy.

3.1 Social dimensions of political influence

If political donations do not directly buy favours¹, then what are they for? Why do some political donors hedge their bets by donating to multiple parties, yet lobbyists rely on loyalty to their existing relationships to influence policy?² Is political influence merely a repeated cooperative game, in which only the select few are invited? And do these questions contain important clues to understanding Olson’s (1982) idea of *institutional sclerosis*, whereby special interest groups incur great economic cost on the community as they reallocate wealth towards themselves?

In this paper we offer the framework of optimal reputation signalling within a repeated cooperation game as a way to model the micro-economic process of entrenchment of elites in the political system, leading to the economic rigidity implied by Olson’s *institutional sclerosis*. While most

¹An argument made by Stratmann (1991); Ayres & Bulow (1998) and Ansolabehere *et al.* (2003).

²Evidence of these patterns is in Harrigan (2008); Bertrand *et al.* (2011); Koger & Victor (2009); McMenamin (2012).

component ideas are borrowed from across the social sciences, the nesting of an optimal reputation signalling problem, where payoffs are proportional to the change in stock of reputation, is an original insight. The particular way in which these ideas fuse together in a simulated agent-based model makes sense of complex social interactions involving competing political parties, and provides coherent answers to, and new insights about, the above questions.

Understanding political action in democracies typically focuses on competition for voters by established political parties (Downs, 1957; Prat, 2002; Page & Jones, 1979) or through coalition formation of parties in the interests of electoral success (Dhillon, 2005). The domain of interest of the model presented here is quite different in that it takes the stability of political parties and their voting blocs as a starting point, and looks at the rational response to that political structure by individuals and firms seeking political gains. Political parties use their power as ‘payoff machines’ to encourage cooperation of elites in a repeated game that can further entrench both their own political power, and the wealth and power of game-players in the private sector. The main element of interest in this repeated game is how donations, lobbying, revolving-door employment, and other such methods of influence, comprise a signalling repertoire used to invest in, and maintain, party-specific political reputation; a reputation which itself determines the political allocation of the economic surplus conditional on anti-corruption monitoring efforts.

Providing common knowledge in multi-player cooperative games through information mechanisms such as reputation is a now-standard tool in the analysis of collective action, falling under a variety of names depending on the specific application, including *tags* (Masuda & Ohtsuki, 2007), *reputation* (Akerlof, 1980; Engelmann & Fischbacher, 2009; Ohtsuki & Iwasa, 2004; Bolton *et al.* , 2005), *image-scoring* (Nowak & Sigmund, 1998; Milinski *et al.* , 2001; Bshary & Grutter, 2006), *types* (Ones & Putterman, 2007; Ambrus & Pathak, 2011), *trust* (Luhman, 2000; Mui, 2002), *peer pressure* (Barron & Gjerde, 1997), *signals* (Lotem *et al.* , 2003; Huttegger *et al.* , 2014), *networks* (Granovetter, 1978), *social capital* (Fukuyama, 1999; Jackson *et al.* , 2012) or *social approval* (Gächter & Fehr, 1999).³ These mechanisms provide both material costs and solidary incentives⁴ to maintain cooperation within a group (Wilson, 1974), and offer a partial solution to the common knowledge problem of players understanding the logic of the cooperative game. Most reputation signalling mechanisms contain the idea of an ‘information threshold’ for cooperation, below which non-cooperative outcomes occur; a characteristic that appears crucial in political cooperation where elites appear to ensure that most of the population is excluded from the game.

The focus of this model is the link between current reputation, investment in signals to ‘buy’ reputation gains, and payoffs. Payoffs arise under the assumption of a stable political party structure that distributes economic rents based on the party’s relative power to do so, and the party-specific reputation of agents in the economy. That is, beneath the media fuelled vote-buying propaganda, political parties are assumed to be social structures for redistributing economic wealth to cooperative partners in a type of gift-exchange game. Because the specific focus of the model is on the signalling element of this game, there is no need to make assumptions about the evolutionary fitness of cooperative strategies or the need for punishment, as the model will fit the data so long as the jointly cooperative strategy is reasonably common in the population.

A number empirical regularities that cannot be easily explained either by the standard economic

³In experimental studies the use of arbitrary symbolic markers (Efferson *et al.* , 2008), non-verbal social cues (De Kwaadsteniet *et al.* , 2012; Kwaadsteniet & Dijk, 2010; Rosenblat, 2008), and previous costly cooperation also play a similar coordinating role as reputation.

⁴Cooperation improves reputation, which in turn facilitates lower cost future cooperation amongst the same group above other groups.

view of rational responses in conflict games, or by rent-seeking approaches to the allocation of political favours, are consistent with this model. First is the clustering pattern of political donations observed by Harrigan (2008) in Australian data, and McMenemy (2012) in Canadian and German data also, around partisan (exclusive donations to one political party) and hedging strategies (splitting donations between parties at certain ratios, usually 50:50). Rent-seeking theory, whereby donations purchase a lottery ticket in a regulatory payoff, make no prediction about such patterns.

A second empirical regularity is the loyalty of lobbyists to their political connections. Evidence that lobbyists suffer financial losses when their connections leave office (Bertrand *et al.*, 2011; Koger & Victor, 2009) suggests that their relationships themselves have value, perhaps because some barrier exists for others to gaining such advantageous relationships. Third is the observed limits to political participation, whereby political access is reserved for some interests but not others (Shughart II *et al.*, 2003; Bihagen *et al.*, 2013). Usually this is explained by a failure of selective incentives in large groups (Olson, 1965), or costs of monitoring contributions to the common good in dispersed networks (Granovetter, 1985). Yet such views cannot explain how small interested groups, such as new entrants in disruptive industries, also find themselves excluded, while entrenched elites in a particular country or region maintain cohesion within very large groups. Such phenomena contradict the precise sclerosis prediction of Olson (1982), though they nevertheless indicate a process of entrenchment of some interests above others. A final puzzle is lack of extortion in politics, with evidence suggesting that in contrast to the basic rent-seeking prediction, favours are made without politicians earning close to the full value of those favours from rent-seekers (Del Rosal, 2011).

The model here takes as a starting point the mutual choice of a cooperative equilibrium amongst politicians and private interests in a coordination game, which may or may not incur negative externalities on non-cooperators and individuals not playing the game, and looks at the optimal signalling choice of an agent within that environment given their current political party-specific reputation level. Payoffs from signals to each party are a function of current reputation and the relative political power of each party over a stable period, as well as the anti-corruption monitoring effort. The introduction of monitoring generates one of the more practical, yet perhaps unsurprising conclusions; that increased monitoring leads to increased costly efforts to conceal reputations for high-reputation well-connected individuals. Diminishing returns to reputation lead to a cutoff point for those with low reputations, who will find that there are never positive returns to signalling, again supporting the evidence of limited political access and the potential for professional lobbying to in fact broaden the representation of interests in politics. A major result is that the hedging behaviour of political donors is the natural result of the existence of agents with sufficient reputation across multiple political parties, and that the point of convergence of hedging donors corresponds to the ratio of power between political parties.

The remainder of the paper is as follows. In Section 3.2 prior literature is discussed in the context of the current approach with a focus on how the use of signals to generate reputation as a mechanism for coordination is widespread, yet the additional incentive to optimise the investment in those signals is largely overlooked. It also expands on the empirical puzzles the model seeks to explain. Section 3.3 then introduces the model and clarifies the economic concepts and relationships being represented. This section concludes by simulating the model in a multi-agent environment. A summary of the model insights and applications comprises Section 3.4, while Section 3.5 looks at corporate cross-directorship data to test whether patterns of political donation signals are consistent with patterns in the network of cross-directorships, which are an

alternative was to signal reputations. A final discussion and remarks are in Section 3.6.

3.2 Background

The coordination of groups occupies a prominent space across the social sciences and a complete review is beyond the scope of this paper. Instead we start from the broad ideas of *institutional sclerosis* as a group coordination problem, to signals and reputation as an approach for solving repeated coordination games where there choice of who to cooperate with, narrowing down to the application of this idea in political analysis. In the process some of the puzzling stylised facts of political lobbying are discussed both from the standard economic perspective, and from the framework of reputation signalling.

Olson (1965) viewed groups as a coordinative mechanism for self-interested individuals seeking access to non-excludable payoffs from collective action. He characterised the problem whereby the cost of collective action in a group, C , is constant for each group member, and yet the value from the public good to a group member, V_i , shrinks in proportion to group size, meaning that as groups get larger there is less chance for individuals to gain positive profits, ($\pi_i = V_i - C$), through costly participation in collective action. Olson (1982) develops this group logic to an underlying cause of stagnation and social rigidity in political stable environments via the accumulation of small special-interest groups, or distributional coalitions, which devote resources to protecting interests from competition and reallocating wealth towards themselves through political means at the expense of others. This is *institutional sclerosis*, and there is growing evidence of this type of entrenchment of interests over time. For example, Bihagen *et al.* (2013) shows that not only have class divisions, in terms of access to elite business positions, increased over recent decades in Sweden, but education as a tool for reducing equality is becoming less beneficial over time. Evolving social structures entrenching elites are now limiting access to advantageous positions, and hence reducing pay-offs to education for those in less beneficial parts of the social network. Shughart II *et al.* (2003) estimate a long-term inverse relationship between the Gini coefficient and interest group dominance in US states, suggesting that even with many interest groups involved in politics, the interests of broad swathes of the community remain excluded from political access.

While highly influential, the original view of sclerosis has been challenged in respect to the assumptions about the necessity for selective incentives to sustain larger groups, even if their interests are aligned (Wilson, 1974; Hardin, 1982; Udéhn, 1993; Cheikbossian, 2012).⁵ To be clear, selective incentives are only loosely defined by Olson as vaguely involving coercion or power to enforce group membership and cooperation, yet are the hook upon which his explanations for coordination in large groups hang. As Udéhn (1993) explains, if any selective incentive s_i is allowed to explain coordination in large groups, it becomes an unlimited reservoir of *ad hoc* explanations which ensure that $\pi_i = V_i - C + s_i > 0$ in any instance of large group organisations.⁶ Indeed if selection incentives are available, why would groups bother with investing in collective public goods at all and not simply enforce club-good arrangements?

If selection incentives in some form are widely available, Olson's logic of groups becomes a

⁵A similar logic arises in sociology whereby the density of relationships in a network are said to enable monitoring of free-riders, and hence smaller and more dense groups will be able to better coordinate in their interests (Brass *et al.*, 1998; Granovetter, 2005).

⁶Similar *ad hoc* explanations occur widely in explaining cooperation, for example the entertainment value term, E in Tullock (1971)

special case rather than a general rule (Trumbull, 2012), bringing into question the extended logic of *institutional sclerosis* as well. Yet even if Olson’s collective action logic is not robust, the empirically informed arguments for stagnation in stable economies maybe still be quite valid but be the result of a slightly different underlying process of group entrenchment (Coates *et al.*, 2007; Horgos & Zimmermann, 2009). Indeed, a broad range of mechanisms of social organisation may be consistent with the sclerosis and stagnation view, and this paper puts forward one potential story relying on the idea of individual reputations as selection incentives in repeated games; allowing for a sorting mechanism that ensures cooperative individuals are rewarded for group participation. Signals are widely observed to sort players via reputations but more than that, the requirement of some sort of existing reputation in order to interpret signals means that the same signal can be interpreted differently if it arises from two individuals with different reputations, providing a hard-to-fake selection mechanism (Goffman, 1959).

Understanding political actions as a cooperative game sustained by signals is a minority view (Potters & Winden, 1992; Ayres & Bulow, 1998; Ackerman & Ayres, 2008). Yet outside this view empirical regularities in in political donations and lobbying behaviour are difficult to interpret. Harrigan (2008) and McMenamain (2012) find surprising regularities in the patterns of political donations in Australia, UK, Canada and Germany.⁷ Figure 3.1 shows the frequency distributions of donation splits between dominant political parties in each jurisdiction, with distinctive peaks at a 50:50 splits at the federal and state level in Australia and in Canada, no donation splitting in UK, and a cluster at a 65:35 split in Germany.⁸ These clusters of splitting donors are called ‘hedgers’ or ‘pragmatists’ or other distinctive motivational labels, yet if donations merely reflect attempt at influence by particular interests, it is not clear what these clusters represent in Olson’s view of entrenched interest groups. Nor does the traditional rent-seeking view of donations representing the purchase of tickets in a lottery for a political payoff have much to say about these patterns, nor the relatively low size of donations compared to political gains (Del Rosal, 2011). Why hedging donors are also the largest donors, as shown by the donation-weighted plots in Figure 3.1, also requires an explanation.⁹

Moreover McMenamain (2008) finds evidence of *ship jumping*, or shifting donation biases, in Australian political donations data close to elections as a response to polling. He finds that political donors “direct more money to the party that is ahead in the polls, increasing the bias as an election approaches.”

A logic to this clustering and bias-shifting behaviour arises when donations are framed as reputation signals. It may be possible for a small well-connected group, with sufficient existing reputation to both major political parties, to signal simultaneously to both sides and gain joint reputations, while also giving a slight preference to those with more political power at any point in time. Such a frame also helps explain the evidence of loyalty to political connections rather than issues in professional lobbying. If relationships represent reputation signals then the logical result is that favours may only be sought from those with existing high reputations. Koger & Victor (2009) for example, demonstrates how this logic plays out using a large network dataset of US lobbyists and their relationships to Congress members, candidates, and political action committees, finding strong patterns of overlapping service committees and voting blocs, and

⁷Donors, each one perhaps an organisation of thousands of members, is a rather large group of interests by Olson’s reasoning.

⁸Figure 3.1 uses data from McMenamain (2012) for Germany and Canada, UK Electoral Commission data as at July 2014 for UK, and Australian Electoral Commission data as at July 2014 for Australian and its states.

⁹It has been argued that loyalties to one party or another can be expressive acts that confirm one’s identity, providing direct utility gains from the act of donating rather than from future gifts. However, there is no reason that such acts be excluded from this analysis just because it this behaviour feels like the right thing to do.

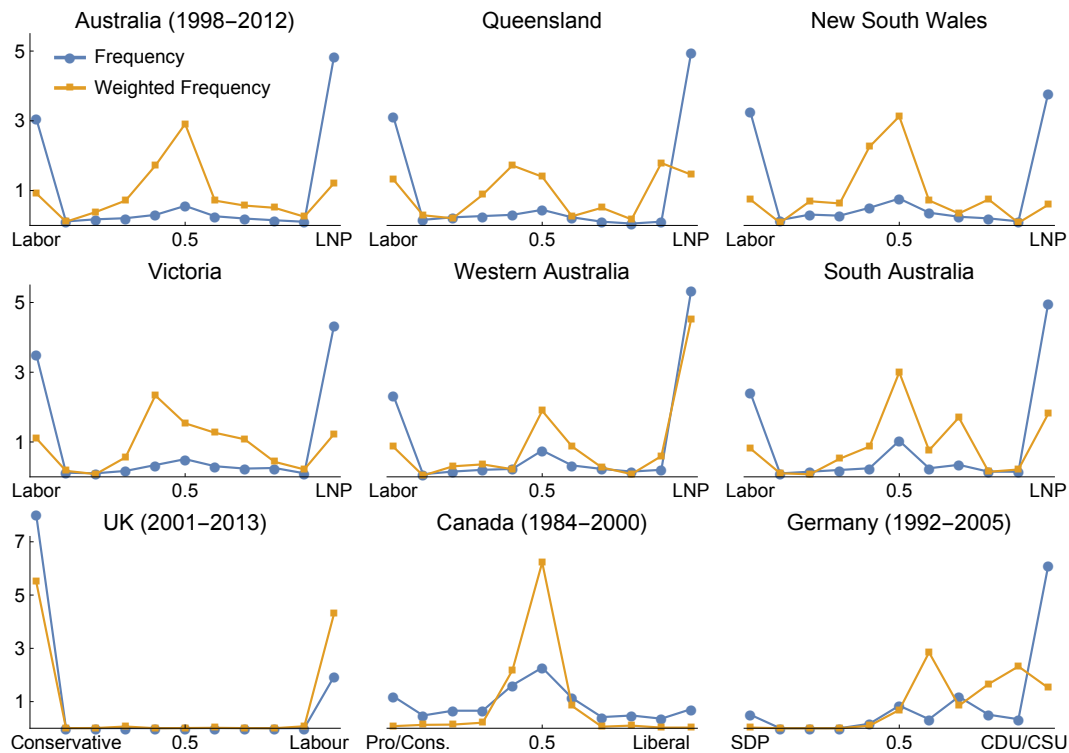


Figure 3.1: Discrete probability density function of donor frequency (by party share of donation and weighted for donation size)

concluding that

...lobbyists tend to concentrate their attention on political allies, avoid their ideological adversaries, and infrequently lobby fence-sitters, suggesting that they are not buying votes or persuading legislators on a case-by-case basis. More importantly, lobbyists appear to systematically switch issues as the politicians they were previously connected to switch committee assignments, hence following people they know rather than sticking to issues.

Bertrand *et al.* (2011) also find that lobbyists are loyal to their ministerial contacts and only change issues when their contacts change committees, while i Vidal *et al.* (2012) estimates that lobbyists whose US Senate connections leave office suffer a 24% decline in revenue, suggesting that the value of social connections is significant and that relationships rather than expertise are the main source of political influence. If lobbyists are selling access to their reputation with certain politicians, essentially vouching for the client as a mafia member would vouch for a cooperative intent of a new recruit by risking their own reputation, these empirical findings of loyalty are exactly as expected from a reputation signalling viewpoint.

While donations and relationships appear to be reliable reputation signals, the overarching coordination problem is one of interpreting signals. In repeated coordination games many types of information, both verbal and non-verbal¹⁰ (Kurzban, 2001; Bolton & Brosig-koch, 2012) can

¹⁰Indeed language itself is a complex signalling system relying on common knowledge to be useful (Jäger, 2007;

evolve as signals of cooperative intent based on past associations with cooperative choices. Certainly many activities outside of political donations, such as common memberships of exclusive clubs, are costly signals that can become associated with a particular type of cooperation necessary for political favouritism. It is the culmination of all signals taken together that represent the reputation stock of one individual with respect to another (Hechter, 1992), allowing for accurate expectations about future cooperation, and a selection incentive for inclusion or exclusion in future coordinated activities. Together the evidence points to political favouritism and entrenchment of elites, or *institutional sclerosis*, being a game of group formation around stable political parties, whereby reputations and the signals that generate reputations, provide the selection incentive necessary to ensure cooperation of the elite group at the expense of outsiders.

3.3 Model

The following sections introduce the key conceptual ingredients in this model in a way that gives the readers from broad social science backgrounds grasp the fundamental idea

3.3.1 Cooperative game

A ‘one-sided’ signalling game, shown in Table 3.1, captures the political environment of interest whereby agents prefer political allocations of rent, b , and political parties prefer beneficial public signals (such as donations) that come at cost c . Agent’s reputation effects are included in parentheses, and represent a change in the stock, r , of political party-specific reputation. In the one-shot game there is no unique Nash equilibrium, though in a repeated setting a strategy of conditional cooperation, or win-stay, lose-switch (where losing involves a payoff of zero or less) renders mutual cooperation evolutionary stable.¹¹

In this game c is the cost of a signal type, s . Signals types capture the range of ways in which individual and firms can provide direct benefits to political parties, such as through donations. But it also captures the idea of joining exclusive clubs, providing favourable media coverage or industry support for political decisions, and other activities that are costly to the individual but provide a political benefit through reinforcing their institutional power, and in doing so improve the reputation between the political party and the individuals or firms involved.

In reality each stage game need not be a simultaneous choice, as sequential choices by signallers and politicians may also support a jointly cooperative strategy using reputations. Moreover, as long as cooperative strategies are reasonably widespread in the population the predicted behaviour should closely match data on political donations, revolving door appointments, and other forms of political signalling and favouritism. Hence, it does not matter what proportion of the population are playing a cooperative strategy as only the cooperative strategy is observable in the data.

Jäger *et al.*, 2011; Franke & Wagner, 2014; Tse, 1998) with research in the evolution of language analysing similar cooperative dilemmas.

¹¹Mutual cooperation leads to ‘stay’ in the win-stay, lose-switch strategy, hence the stability of this outcome. Mutual defection leads to both players switching to mutual cooperation. Defection by the agent and cooperation by the political party leads to the political party party defecting next period, creating mutual defection. The agent cooperating and political party defecting leads the agent to switch to defecting next period creating mutual defection. Even where the lose criteria is shift from zero to strictly negative, mutual cooperation remains a ‘stay’ for any agents who start by chance at that point.

Table 3.1: Payoff (reputation) structure for implicit political cooperation stage game

| | | Political party | |
|-------|---|---------------------|------------------|
| | | C | D |
| Agent | C | $b - c, c$ (e) | $-c, c$ (d) |
| | D | $b, 0$ (d) | $0, 0$ (0) |

C is cooperate, D is defect.

Stage game payoffs are $0 < c < b$.

Reputation effects are change in reputation level r , where $0 < d < e$.

The main element interest in this game is how signalling is optimised when the payoff b is the politically allocated rent, c is the cost of a signal, and the size of both depends on the current reputation level r . The relationships between these variable open up an array of cooperative outcomes for agents with different reputation levels, some of which may have zero or negative payoffs. This means that not all people will be able gain by attempting to cooperate on $\{C, C\}$ because their reputation level is insufficient to generate a positive $b - c$ payoff.

3.3.2 Reputation mechanism

The reputation level performs two functions in the model. First it determines the size of the rents allocated to each agent, i , by a political party, j , in a given time period. The underlying assumption is that rents are predominantly allocated by politicians on the basis of relationships and reputations, rather than some objective criteria, such as productivity. Second, and perhaps more importantly, the reputation level provides a way to interpret signals, and hence determines the the relationship between the quantity of signals and the reputation gains which lead to payoffs b .

It is first worth discussing the general concept this reputation variable is capturing. Like an image-score, tag, or other stock indicator of trustworthiness, the reputation level functions as a selection incentive that allows cooperation to be sustained between those with sufficient reputation and to exclude those with insufficient reputation. If the reader prefers, a simple way to understand reputation in terms of relationships networks is as a generalisation of the network distance between two individuals. Figure 3.2 shows how a relationship network can be mapped into a simple single variable measure of social distance, which is a reasonable proxy for the idea of reputation if each relationship is uniform in terms of trust between agents. In a single component network there is hence a minimum and maximum distance to any other node, and hence a closed range of social distance or reputation (which is an assumption of the model). The point here being that the reputation concept is a general one that is consistent with alternative ways in which scalar measures of relationships are characterised.

The interpretation function of reputation level captures the idea that some previous knowledge about an individual is required in order for a signal to be interpreted. As Goffman (1959) explains, [i]nformation about the individual helps to define the situation, enabling others to know in advance what he will expect of them and what they may expect of him. Informed in these ways, the others will know how best to act in order to call forth a desired response from him.” After all, a political donation from an unknown source provides little information about

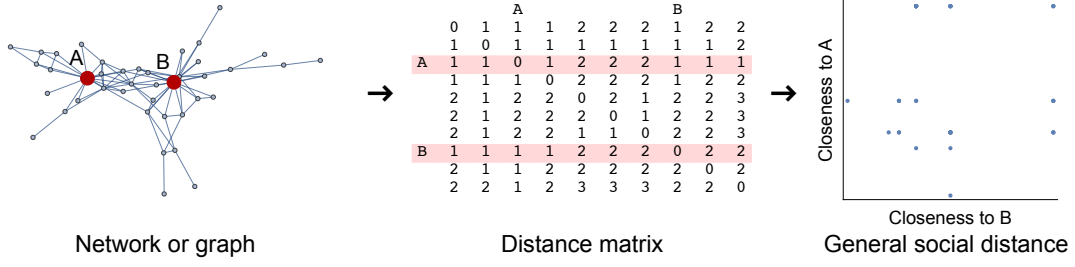


Figure 3.2: Generalisation of relative social space from network

how to sustain the jointly cooperative outcome and avoid defection in the one-sided signalling game.

Incorporating this idea into the model, reputation r for an individual i with political party (or politician) j can be said to evolve as follows

$$r_{i,j,t} = \gamma r_{i,j,t-1} \left(1 + \sum_s \alpha_{s,i,t} s_{i,j,t}^\beta \right) \quad (3.1)$$

where $r_{i,j,t-1}$ is the last period reputation between i and j , which decays in the absence of new signals by $0 < \gamma \leq 1$. Reputation gains, $e_{i,j,t} = r_{i,j,t} - r_{i,j,t-1}$, arise from the total signalling effort in a period, where $s_{i,j,t}$ is the size of a signal type from i to j , $\alpha_{s,i,t}$ is a weighting factor for each signal type, and β captures the diminishing returns to each signal. This setup captures the incentive to use a wide variety of signals to gain reputation, rather than rely on a single signal type. Equation 3.1 also describes a process of cumulative advantage via signals in a reputation space, since additional reputation allows for better interpretation of signals, and hence the same gains for fewer or smaller signals. The unit costs of a signal type is assumed to be constant, which simplifies signal type costs to $c_{s,i,j,t} = s_{i,j,t}$.

3.3.3 Use of political power

Political parties are assumed to allocate the economic surplus based on reputation levels. Rather than the payoff to cooperation being the result of an increase in combined output, here the cooperative game relies on pre-existing institutional power of political parties to merely allocate away from a large surplus pool to their cooperative partners. The cooperative payoff b , for agent i cooperating with political party j , is therefore a function of their reputation at the time, $r_{i,j,t}$.¹²

For each j political party, their power to allocated economic rents, $\kappa_{j,t}$, will affect the payoff to cooperative partners. This weighting parameter depends on the political environment and each party's relative ability to change policy. In a very even two party system like Australia, the weighting of the two major political parties will be roughly equal. Whereas in Germany, for example, the political power of the Social Democrat Party of Germany (SDP) is less than the combined power of the Christian Democrat Union (CDU) and its sister party the Christian Social Union (CSU), and hence the political power of the CDU/CSU alliance will be significantly larger than for the SDP.

¹²This assumption is supported by the results of Engelmann & Fischbacher (2009), whereby the helping rate in repeated donation games was proportional to the public reputation score.

Additionally, institutional constraints can have an effect on the relationship between reputation and rents. The practical level of political influence, or the ability to capture economic rents from the favour exchange, $I_{i,j,t}$, need not be directly proportional to the reputation level $r_{i,j,t}$. Under a regime of political monitoring, whereby political allocations of rent to close acquaintances (e.g. nepotism and cronyism) are either strictly illegal, electorally costly to the political party or politician involved, or result in some other cost due to community expectations, the practical political influence will not be strictly monotonic in reputation, $r_{i,j,t}$.¹³ Because of monitoring of close acquaintances there will be a peak in the functional relationship of $I_{i,j,t}$ with $r_{i,j,t}$ as shown in Figure 3.3, where m is the degree of monitoring and determines how far from the maximum $r_{i,j,t}$ the peak of $I_{i,j,t}$ is.¹⁴ This implies that to gain influence it may be necessary for high-reputation close acquaintances to socially distance themselves from specific politicians or political parties to gain rents.

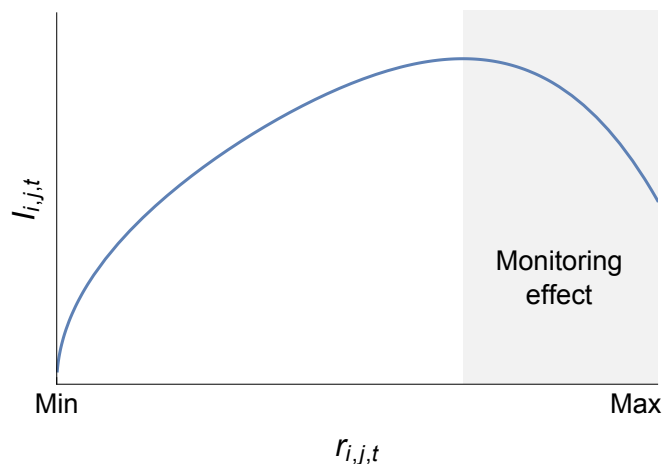


Figure 3.3: Typical relationship between reputation and political influence

In terms of our one-sided signalling game setup, the payoff to an agent's political cooperation, b , is the change in influence during that period, scaled by their ability to capture economic rents, ω , and by the political party's relative power $\kappa_{j,t}$, or $b = \omega_{i,t} \kappa_{j,t} \Delta I_{i,j,t}$. The $\omega_{i,t}$ scaling factor accounts for the differential ability of firms and individuals to capture economic rents due to their 'skin in the game'. A large landowner with a high reputation might find it easy to gain rents due to rezoning and public investment decisions, but a high reputation acquaintance with no business or asset market interests might be unable to gain such valuable favours despite their identical reputation.

¹³Monitoring captures the idea that outside the system of favour exchange there are often institutions that effectively enforce laws surrounding conflicts of interest of political decision-makers when they are overly blatant. In Australia examples include the Crime and Corruption Commission in Queensland, and the Independent Commission Against Corruption in New South Wales. These institutions investigate allegations of alleged corruption, specifically in cases of nepotism and cronyism.

¹⁴The qualitative model results hold for a variety of functions forms. This curve is of the form $I_{i,j,t} = r_{i,j,t}^\tau - m r_{i,j,t}^\varphi$, where $\tau = 0.5$ and $\varphi = 5$ over the reputation range $\{0, 11\}$, and is the function used in later simulations.

3.3.4 Agent optimisation problem

Agents seeking to cooperate in the ‘one-sided’ signalling game choose signals to maximise profit, π (or $b - c$), subject to current reputation, public monitoring of political favours, and their ‘skin in the game’. They solve the following dynamic signalling problem with respect to all j political parties.

$$\max_{s_t} \pi_{i,t} = \sum_{j=1}^n b_{i,j,t} - c_{i,j,t} \quad (3.2)$$

$$\begin{aligned} \text{subject to } c_{i,j,t} &= f(s_{i,j,t}) \\ b_{i,j,t} &= f(r_{i,j,t}, s_{i,j,t}, m, \kappa_{j,t}, \omega_{i,t}) \\ e_{i,j,t} &= f(r_{i,j,t}, s_{i,j,t}) \end{aligned}$$

A summary of all the variables and parameters is in Table 3A.1 of the Appendix. The solution to the profit-maximising problem in each period arises when

$$\frac{\Delta b_{i,j,t}}{\Delta c_{i,j,t}} = \frac{\Delta c_{i,j,t}}{\Delta s_{i,j,t}} \quad \forall i, j, s \quad (3.3)$$

Because we simplify that $c_{s,i,j,t} = s_{i,j,t}$, which is clearly the case in signals such as political donations, then this solution occurs when $\frac{\Delta b_{i,j,t}}{\Delta c_{i,j,t}} = 1$. In the case of one signal type to a single political party a typical qualitative result for the optimal signal size across reputation levels is in Figure 3.4.

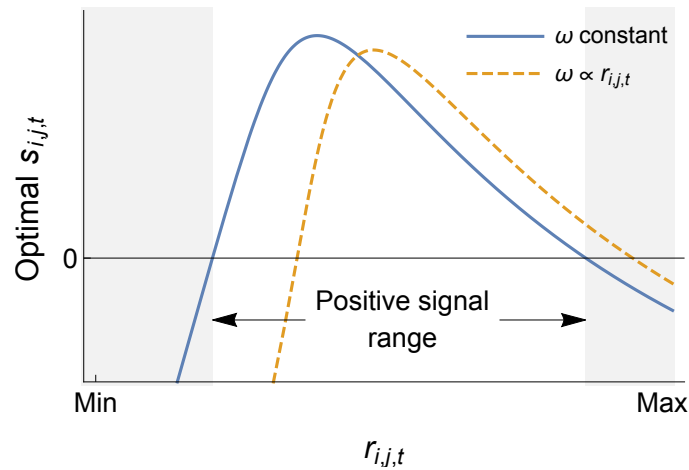


Figure 3.4: Optimal solution for one signal type across reputation space

This solution contains a number of elements suggesting a close correspondence between the model and key characteristics of political favouritism. First are the two shaded reputation ranges where

optimal signalling is negative. On the left is the low reputation range, a *disengagement range*, where agents have insufficient current reputation for any positive signals to be reliably interpreted as an intention to cooperate. That is $b - c$ is negative for any signal. The vast bulk of the population is likely to reside in this range, and hence the model suggests that most individuals will be unable to participate in a repeated political cooperation game of this nature. If this is the case then over time the model will see an entrenchment of elites and a rise in inequality due to political access of the few over the many.

The shaded negative signal range near the maximum reputation is the *concealment range*, where the gains to signalling for already high reputation individuals are negative due to monitoring of political favours to close acquaintances. Instead of signalling, it pays for these agents to invest in signals that distance themselves from the political party in order to capitalise on reputations. These "negative signals" could better be described as concealment efforts, and might include activities such as sheltering business connections through trusts and shelf companies, actively avoiding being seen together in public, or employing lobbyists as intermediaries. Such concealment efforts can have an economic cost by diverting resources away from productive activities.

A third feature of this optimal signalling relationship is the effect of 'skin in the game'. In the dashed plot the ω parameter is proportional to the reputation level, as would typically be expected. The effect is to first extend the *disengagement range* further up the reputation level when ω is small, but also to shrink the *concealment range* and increase signals for individuals with a large ω at high reputation levels.

3.3.5 Simulating agents in a reputation space

The above optimisation problem generates a *basin of attraction* towards each political party for agents whose current reputation lies within the positive signal range. For those agents, if they choose to participate in the cooperative equilibrium, they will ultimately increase their reputation through repeated signalling towards the attractor point at the high end of the range; a point where signals remain necessary only where the decay parameter $\gamma < 1$. In a two party system an agent's reputation level for each party leads their total signalling effort, though variation between these two reputations can lead to combinations of signals or concealment effect.

Figure 3.5 shows the regions in a two-party, $(r_{i,j1}, r_{i,j2})$, reputation space that contains all possible joint signalling outcomes. Above each blue line, which represents the reputation attractor point for each political party, is the 'concealment range' for each of the two reputation levels, where optimal concealment reduces reputations towards the attractor. Below the dashed line is the 'no signal range', indicating an insufficient reputation to engage in the cooperative equilibrium of the signalling game. The blue dot represents a third attractor point for agents who find themselves in the signalling range of both parties, where it is optimal to 'hedge' their signals, leading them from any starting point in the hedging space to the attractor point.

The relative position of this third attractor point, the hedging equilibrium, depends on the relative power of each political party. Where the relative power is roughly equal, this point will result in signals being equally split near that point. Where one party has more power, the hedging equilibrium will shift towards that more powerful party, with signal sizes to the two parties at the equilibrium point being proportional to their relative power. Where three or more stable established parties exists, there will be additional hedging regions representing each two-party combination, and all three parties, with the shared signal size in any of these hedging regions proportional to the relative power of each party. The resulting aggregate patterns of

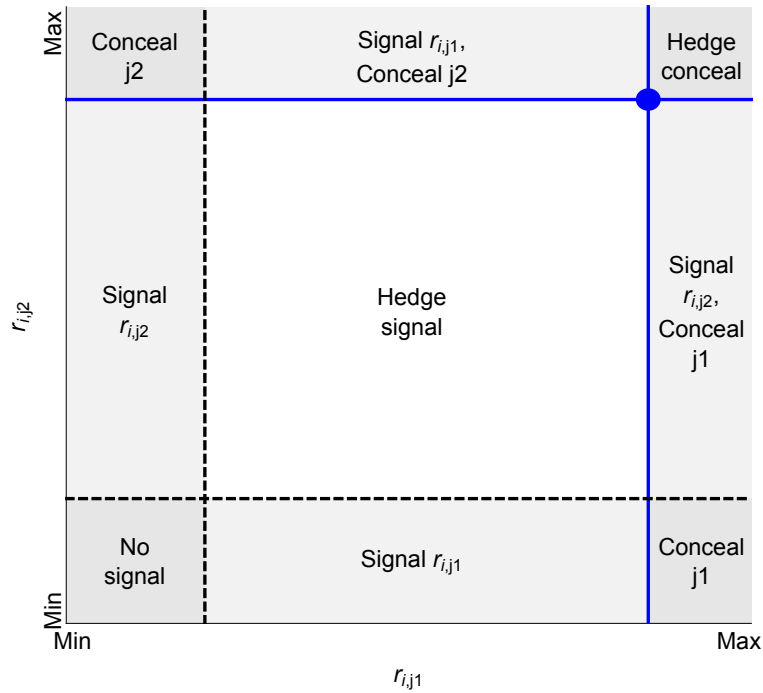


Figure 3.5: Regions arising in two-party reputation space

observable signals are the result of the distribution of the agents in the political economy within these reputation spaces.

To show the aggregate patterns of signalling emerging from this type of game we simulate a simple version of the model for a two-party system¹⁵ for a population of individuals in a reputation space using two distributions of agents.¹⁶ We use two different distributions of 2000 agents in the initial period of the simulation; first, a uniform distribution across the full range of the two-party reputation space, and second, a power law distribution, which is typically a more common pattern arising in other agent-based interactions in networks that might be operating alongside the particular favour-exchanges captured in this model (Page, 2012).¹⁷ We also use two relative weights to the political parties to show the impact to the hedging region, with an equal weighting, $\kappa_{j1,j2} = 1$, reflecting very even powers of political parties in systems such as Australia and Canada, and an unbalanced weighting, $\kappa_{j1} = 1$ and $\kappa_{j2} = 2$, representing a relatively more powerful $j2$ party.

Signal patterns for each agent in the first simulation time period are in Figure 3.6, which closely reflect the political donations data. Of note is that hedging signallers use larger or more costly signals on average, as the weighted frequency distributions show higher peaks near the even split

¹⁵ $\gamma = 0.8, \alpha_s = 1, \beta = 1, \tau = 0.5, \phi = 5, m = 6 \times 10^{-6}, \omega_{\forall i} = 0.5, \kappa_{\forall j} = 1$.

¹⁶ Unlike typical agent-based simulations we do not consider the roll of feedback in the system as agents react to the changing conditions of peers in their environment. This model merely focusses on the one-way attraction to stable political power structures, capturing the idea of *institutional sclerosis*, and not the evolutionary dynamics that allow the political power structures to evolve over time.

¹⁷ Pareto distribution is $r_{i,j}^{-0.2} : 0.1 < r_{i,j} < 11$.

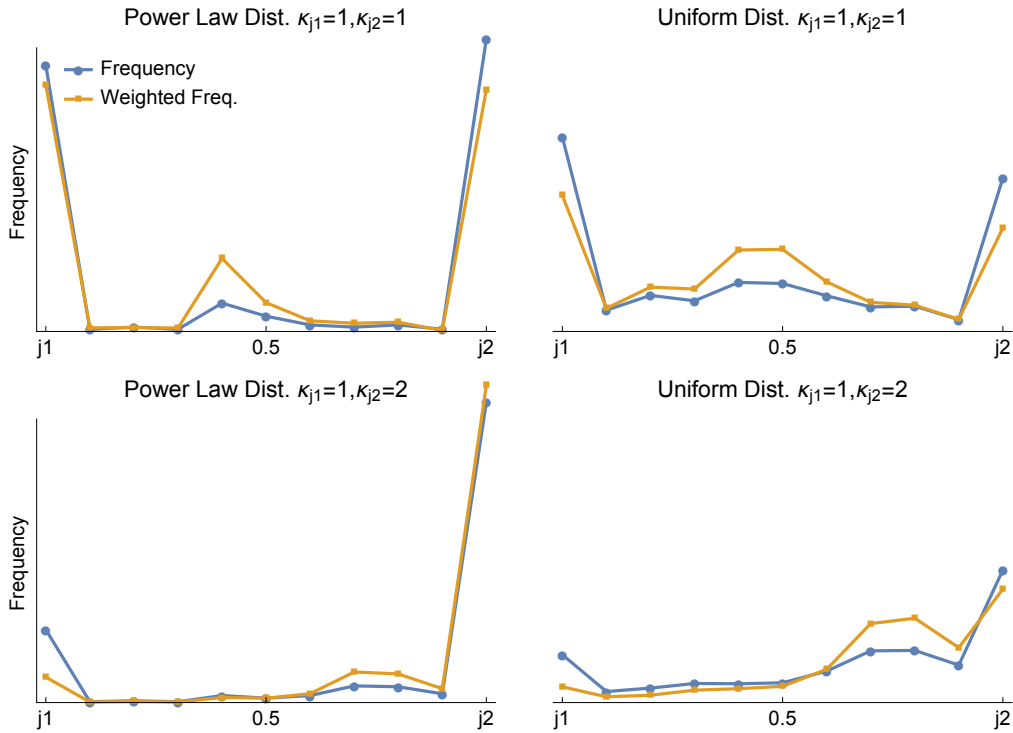


Figure 3.6: Frequency of $j_2/(j_1 + j_2)$ signal ratio in one period of a two-party simulation

between parties, and lower peaks at the partisan ends of the distribution. In the unbalanced political power setup hedging signallers shift the balance of signals towards the more powerful party, reflecting the case of the CDU/CSU alliance in Germany. In this model the ratio of hedging signals at any point in time arises a direct result of the relative power of the political parties. This offers a story consistent with the results of McMenamin (2008) in that when relative power shifts prior to elections, political donations shares for hedging donors shift toward predicted election winners.

In a repeated setting, agents optimising their signalling are able to build reputations towards the attractor points in the reputation space. Figure 3.7 plots reputations over time for a sample of the 2,000 agents in the simulation as they make use of optimal signals, capturing the idea of a ‘social ladder’ that can be climbed in this type of game for agents with sufficiently high starting reputation. A full suite of intermediate summaries in the repeated simulation are in Figure 3A.1 of the Appendix. Over time convergence towards the three attractor points creates a clusters of highly reputable and favoured agents quite separate from the many agents who are perpetually excluded from the game. The model therefore captures a process of entrenchment of elite political groups emerging over long periods of time.

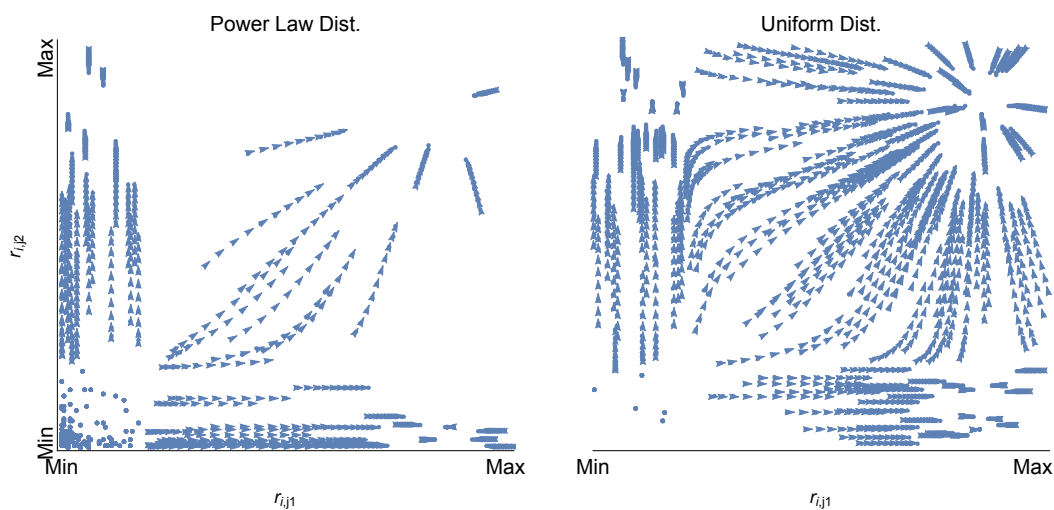


Figure 3.7: Sample of agent's simulated optimal 'social ladders'

3.4 Insights and applications

3.4.1 Concealment trade-off

A key insight of the model relevant to anti-corruption public policy is that observable signals, such as political donations and lobbying, are not monotonically related to successful political favouritism. Indeed, for a large part of the positive signalling range of reputation space, higher reputations and greater political favours are related to smaller, or fewer, signals. Large political donors in this model are likely to be those who came into wealth aided by luck, who are now looking to play the political game from a relatively low reputation starting point.¹⁸ Thus the model points to political favouritism being dominated over time by those close to the reputation space attractors who either a) need only minor signals to sustain their reputation, or b) need only put in a minor concealment effort to distance oneself to escape monitoring and policing of political favours.

Figure 3.8 shows that under a power law distribution of agents there is an expectation of a group of agents close to the third hedging attractor engaging in a great deal of hedged concealment, but if reputations are more uniformly distributed, that group will be much smaller than the groups concealing reputations to only one political party. Such results may indicate that the focus of monitoring efforts by public authorities should add to their remit the investigation of concealed relationships as well as monitoring signals such as political donations.

¹⁸The case of billionaire miner Clive Palmer in Australia is a good example of this, whereby his rapidly expanding mining interests prompted him to become the largest donor to the conservative party in Queensland. Though he later left the party to start his own party, indicating that his reputation was not high amongst the party and he was not receiving favours as expected. Another case is Huang Changran, a wealthy Chinese property developer who arrived in Australia in 2011. With his large 'skin in the game' and lack of strong relationships he quickly became the largest political donor in New South Wales (Welch & Noyce, 2015).

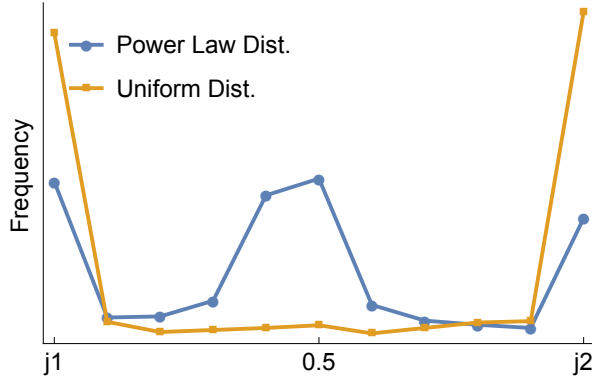


Figure 3.8: Optimal concealment effort ratios from $\kappa_{j1,j2} = 1$ simulation

3.4.2 Distribution of power and monitoring

An assumption of the model is that the degree of relative power of a political party affects the size of the payoff from cooperative signalling. It is therefore of interest how the size and scope of political signalling changes as political power is shared amongst more political parties.

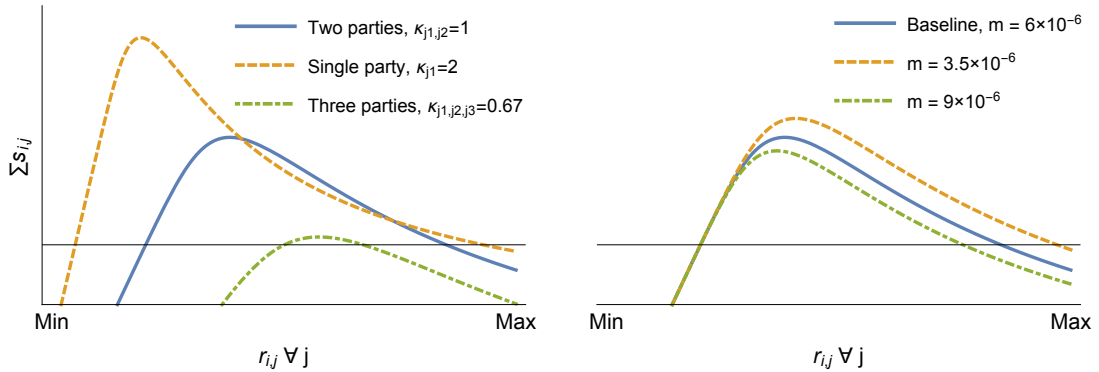


Figure 3.9: Optimal signals for combinations of relative political power, κ_j

The left panel of Figure 3.9 shows the optimal total signal to all parties in our baseline simulation, and varies the way total political power is shared amongst one, two and three political parties, holding all else constant. As the power of a party declines, and where monitoring is held constant, the range of reputations that find it advantageous to engage in the cooperative signalling equilibrium reduces. Not only that, but the total signalling activities for agents in that range also declines. These results suggest that the more widely political power is shared, the less signalling activity devoted to reputation-building occurs at any reputation level. Whether this results in lower total signalling in aggregate will depend on the complete set of reputations of all agents, though the general model prediction is that more dispersed power structures reduce the degree of participation in the signalling game.

To expand on the role of the monitoring trade-off, the right panel of Figure 3.9 shows the effect on

optimal signal size across reputation space in the two-party baseline under different monitoring regimes. Greater monitoring leads to lower signalling for those in the positive signalling range, but greater concealment by those at high reputation levels, while also decreasing the reputation level that maximises political influence. In all there is less signalling but more concealment, both of which divert resources from productive economic activity and are therefore economically costly.

3.4.3 Equality and efficiency

One application of this model is to demonstrate the potential complexity of the relationship between equality and efficiency as a result of optimised cooperation in the repeated signalling game. In terms of the larger debate about *institutional sclerosis*, understanding the economic costs associated with this process of entrenchment is important. The aggregate equality and efficiency outcomes in this model depend first on the economic cost of signals in terms of resources able to be used productively, and second, on the distribution of reputations in the population. If all agents are near the attractor points in the reputation space the distribution of political favours will be roughly equal, resulting in a roughly equal distribution of wealth as a result of the game. If signals required to sustain reputations are economic transfers, the efficiency loss will be zero. Outside of these extremes a great deal of complexity arises.

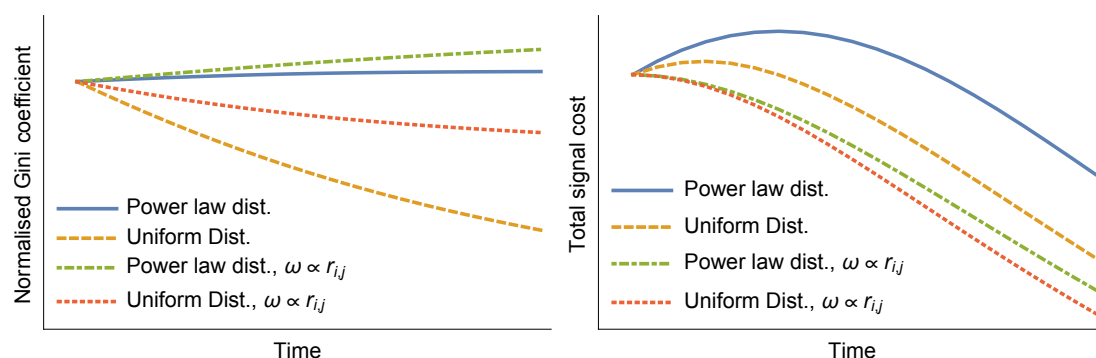


Figure 3.10: Simulated total signal and concealment costs over time

Recall that the political allocation of economic rents accruing to each individual is proportional to their reputation. We can thus use the sum of an agents reputations to each political party, weighted by political power, as a proxy for individual wealth at each point in time in the model simulation. The left panel of Figure 3.10 shows the change in the wealth Gini coefficient of the agent population over time for the simulated baseline with both power law and uniformly distributed initial reputations for all agents (with a normalised starting point), and additionally with ‘skin in the game’, ω_i proportional to reputation. The range of Gini coefficient paths demonstrates that increasing inequality is not a fundamental feature of the game, but is a product of the distribution of agent reputations. While in this case the power law distribution resulted in increasing equality, as measured by the Gini coefficient, the ratio of the top 1% of wealth to the bottom 20% still increased from 32 to 36 over the 20 period simulation. Thus the net distributional effect across the whole population of agents is highly dependent on the distribution of reputations.

In terms of efficiency, while many signals involve diverting resources from productive activities, such as professional lobbying, costly luncheons and industry conferences, many are mostly transfers. Donations are pure transfers, while other more subtle reputation signals, such as attending exclusive private schools, clubs, owning a home in the ‘right’ suburbs, driving the ‘right’ car and dressing the ‘right’ way, are not clearly unproductive. People need to be schooled, housed, and dressed even in the non-cooperative part of the game. Any costs also need to be evaluated against alternative institutional or social arrangements that would provide sufficient levels of trust to enable a highly function system of production and trade. There may also be additional ‘growth costs’ from the game if political allocations of economic rent constrain investment and innovation in order to protect the interest of the cooperative counterparts.

What can be shown using this model is that because signalling efforts transform the social space they may generate a reputation distribution that can result in total signalling effort either increasing or decreasing over time. The right panel of Figure 3.10 shows the total size of positive signals over the simulated population under various conditions. In the two scenarios where ‘skin in the game’, ω_i , is fixed, signalling effort first increases before decreasing, and the signalling agents moves towards the attractor points in the reputation space where optimal signals trend towards zero. There is thus no general rule of thumb arising about the expected trends in the size of total signalling efforts across the population. Any efficiency loss arises when signals are mostly resource investments rather than transfers, and where a larger share of the population has reputations within the positive signal range but further from the attractor points. While the aggregate economic costs in terms of efficiency losses are highly dependent on a number of factors, from an individual agent’s perspective the marginal gains are equal to the marginal cost from rent-seeking signals.

3.5 Signalling across domains

Another key element of the model presented here is that because of diminishing returns to individual signal type, signalling efforts should be spread across a number of types and show consistent patterns across these alternative signalling domains. Does the same clustering around the reputation attractor points occur in signalling domains apart from political donations? To answer that question we look at the patterns of cross-directorship in Australian listed companies, which is a domain in which signals of reputation are able to be made not just directly to politicians and political parties, but to other firms who may form part of a group of politically-connected insiders who all jointly play a cooperative signalling game. That is, increasing one’s reputation with another firm, which itself has a high political reputation with one or more parties, is one way to improve one’s reputation with the political party *and* the other firm. There also a pattern of entrenchment in this domain, with Alexander (2003) finding that over the period 1976-1996 the cross-directorship network of Australian listed companies became significantly more interconnected and clustered. To see whether the clustering patterns in Australian political donations data corresponds to the clustering patterns in this cross-directorship domain, we use the cross-directorship network of the 2,159 companies on the Australian Stock Exchange (ASX) in June 2013, of which 117 are also political donors, and 28 directors are donors in their own names. Figure 3.11 shows the large component of this network, highlighting the location of hedging donors (yellow), Liberal donors (dark blue) and Labor donors (red), with the size of the company node corresponding to betweenness centrality, a measure of how well-connected ones

own connections are to each other,¹⁹ in the network. The location of each node, or director, relative to each other reflects the number of direct and indirect connections between them. Graphically, patterns corresponding to political donations were present, red and blue nodes would be clustered together amongst a sea of yellow. This is not clearly the case.

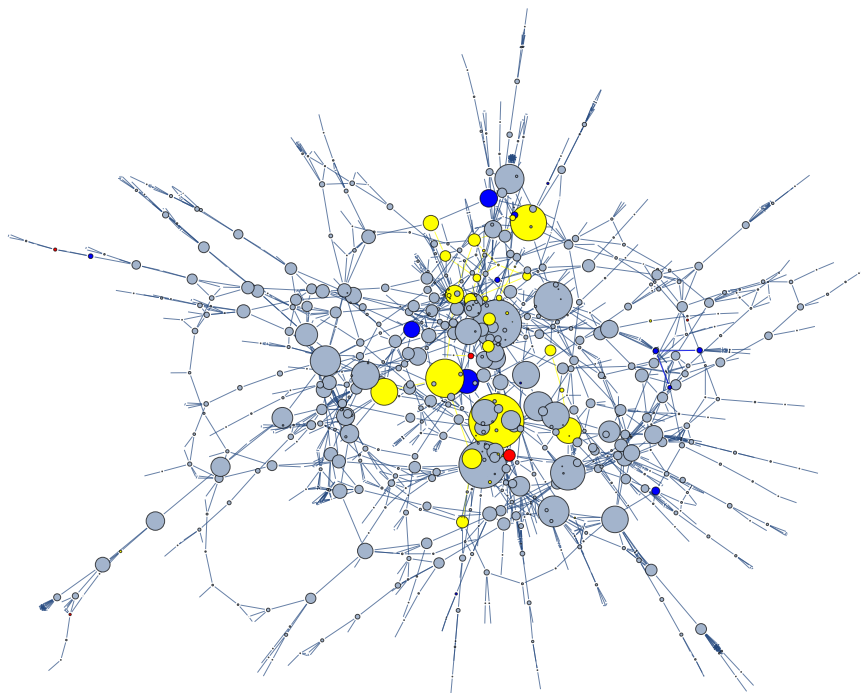


Figure 3.11: Large component of ASX cross-directorship network in 2013

From Table 3.2 we see that the hedging donors in the network are tightly connected within their own group, with 47% of firms being connected to each other by an average distance of 5.7 edges, and 43% being connected by a single edge. Labor donors are less connected amongst themselves (average distance 10.4, and no direct connections), with Liberal donors showing similar characteristics. While the partisan patterns are not clear, the extensive clustering of hedging donors in the cross-directorship network offers some support for the idea that cross-directorship is an additional reputation signal that sustains cooperation of political favour exchanges.

3.6 Discussion and conclusions

The above optimal signalling model nested in a ‘one-sided’ signalling game is a broad framework that captures many intuitive elements of political favouritism. It relies on the following key assumptions

¹⁹Betweenness centrality for a node i in a connected graph is given by $\sum_{s,t \in V \wedge s \neq i \wedge t \neq i} \frac{n_{s,t}^i}{n_{s,t}}$ where $n_{s,t}$ is the number of shortest paths from s to t and $n_{s,t}^i$ is the number of shortest paths from s to t passing through i .

Table 3.2: ASX cross-directorship network characteristics of donor groups

| | Hedgers | Labor | Liberal |
|-----------------------------------|---------|-------|---------|
| Total donors | 61 | 15 | 41 |
| Within-group share of connections | 0.47 | 0.31 | 0.34 |
| Mean in-group graph distance | 5.7 | 10.4 | 8.1 |
| Out-group share of connections | 0.40 | 0.39 | 0.38 |
| Mean out-group graph distance | 7.4 | 7.5 | 7.3 |
| Share direct connections | 0.43 | 0.00 | 0.05 |

1. Reputations are a coordinative mechanism capturing the ideas of image-scores, tags, or other stock indicators of trustworthiness that allow cooperation to be sustained and offer a selection incentive for groups to coordinate on a cooperative equilibrium.
2. Political allocations of economic rents occur in proportion to reputations to each political party, scaled by each party's power and augmented by monitoring and policing of favours.
3. Agents are distributed in the reputation space and optimise their use of available signals to increase their reputation level.

From these starting propositions a number of key relationships arise. First, there is a finite reputation range that allows for positive signals to be interpreted. This means that many individuals will in general be excluded from the cooperative game and be unable to gain reputation and political favour. Exclusivity of elites is a key element of Olson's sclerosis, and the model captures this idea through the *disengagement range*, which is a low end reputation cut-off for participation in the cooperative strategy, and the entrenchment over time of agents in the positive signalling region above that point. Figure 3.7 shows this preferential attachment process when political power structures are stable over long periods.

At the high end of the reputation range is the *concealment range*, where monitoring of political favours results in efforts to distance oneself from political parties in order to be able to gain political influence. In the model an increase in monitoring will decrease positive signals, but this will come at a cost of increase concealment efforts. Moreover, the empirical prediction is that political favours will not necessarily be well correlated with positive signals, such as political donations, if there is an ability to control for reputations. Exactly this result was found in Murray & Frijters (2015) (Chapter 2), where centrality in relationship networks was used as a proxy for reputations, in line with the network concept of reputation in Section 3.3.2, in a model that predicted political favouritism. In that study political donation coefficients were positive, but not significant, while the coefficients of reputation proxies were all positive, large, and significant.

In terms of observable signalling patterns between political parties, the model makes clear that hedging is a viable option for individuals who have a reputation level in the positive range for two or more political parties. Moreover, the ratio of signals between parties in this hedging region is the direct result of the relative political power of the parties. In the data reviewed earlier, all Australian states and Canada see hedging donors offering even split between major parties, while in Germany hedging donors cluster around a 65:35 split between the CDU/CSU alliance and the SPD, indicating that donors believe the CDU/CSU alliance is almost twice as powerful as the SPD.

Signalling behaviour in this model responds to political power. This contrasts to the standard

view that small well connected groups can act in their collective interest more easily, and hence the signals used to coordinate small groups are what leads to the group becoming powerful. While this may be true as a general observation, the model here deals with the case of a stable power structure and the entrenchment of elites within an existing power structure over time. Certainly there is scope for signals amongst the individuals unable to participate in this political signalling game (i.e. those with low reputations to current political parties) to use signals to coordinate their own groups and pool resources in order to tackle the political power structure through the creation of new political parties. The model here is consistent with this view, though the additional implication is that due to the distribution of current reputations amongst the population, new political parties are likely to arise from groups of disaffected individuals, rather than from current political elites.

Reframing political favouritism in terms of a cooperation game supported by reputations suggests a reexamination of how anti-rent-seeking, or anti-corruption, policy is assessed. Consider the argument of Ayres & Bulow (1998) that mandating donor anonymity would disrupt the market for political influence, since donations are identifying reputation signals in a game of favour exchange. If we believe that signalling trust through donations is only required for less connected firms, then restraints on donations will result in the market for political influence constricting to a smaller, but more reputable group, but also the use of alternative reputation signals that may be more economically costly than donations which are pure transfers.

It is also not clear whether caps on lobbying decrease the economic cost of political favour exchanges in terms of signalling activity (Che & Gale, 1998; Kaplan & Wettstein, 2006; Pastine & Pastine, 2010). If professional lobbying is merely one way to signal reputation by being vouched for by someone with a higher reputation, capping or outlawing it would result in a narrowing of the field of influence to only current high reputation individuals, or perhaps lead to the formal market for lobbying becoming informal, in a similar manner to the signalling game itself. Given the reliance on the reputation mechanism, regulating the way signaller's identities are concealed or revealed could be disruptive to the coordination of political favours. For high reputation individuals revealing identities to the public, such as through the disclosure of corporate records, may reduce their influence.

While there are limitations of this model in some areas, particularly the measurement of reputations and the interpretation of the wide array of activities that could be signals, the overall framework offers a new direction in understanding political favouritism, the mechanisms that sustain it, and the likelihood of different policies to curtail it. The influential idea of *institutional sclerosis*, whereby elites become entrenched over time and divert resources to themselves at an economic cost to others, now has a new plausible underlying mechanism that is consistent with a range of empirical regularities.

Appendix

Table 3A.1: Variable and parameter description for political signal model

| Variable | Description | Relationship |
|----------------|---|-----------------------------------|
| $b_{i,j,t}$ | Economic rent given to individual i from political party j | $f(r_{i,j,t}, m, \omega)$ |
| $r_{i,j,t}$ | Reputation level between individual i and political party j | $f(r_{i,t-1}, s_{i,j,t})$ |
| $s_{i,j,t}$ | Signal size between individual i and political party j | Choice |
| $c_{s,i,t}$ | Total cost of a signal type, s , for individual i at time t | $f(s_{i,j,t})$ |
| $e_{i,j,t}$ | Marginal reputation level gains from cooperative signals | $\Delta r_{i,j,t}$ |
| m | 'Strength of monitoring' for all political parties | $m \propto \text{strength}$ |
| β_s | Parameter for diminishing returns to a signal type s | $0 < \beta \leq 1$ |
| $\alpha_{s,t}$ | Relative strength of signal type s | $\sum_{s=1}^n \alpha_{s,i,t} = 1$ |
| γ | Decay factor for reputation $r_{i,j,t}$ | $0 < \gamma \leq 1$ |
| ω_i | 'Skin in the game' for individual i | $\omega_i > 0$ |
| $\kappa_{j,t}$ | Relative power of political party j | $0 < \kappa_{j,t}$ |

Variables and parameters with subscript t represent values at a particular time period only.

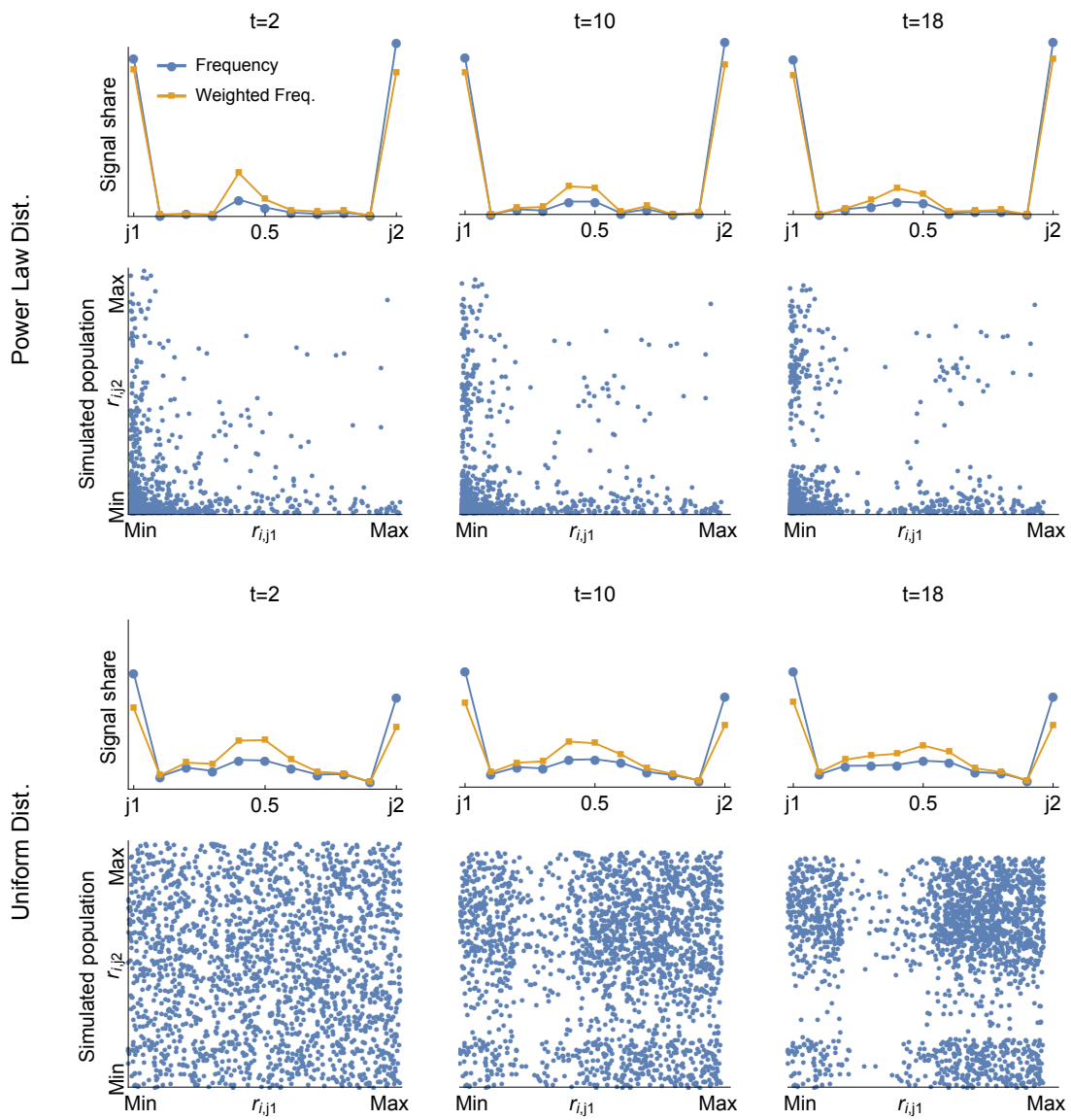


Figure 3A.1: Simulated evolution of signalling and reputations

Chapter 4

Give and you shall receive: the emergence of back-scratching

Abstract

We develop a new experiment to study the emergence of welfare-reducing bilateral alliances within larger groups, and the effectiveness of institutional interventions to curtail this reciprocal alliance behaviour. In each of the 25 rounds of our experiments, a player (the ‘allocator’) nominates one of three others as a co-worker (the ‘receiver’), which determines the group production that period to be the productivity of the receiver (which varies by round), but also gives the receiver a bonus and makes them the allocator in the next round. Alliances then form if two individuals keep choosing each other even when their productivities are lower than that of others, causing efficiency losses. Males and business students are found to be more likely to form welfare reducing alliances. Random allocator rotation policies and low bonuses fail to significantly improve overall welfare: rotation policies significantly reduce the rate of formation of new alliances but do not lead to the breakdown of existing alliances, while low bonus policies are only found to be effective when alliances are well established. This points to the importance of the strength of existing alliances for the chances of institutional interventions curtailing welfare reducing reciprocity, i.e. ‘back-scratching’.

4.1 Introduction

Lehman Brothers filed for Chapter 11 bankruptcy protection on September 15, 2008, triggering a collapse in financial markets. A lack of diligence by regulatory authorities in the United States, whose impartiality was undermined by the ‘revolving-door’ of personnel between private banks, lobbyists and regulators, is arguably a key element in the crisis (Roubini & Mihm, 2010; Levine, 2012; Matthews, 2014; Barth *et al.*, 2012).¹ For instance, Rohit Bansal and his superior Joe Jampietro, Goldman Sachs investment bankers who had previously worked at the NY Fed and Federal Deposit Insurance Corporation (FDIC), were alleged to have obtained market sensitive

¹Leaked recordings by Federal Reserve Bank of New York (NY Fed) whistle-blower Carmen Segarra provide evidence as to the degree of favouritism regularly shown between regulators and the regulated.

information from another former NY Fed employee, Jason Gross, that undermined regulatory oversight (Silver-Greenberg *et al.*, 2014).

Like most instances of favouritism, Bansal and Jiampietro’s case does not cleanly fit the definition of corruption by Jain (2001) as “acts which utilise the power of public office for personal gain in a manner that contravenes stipulated rules” due to substantial grey areas in the interpretation of confidentiality rules. Yet it is a clear example of where a degree of discretion can give rise to *quid pro quo* alliances formed on bases other than merit. Such alliances can be payoff-increasing for the insiders, but come with efficiency losses that are hard to measure. Faccio *et al.* (2006) for instance, find that companies are more likely to be bailed out with public money when they have political connections, though the authors were not able to observe the actual pay-backs to politicians. Mancur Olson (1982) nevertheless surmises that alliances can impose external costs as they redistribute gains towards themselves that can “exceed the amount redistributed by a huge multiple”, which raises the question of what institutions can reduce this kind of welfare-reducing reciprocity, or ‘back-scratching’.

Because costly alliances are hard to observe in real markets, we develop a new experimental design that captures their two key elements. First, alliance partners have to actively find each other and develop the trust necessary to sustain an alliance, and second, there is a conflict in payoffs between direct reciprocity within an alliance, and indirect reciprocity amongst a larger group. This design adds to existing experimental approaches to corruption and costly reciprocity.² An influential prior design is the Repeated Bribery Game (RBG), pioneered by Abbink *et al.* (2002). The basic stage game of this experiment involves two players in the role of briber and public official, where the briber first makes a choice of how much to offer as a bribe (if any), after which the official makes the choice to accept the bribe (or not), and then makes an allocation decision that may favour the briber. A public official’s allocation choice in favour of the briber triggers a negative externality determined by the experimenter, either by subtracting earnings from other subjects in the experimental session (Abbink *et al.*, 2002; Abbink, 2004), or by reducing the size of a charity donation by the experimenter (Lambsdorff & Frank, 2010; Schikora, 2011b; van Veldhuizen, 2011).

A wide variety of interventions have been tried in the RBG setting. A key finding by Abbink (2004) is that staff rotation is effective at reducing bribery and corrupt decisions, where rotation was implemented by randomly pairing bribers and public officials each round. The basic RBG design has since been augmented to allow for whistle-blowing (Schikora, 2011a; Lambsdorff & Frank, 2010), an outside informed monitor (Schikora, 2011b), payoff variations that mimic high non-bribery wages (van Veldhuizen, 2011; Armantier & Boly, 2008), and ‘citizen’ and probabilistic punishment (Abbink *et al.*, 2002; Serra, 2012; Cameron *et al.*, 2009). Abbink (2004) cautions though that the fixed briber-official setup of the RBG (where the experimenter determines the possible alliance) does not fit situations where unobserved alliances already exist before policy interventions take place, nor where the composition of the alliances is completely indeterminate *ex ante*, i.e. where potential partners have to find each other rather than be paired by the experimenter.

In our new experimental design, in each of the 25 rounds of our baseline experiment, a player (the ‘allocator’) nominates one of three others as a co-worker (the ‘receiver’), which determines the group production that period to be the productivity of the receiver, where the productivity

²Our paper adds to the experimental literature on coordination with negative externalities, including Frank & Schulze (2000); Schulze & Frank (2003); Abbink (2004); Abbink & Hennig-Schmidt (2006); Armantier & Boly (2008); Schikora (2011b); Büchner *et al.* (2008); Schikora (2011a); Lambsdorff & Frank (2011); van Veldhuizen (2011); Barr *et al.* (2009); Barr & Serra (2009)

of all potential receivers is randomly drawn each round. Yet, the receiver also gets a bonus and becomes the allocator in the next round, allowing the receiver to return the favour independent of the productivity of their partner. Alliances thus form if two individuals keep choosing each other as receiver even when their productivities are lower than that of others in some rounds, creating a cost to every other individual in the 4-person experiment. The key innovation with regards to the existing literature is that it is not given before the experiment who will be harmed, who will form alliances, and who will benefit from alliances, allowing us to look at the dynamics of alliance formation and the effect of policy intervention on both the emergence of new alliances and the break-up of existing ones.

Our first treatment is Rotation, which mimics a ‘staff rotation’ policy by introducing a degree of randomness in who makes the discretionary decision each round. This intervention is implemented in an additional 25 rounds with the same players, hence with possible existing alliances in place. Whilst such a policy reduces the payoffs of alliances and hence should reduce the rate of formation of new alliances, it is not clear whether they will help break up existing alliances.

In our second treatment, the bonus is reduced, again for an additional 25 rounds after the baseline experiment. The reduction in the bonus is sufficient to make a meritocratic strategy, wherein every allocator chooses the highest productivity player each round as receiver, more profitable than being in an alliance, as long as everyone else also plays meritocratic. We interpret this treatment as reducing the level of discretion, which in real organisations might take the form of having strongly enforced rules, or as Congleton (2014) explains, the bureaucratisation of individuals into “cogs in an organizational machine”. This treatment is also informed by rent-seeking theory which suggests that the size of rents available is a primary determinant of the efficiency cost of rent-seeking activity (Lambsdorff, 2002b), and hence we call this a Low Rent treatment.

In a separate set of treatments, we prime alliances by giving players stories about fictitious player friendships to read before the experiments. This priming is meant to increase expectations of reciprocity and thus allows us to see whether the effectiveness of institutions changes with the strength of the existing alliances.

As a prelude to our results, males and business students are found to be more likely to make choices leading to back-scratching alliances. In the baseline treatment 26% of rounds are identifiable as alliance-play, and we find that primed relationships do indeed more often form alliances, with 70% of rounds identifiable as alliance-plays. Primed alliances also change the anti-corruption treatment effects: Rotation is effective where players are anonymous and alliances emerged in the previous 25 rounds, but not in the ‘primed alliance’ set of treatments where subjects remain loyal to their pre-existing relationships despite rotation. Our Low Rent treatment however, is somewhat effective in the primed condition, but not when anonymous, perhaps because in the primed experiments there is a general expectation of individuals to favour their pre-assigned partners, which means that there is less expectation of revenge if individuals deviate from their alliance when the payoffs make them unproductive (i.e., the partners ‘understand’ it is actually better for both not to play alliance).

Section 2 discusses the literature our paper adds to. Section 3 introduces the experiments, after which Section 4 presents and analyses the empirical results. In Section 5 we develop a simple theoretical framework to see whether the choices of the participants in the experiments can be interpreted as Nash-equilibria in player-types, where players have to choose before the game what type of player they will be and hence how they will react to the choices of others (e.g. strictly meritocratic or tit-for-tat reciprocal). We present simulations that suggest a reasonable

fit between the experimental choices and this theoretical framework. Section 6 concludes.

4.2 Background

The paper falls within two related strands of experimental literature: the literature on corruption experiments that use the repeated bribery game (RBG), and the wider literature on coordination in the presence of negative externalities from which we discuss the experiments closest to ours.

As mentioned earlier, we mainly tie into the RBG experiments. Abbink & Serra's (2012) survey of these and other corruption experiments report a large willingness to form alliances on the part of both briber and official. For instance, Cameron *et al.* (2009) found that even with the chance of punishment by a third player 78- 93% of players will offer a bribe, with 77-93% of bribed officials reciprocating by making an allocation decision that favours the briber but that has negative consequences for the third player.³ Whether a higher negative externality makes a difference to the actions of the official is uncertain: Abbink *et al.* (2002), Büchner *et al.* (2008) and Cameron *et al.* (2009), find it makes no difference in the RBG and its variations. Yet, Barr & Serra (2009) do find an effect. They implement a one-shot petty corruption experiment where externalities automatically come from accepting bribes, and fall on passive members of the experimental session not involved in making the bribery decisions. In their setup higher externalities are related to fewer and smaller bribes, both offered and accepted. In our setup, where alliances are endogenous rather than fixed by the experimenter, the externalities come from alliance formation, which makes it unclear how greater externalities would affect alliances: the greater harm on others might make alliance partners more fearful of reprisals should they make someone outside of their alliance the allocator, potentially strengthening the alliance.

Lambsdorff & Frank (2011) extend the RBG design by having the briber be a potential whistleblower on the public official if that public official does not reciprocate on the bribe. Interestingly, they find that men and economics students are more corrupt in general as they are more likely to bribe and accept the bribe. Men and economics students also were more likely to punish the public official if their accepted bribe wasn't reciprocated, which suggests that in our experiments too we might expect men and economics students to form more stable alliances, even though in our design they have to find each other without knowing the other's gender and other characteristics.

A very different design is that by Greiner & Schneider (2015). In their study, subjects interact over 100 rounds in fixed groups. In the first stage of each round, subjects vote on who will be the dictator in the second stage and thereby gets to allocate group resources. Despite it being the case that there is no stable coalition if everyone were rational and selfish (because then every member should vote for themselves), they find strong and long-lasting coalitions, usually a minimum majority who get all the resources distributed amongst them by a dictator in that coalition, excluding the others. This setup mimics the emergence of large coalitions, like clans or ethnicities within larger societies, and also shows that laboratory participants quickly recognise the possibility of forming a reciprocal alliance with a subset of other players that benefits them at the exclusion of others. Yet, given that the size of the pie is fixed in their setting, there is no efficiency loss of such coordination and hence also no direct welfare implication.

³Participants in India were on average 15 percentage points more likely to bribe than the participants in Australia, 9.9 percentage points more likely to bribe than participants in Indonesia, and 5.4 percentage points more likely than participants in Singapore.

The general literature on how coordination on an efficient outcome arises is vast, much of it using the public good games setup in which individuals have to contribute to a common project, with the efficient outcome being that everyone contributes maximally, though the optimising selfish strategy is to contribute nothing whilst hoping that others do contribute. Pro-social behaviour is then an individual decision in a one-shot game, though individuals can learn from others in repeated games. In a survey of the literature, Chaudhuri (2011) finds that individuals are more likely to coordinate on high contributions when their contributions are observed; or when there is the possibility of punishing non-contributors or rewarding high-contributors.

It is not clear whether the findings on coordination in public goods games should be expected to hold for our design. For instance, in our design punishment is also possible in the sense that allocators can decide who will become the receiver and who will not, but this punishment has ambiguous effects: just as much as other players can punish someone for not having played meritocratically in previous rounds, snubbing an alliance attempt might mean that the next time the snubbed person is the allocator he or she will attempt to form an alliance with someone else. This possibility of ‘forming an alliance with someone else’ is not a part of the public good game since the pro-social behaviour is towards the whole group, not a sub-set of it.

Regarding the role of information in public goods games, Choi *et al.* (2011) show that when a player can see that others have contributed in previous rounds, they are likely to contribute more themselves, pointing to the role of transparency in achieving efficient outcomes. In our setup too, the history of players’ decisions is known (yet not actively displayed), but only individuals who become allocators get to make decisions, meaning that those who are not chosen as allocators may never get a chance to ‘punish’ others who have not played pro-socially, making it unclear whether this public goods result would hold in our setting too.

Rand *et al.* (2011) had a local public goods design that included the possibility of players using information on the previous actions of others to infer who are likely to be contributors in future rounds. Their design had individuals pair up with several ‘neighbours’ whom they could send 50 units, with the neighbours receiving 100. Individuals could then choose new neighbours in later rounds, and were found to want to pair up with those individuals who indeed sent 50 units to their neighbours in previous rounds, indicating that individuals expect pro-social behaviour to be a persistent trait. This is very salient to our experiment where individuals looking to form an alliance will also be trying to team up with reciprocators contributing to the alliance, though in our case the question is how such reciprocation can be discouraged rather than encouraged, as there is a group loss.

The literature on who forms alliances with others, i.e. how in-groups and out-groups form and maintain, often follows the work of Tajfel (1970), who found that arbitrary allocation into groups by the experimenter induced a striking degree of bias towards fellow group members, for instance on no other basis than that individuals are handed the same colour shirt or the same group label (‘A or B’). Experiments of this type require priming of subjects with group identities, a process that has been repeatedly found to effectively invoke pro-sociality within groups or pairs (see Cameron *et al.* (2012) for a review).

Typically the priming occurs by arbitrary nomination into named identifiable groups by the experimenter (Tajfel, 1970; Chen & Li, 2009), using writing tasks (Yopyk & Prentice, 2005; McLeish & Oxoby, 2011), sharing information such as surnames or pictures of other players (Bohnet & Frey, 1999; Burnham, 2003; Charness & Gneezy, 2008; Andreoni & Petrie, 2004), simple messages or stories (Takács *et al.* , 2014), or in some cases using mutual gaze, touch or tapping rhythms in synchrony (Kurzban, 2001). We adopt the story-telling method in our groups

of primed player pairs.

Summarising, the main innovation in our design is that we have an easy-to-implement dynamic setup in which alliances that have endogenous externalities arise even without priming, and in which we can see whether policy interventions can prevent alliances from emerging and/or break down existing alliances. The lack of enforceability or punishment of alliances in our design arguably corresponds well to real world favouritism which is often very hard to observe and can only be indirectly discouraged.

The external validity of experimental studies of questionable aspects of behaviour is a prime concern. On this point, Barr & Serra (2010) show that in an RBG game the degree of corruption by undergraduate subjects was predicted from the corruption index of their country of origin, suggesting that laboratory choices regarding bribery and corruption indeed captures an aspect of real-world behaviour. Additionally, Armantier & Boly (2008) ran a field experiment in Burkina Faso where recruited exam-markers were unaware of their participation in a bribery experiment and were offered bribes folded in some exam papers. They found, consistent with their their laboratory results in Canada that had the same design, that higher wages for exam-markers decreased the prevalence of accepting bribes, showing a correspondence between the behavioural change following an institutional treatment in the lab with the same institutional treatment in the field.

Finally, approaching our design from a theoretical perspective is a challenge, with group formation theories generally characterised by multiple equilibria (Konishi & Ray, 2003; Nash *et al.*, 2012; Ray & Vohra, 2014). In simple terms, if it is beneficial to form a sub-group within a population in order to capture rents, then it will usually be beneficial to form a sub-group within the initial sub-group for the same reason. Backward induction immediately implies that rational selfish agents in our setup would always choose to pick the most productive player in each round as the receiver, because this is optimal in the last round and thus also in each round before. To nevertheless rationalise the finding that alliances do form, we appeal to strategic games wherein individuals choose to be a certain type of player before any of the 25 rounds, allowing us to see if, for instance, being a pure meritocrat would be a rational choice when all others are reciprocators. By picking a set of possible types, we use simulation analysis to explore the expected earnings from the interaction of strategy choices, the existence of Nash-equilibria in strategies and a trial-and-error mechanism for updating strategies.

4.3 Experimental Design and Research Questions

Subjects play in groups of four whose composition is fixed for the duration of the experiment, and are identifiable to each other by a unique coloured shape⁴. The game proceeds in rounds, of which there are 50 in total covering two treatments of 25 rounds. Each round, one player, the allocator, chooses which of the other three players to receive a 25 Experiment Currency Units (ECU) payment (with the first round allocator randomly chosen). The receiver of the payment in a round becomes the allocator for the next round, providing the potential for back-scratching to emerge.

The payoff structure creates a conflict between maximising group and individual payoffs via back-scratching, with a ‘productivity number’ device that determines the group payoff in a round. Each round the three potential payment receivers are given a randomly shuffled productivity number,

⁴One might think it is better to be one shape than another, but no such pattern was found.

from the set $\{1, 2, 3\}$, which the allocator can observe before making their decision. Each of the four players in the group receives a payoff in each round equal to the receiver’s productivity number. The receiver’s payoff that round includes the 25 ECU payment in addition. We call a choice meritocratic if the receiver has the highest productivity number. Table 5.1 lists player payoffs for the three possible choices available in a round in the situation that the ‘Circle’ is the allocator, the Triangle happens to have productivity 1 that round, Square has 2, and Pentagon has 3.

Table 4.1: Payoff structure for a stage game

| | Circle | Triangle | Square | Pentagon |
|---------------|-----------|----------|---------|----------|
| <i>Choice</i> | Allocator | Prod. 1 | Prod. 2 | Prod. 3 |
| Triangle | 1 | 26 | 1 | 1 |
| Square | 2 | 2 | 27 | 2 |
| Pentagon | 3 | 3 | 3 | 28 |

With selfish rational players, the equilibrium for both the one-shot game, and by backwards induction the repeated game, is what we call the meritocratic strategy of allocating to the highest productivity player. It is the institutional structure, whereby the payment receiver makes the allocation decision in the next round, which provides scope for a wide variety of cooperative outcomes in the repeated game. Since the receiver of the payment is able to discern whether the allocator has favoured them (i.e. their productivity number was less than 3), the allocating player can use a non-meritocratic choice as a costly signal to the receiving player of their intention to form an alliance; the cost arises from the reduced individual payment to the allocating player from making a non-meritocratic choice. In all there are six potential two-player alliance combinations possible.

We limit the information provided to players each round in order for alliances to emerge under a *veil of ignorance*. Players not allocating in a round are able to see only their own productivity number, though they do know the distribution of all productivity numbers. After a round, players see only their new total earnings and not the specific earnings from the round, ensuring that only observant players who remembered their previous earnings balance, or had a productivity of 3, could infer whether or not the previous decision was meritocratic. We do this to reflect the normally hidden nature of any individual favourable decisions.⁵ Images of decision, waiting and notification player screens are in Figure 4A.1 of the Appendix.

4.3.1 Treatments

Our two policy treatments mimic commonly prescribed anti-corruption measures, and we specifically test the efficacy of these treatments in breaking down alliances while deterring the formation of new alliances. As such we use a within-subject, or group, design in which the receiver in the final (25th) round of the baseline treatment becomes the allocator in the first round of a second policy treatment.

⁵In later work we change this element of the design and find no difference in choices from providing complete information to all players, so this turned out to be an innocuous part of the original design.

Rotation

We reduce the ability for immediate reciprocation in this treatment by reducing the receiver's probability of being the next allocator from 1 to 0.5, which allows all other players to have a 0.17 probability of being the next round allocator. This treatment mimics policies of staff rotation in senior positions. To be clear, the person nominated by the allocator as receiver still gets the bonus (and can hence deduce that he was chosen by the allocator), but that receiver has a 50% chance of not being the allocator in the next round.

Low Rent

This treatment mimics policies designed to reduce the size of rents that can be allocated with discretion, and is achieved by reducing the bonus payment allocated each round from 25 ECU to 3 ECU.

4.3.2 Theoretical Effects of treatments on optimal choices

Selfish rational players should choose meritocratically. To nevertheless account for the logic of alliances, we here restrict ourselves to looking at two different types of players, neither of which is fully rational: the first is the meritocratic player type who chooses the highest productivity person as receiver in each round that they are the allocator. The second type is a tit-for-tat reciprocator who conditionally chooses the player who made them receiver in the previous round as long as that allocator displayed a willingness to reciprocate. A tit-for-tat reciprocator strategy is as follows.

- If the previous round is not meritocratic, choose the previous round allocator.
- If the previous round is meritocratic and the two rounds prior allocator is me, choose the previous round allocator (continue an alliance).
- If the previous round is meritocratic and the two rounds prior allocator is not me (or it is the second round), choose productivity 2 player, or the productivity 1 player if the productivity 2 player is the previous allocator.
- If the first round, choose the productivity 2 player.

With these two types in mind, we can see how the treatments change the incentives for being either a meritocrat or a tit-for-tat reciprocator (TFT), depending on the order of being able to make a choice in the game. The important situations in terms of a Nash-equilibrium are:

1. An individual chooses to be a meritocrat when all others choose to be a meritocrat. The first receiver's expected payoff is then 245, whilst the expected payoff of all other players is then 227.
2. An individual chooses to be meritocratic when all others are TFT. Since choosing a type is only salient if a person gets to make a choice, we look at the individual being a meritocratic allocator in the first round. Their expected payoff is 51, and for the first receiver (who is TFT), the expected payoff is 375, as the receiver immediately switches to choosing someone else with whom a stable alliance is then formed.

3. An individual chooses to be a TFT when all others also choose this. The expected payoff for the first allocator is then 350, with 375 for the first receiver, and they immediately form an alliance lasting the whole treatment.
4. An individual chooses to be a TFT when all others are a meritocrat. The expected payoff to the first round allocator is then 219, while the first receiver (who is a meritocrat) can expect to get 245.

What this shows is that in the baseline game, there are two Nash-equilibria in these player types, i.e. where everyone plays TFT or where everyone plays meritocratic. In the TFT equilibrium, there is a winning alliance that gets formed in the first round and is sustained all 25 rounds, with the winning alliance members getting more than they would in the meritocratic equilibrium, meaning that the TFT equilibrium dominates the meritocratic equilibrium in expected payoffs for the winning alliance.⁶

Table 5.2 shows the expected payoffs for the baseline and the treatment scenarios, for first round allocators, first round receivers, and other players. The Nash-equilibria are in bold font and show that the same equilibria hold in the Rotation and Low Rent treatment as in the baseline, but that in both these treatments, the meritocratic equilibrium payoff dominates the TFT equilibrium, even for the winning coalition.

Table 4.2: Expected payoffs from TFT and meritocrat strategies in ECU

| | Allocator Strategy | First receiver (others) | | | |
|----------|-----------------------|-------------------------|------------------|-------------|------------------|
| | | Meritocrat | | TFT | |
| Baseline | Meritocrat | 227, | 245 (227) | 51, | 375 (201) |
| | TFT | 219, | 245 (214) | 350, | 375 (50) |
| Rotation | Meritocrat | 227, | 245 (227) | 160, | 245 (223) |
| | TFT | 218, | 240 (219) | 214, | 225 (194) |
| Low Rent | Meritocrat | 93, | 95 (93) | 50, | 90 (69) |
| | TFT | 85, | 88 (85) | 86, | 89 (50) |

4.3.3 Anonymous or Primed

To mimic the situation where agents within institutions have prior relationships, we prime player pairs with bilateral expectations of friendship in a selection of experiment groups. Before the game, they had to read a brief recount of their imaginary ‘in-game’ relationships with a connected partner, effectively being told that one of the symbols was their friend that helped them in the past. The full description of this priming device is in the Appendix. A sample of hand-written participant notes in Table 4A.1 of the Appendix reveals that our priming method successfully manipulated some subjects’ expectations and behaviour towards reciprocity within an alliance, such as the remark by one primed person who wrote that “Hope the player information is correct with

⁶It is easy to see that a simple reciprocity strategy whereby someone reciprocates to the last person who made them receiver, is not a Nash-equilibrium: if all others are simple reciprocators then being a meritocrat increases the payoff. Conditional on being involved in the first round, the meritocrat keeps allocating it to the highest productivity player each time they are allocator, and keeps being chosen as receiver in the subsequent round, leading to a payoff around 12 ECU higher than being a simple reciprocator too.

who trusts me to pay them so they repay me.” We expect these experiments to produce faster alliance formation, longer lasting alliances, and less responsiveness to anti-corruption policies than our anonymous groups in which all expectations of relationships are an emergent characteristic of game play.

4.3.4 Data

The experiments were conducted at the University of Queensland in Brisbane, Australia, in May and June 2013. In all 160 student subjects were recruited from the university student body using the ORSEE online recruitment system (Greiner, 2003), with experiments conducted in a university computer lab using CORAL software (Schaffner, 2013). The full experimental program, data and code is available at the research website⁷. Each subject played 50 rounds in total and received their accumulated experimental currency earnings converted to Australian Dollars at a ratio of 20:1, earning between \$5 and \$34, with the average payoff \$21 for around a 1 hour experiment session, slightly above the minimum wage, with earnings inclusive of a show-up fee.

Each session began with a brief introductory talk and written instructions provided to each subject for later reference. Subjects playing in primed groups received a single additional printed sheet with their priming device, which they were directed to read and consider prior to commencing the computerised part of the session. Prior to commencing both the baseline and any treatment, subjects answered a series of hypotheticals to ensure they had a complete understanding of the experiment and payoff structure. At the completion of two sequential 25 round treatments, subjects answered a socio-demographic survey and were paid in cash upon departure via sealed envelopes.

Altogether 28 anonymous groups played the baseline, with 14 each continuing to either Rotation or Low Rent treatments. An additional 12 primed groups played in a second set of experiments, with each policy treatment implemented on 6 groups. A diagrammatic summary of the experimental setup is in Figure 4.1. Subjects were also given blank paper and pens in order to make notes during the experiment, which were collected upon completion in order to gain additional insight into the thought processes occurring during the game.

| | | Treatment sequence | | Groups | Subjects |
|-----------|----------|--------------------|-----------|--------|----------|
| | | 25 rounds | 25 rounds | | |
| Anonymous | Baseline | Rotation | | 14 | 56 |
| | Baseline | Low Rent | | 14 | 56 |
| Primed | Baseline | Rotation | | 6 | 24 |
| | Baseline | Low Rent | | 6 | 24 |

25ECU bonus per round
Productivity numbers from set {1,2,3}

Figure 4.1: Experiment setup

⁷<http://buddyexperiment.blogspot.com.au>

4.3.5 Research Questions

We define two choice variables of interest that we later use as measures of policy success and that are useful in terms of formulating the research questions: Alliance Initiation (AI) and Alliance Reciprocation (AR). Alliance initiation is any non-meritocratic decision (allocation to a player with a productivity number less than 3) outside of a current alliance, and hence can be seen as an attempt at alliance formation. An alliance reciprocation is any non-meritocratic choice during an alliance period involving the same duo as the alliance initiation. An alliance is then a unbroken chain of choices involving an alliance initiation and at least one Alliance Reciprocation, ending when a different receiver is chosen than the duo in the alliance. These two alliance behaviour variables are roughly inverse to the frequency of meritocratic decisions, but they capture slightly different tendencies; AI captures active effort to form alliances, while AR captures willingness to sustain an alliance. We structure our enquiry around the following questions.

Question 1. Does implementing a rotation policy increase the frequency of meritocratic choices and total group payoffs?

This question is motivated by the success of Abbink's (2004) experiment, and by the wide adoption of such policies in sensitive areas of large bureaucracies (World Bank, 1992). The intuition behind this hypothesis arises naturally from the expected payoffs summarised in Table 5.2, which shows that it is no longer a payoff-dominant strategy to play TFT, even for the alliance members that become receiver in the first round. If some individuals 're-set' their strategy before the treatments (or after a few rounds) towards the payoff dominant equilibrium, then we should see more meritocratic play. Yet, since TFT play is still a Nash-equilibrium, strong expectations of alliance play on the part of others might prevent alliance members from switching strategies.

Question 2. Does a Low Rent treatment increase the frequency of meritocratic choices?

Like our first question, Question 2 arises due to the expected optimal strategy choices in response to the new payoff structure, making the meritocratic choice the payoff dominant Nash-equilibrium. Mainstream economic theories of rent-seeking also suggest that Low Rent environments are welfare enhancing due to lower rent-seeking activity (Lambsdorff, 2002a).

Question 3. Do primed groups have i) earlier Alliance Initiation, ii) more frequent Alliance Reciprocation, iii) longer lasting alliances, and iv) less responsiveness to anti-corruption policies?

Question 3 is motivated by the increase in certainty players will have about the strategy of the player they are now connected with via a primed relationship. Previous experimental evidence showed that priming relationships does increase cooperation within those relationships, and hence, we are likely to observe greater cooperation in alliance pairs than between the experimental group as a whole (Cameron *et al.*, 2012). Our expectation that our policy treatments will be less effective is informed by the general findings of cooperative games summarised in Chaudhuri's (2011) review, whereby norms formed early in a repeated game are often persistent. Hence, our rotation policy may simply allow the continuation of two bilateral alliances based on the primed relationships, while our low discretion treatment may be insufficient to break the norm of alliance formation for fear of losing the outranking winning position of the alliance.

Question 4. Can socio-demographic characteristics predict individual alliance choices, AI and AR?

Question 4 is informed by previous studies revealing biases associated with particular demographic traits, such as gender and profession (Frank & Schulze, 2000; Ones & Putterman, 2007; Lambsdorff & Frank, 2011; Chaudhuri, 2011), and offers some insight into what sort of personal qualities to look at when trying to select new members of a group that are not corruption-prone.

4.4 Empirical analysis

4.4.1 Summary statistics

Table 4.3 provides basic descriptive statistics of the experiment outcomes and player characteristics. In all, we have reasonable amounts of variation in gender, political views, wealth, and between local and international students. In the baseline treatment, 74% of groups saw an alliance formed at some point⁸, and of those, with the first alliance formed on average in round 8, and with 29% of all baseline rounds spent in an alliance. We see significant variation in many indicators including individual earnings (ranging from 53 to 384 ECU), alliance lengths (ranging from 2 to 25 rounds), and share of rounds in an alliance (ranging from 0 to 1). Together these basic metrics indicate that back-scratching alliances within larger groups can easily form in experimental settings of repeated games featuring discretionary decisions.

We can note that primed groups had fewer AI choices (0.14 compared to 0.28 share of rounds) and more AR choices (0.38 compared to 0.17 share of rounds), indicating that alliances were indeed both more rapidly formed and sustained for longer on average: when alliances form and are stable there are fewer rounds to initiate an alliance.

To examine Olson's (1982) claim that groups will steal from the economic pie even if the cost to others is greater than their gain, we calculate a measure of *gains minus losses* for a group as the difference between the maximum group payoff under meritocratic play and the realised group payoff. Group losses are 59ECU on average (74ECU for primed groups), or 6.4% (8.0%) of the total expected group payoffs under the meritocratic outcome. If we take out the effect of bonuses on payoffs and only focus on the productivity payoffs, then the losses become 20% (25%) of total expected group payoffs from production.

Figure 4.2 shows the smoothed distribution of group payoffs across the baseline and treatments. A bimodal distribution appears to be present, particularly for anonymous groups; a result of groups ending up in one of the two equilibria, either alliance play or meritocratic play. A striking feature here is the degree to which primed groups fail to display increased payoffs in the Rotation treatment compared to the anonymous groups, indeed suggesting that Rotation couldn't break existing alliances.

It is worth noting how the interactions of player choices creates rather complex outcomes. Charts of individual payoffs by round for all groups are in Figure 4A.3 of the Appendix, though a sample of payoff charts capturing unexpected complex interactions is in Figure 4.3.⁹ The 4 payoff lines

⁸We define an alliance as a period of exclusive dealing between two players where in the first round, and at least one other, the allocation choice is non-meritocratic (meaning the payment receiver had a productivity number in that round of less than 3).

⁹From left to right, the relevant treatments belonging to the graphs are: Anonymous Low Rent, Primed Rotation, Primed Rotation

Table 4.3: Descriptive statistics for Anonymous and Primed groups

| | Anonymous | | | Primed | | |
|--|-----------|------|------|--------|------|------|
| | Mean | Max | Min | Mean | Max | Min |
| Share Meritocratic rounds | 0.60 | 1 | 0.24 | 0.48 | 1 | 0.24 |
| Share Alliance Initiation | 0.23 | 0.60 | 0 | 0.14 | 0.48 | 0 |
| Share Alliance Reciprocation | 0.17 | 0.72 | 0 | 0.38 | 0.72 | 0 |
| Share Rounds in alliance | 0.28 | 1 | 0 | 0.62 | 1 | 0 |
| Mean alliance length [#] | 8 | 25 | 2 | 13 | 25 | 3 |
| Round of first alliance [#] | 8 | 24 | 1 | 6 | 24 | 1 |
| Number of alliances/group | 0.9 | 3 | 0 | 1.2 | 2 | 0 |
| Group earnings [!] | 868 | 925 | 825 | 847 | 925 | 809 |
| Individual earnings [!] | 217 | 384 | 53 | 213 | 376 | 46 |
| Equality (group Gini) | 0.15 | 0.39 | 0.01 | 0.20 | 0.39 | 0.03 |
| Gains minus losses | -59 | 0 | -124 | -74 | 0 | -116 |
| Age | 21 | 34 | 18 | 22 | 39 | 18 |
| Group male share | 0.53 | 1 | 0 | 0.52 | 1 | 0.25 |
| Group business student share | 0.32 | 1 | 0 | 0.35 | 1 | 0 |
| Happiness (1= V. Unhappy ... 5=V. Happy) | 3.89 | 5 | 1 | 3.95 | 5 | 2 |
| Political (1= Left ...10= Right) | 5.63 | 10 | 1 | 5.65 | 10 | 1 |
| Family wealth (1= Wealthy ... 3= Poor) | 1.92 | 3 | 1 | 1.71 | 3 | 1 |
| Native english speaker (1= Yes) | 0.60 | | | 0.65 | | |
| International student (1=Yes) | 0.44 | | | 0.48 | | |
| Club members (1= Yes) | 0.66 | | | 0.67 | | |
| People v skills (1=People...5=Skills) | 2.72 | 5 | 1 | 2.38 | 5 | 1 |

[#] For groups with any alliance

[!] Except Low Rent treatment

completely characterise all the choices in an experiment, with the person being chosen as receiver in a round showing a jump in the payoff line. In the left panel, blue and green players form an initial alliance (alternating the jump in payoff reflecting the bonus), only for green to renege and form an alliance with orange for about 10 rounds, after which green again teams up with blue till round 25. In rounds 26-50 (a Low Rent treatment), orange and red eventually team up for most of the rounds.

A strange situation occurred in the centre panel, where green and red formed an alliance till round 13 when red chose blue as the receiver who promptly formed an alliance with green for the rest of the 25 round treatment. In rounds 26-50 (a Rotation treatment), blue and green maintained an alliance throughout most of the rounds, with occasionally red and orange being randomly chosen as allocator who then chose the other some of the time.

In the right panel, blue reneges on a prior alliance with orange in round 9 by choosing green, who promptly formed an alliance with red for the rest of the 25 rounds. In rounds 26-50 (a Rotation treatment), the two alliances (red-green and orange-blue) remained loyal to each other

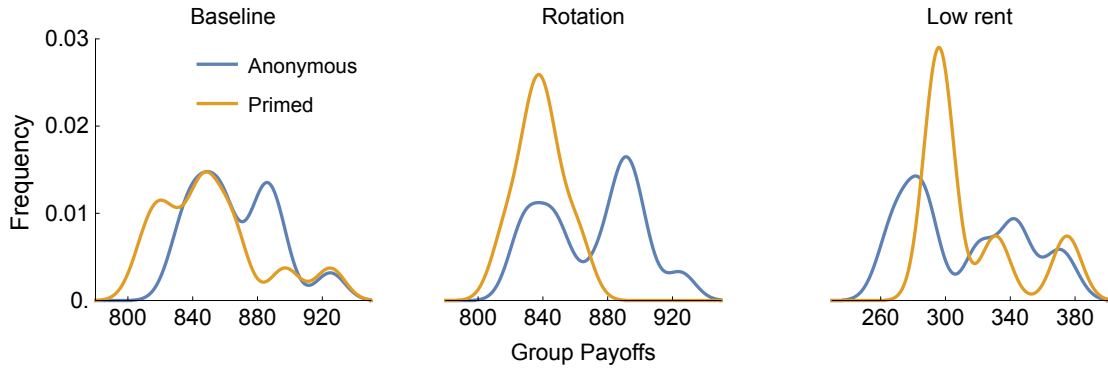


Figure 4.2: Smoothed frequency distribution of group payoffs (Gaussian kernel, bandwidth 9)

and hence only lost the allocator rights in some rounds due to random rotation.

These examples demonstrate that allocating meritocratically outside of the alliance can be punished either by 1) being replaced from your alliance with an outside player (as in the centre and left panels), or 2) giving power to an alliance of the two outsiders (as in the right panel). Fully capturing this kind of play in a theoretical model would be a challenge, as one might imagine, for the obvious reason that the players left outside an alliance almost certainly were surprised by the actions of the other players. Table 4A.1 in the Appendix gives more examples of ‘strange’ strategies as noted by some of the participants.

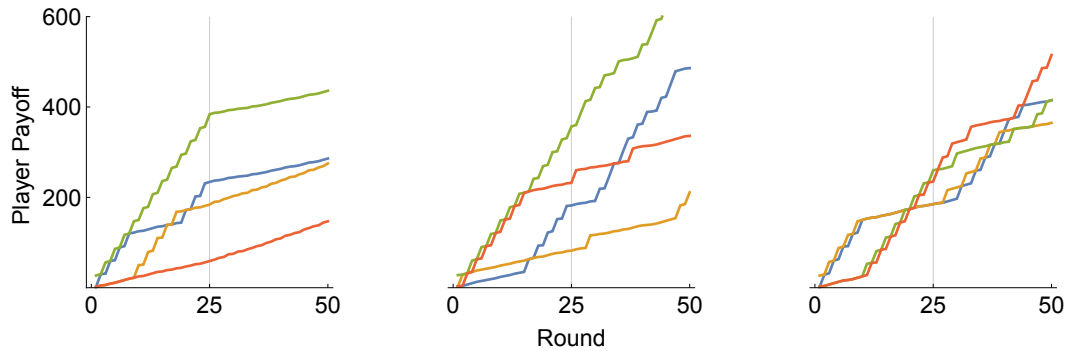


Figure 4.3: Individual payoffs by round with complex interactions

4.4.2 Treatment effects

We test for changes in the distribution of key outcome metrics between our baseline and policy treatments and report the results in Table 4.4. The primary outcome of interest is the change in the number of meritocratic rounds which ultimately determines the size of the group payoff.

In the anonymous Rotation groups, meritocratic choice frequency increases slightly to 0.62 from

0.60 in the baseline, whilst the Low Rent treatment decreases it to 0.56, though neither change is statistically significant. For primed groups, Rotation reduced meritocratic play to 0.42 from 0.47 whilst Low Rent increased it up to 0.57, again neither change being significant. Yet, the number of realised alliances (out of a maximum of 6 different pairs) per group decreased for anonymous groups under Rotation (1.1 to 0.8), but increased for primed groups (1.2 to 1.5) under Rotation, showing that under Rotation the two primed pairs typically choose each other when given the chance via random rotation.

Additionally, Alliance Reciprocation increased from 0.14 to 0.24 for anonymous groups in the Low Rent treatment (if there was an alliance, which was less likely, it lasted longer), but fell for primed groups under Low Rents, from 0.44 to 0.35 (slightly more meritocratic choices). Together these measures indicate that Rotation policies are more likely to result in two alliance pairs in primed groups than in anonymous groups, while Low Rent policies do reduce the likelihood of alliance initiation in anonymous groups, but the alliances that then do form last longer, leading to no net gain.

Table 4.4: Treatment effects for Anonymous and Primed groups

| | Anonymous | | | Primed | | |
|---------------------------------------|-----------|----------|----------|----------|----------|----------|
| | Baseline | Rotation | Low Rent | Baseline | Rotation | Low Rent |
| Share Meritocratic rounds | 0.60 | 0.62 | 0.56 | 0.47* | 0.42 | 0.57 |
| Share Alliance Initiation | 0.25 | 0.31 | 0.12** | 0.08*** | 0.30** | 0.08 |
| Share Alliance Reciprocation | 0.14 | 0.06 | 0.33 | 0.44*** | 0.28 | 0.35 |
| Share Rounds in alliance | 0.26 | 0.11** | 0.48 | 0.70*** | 0.43** | 0.67 |
| Mean alliance length | 6.2 | 3.8** | 18.8*** | 14.8*** | 6.4*** | 16.8 |
| Round of first alliance [#] | 8.4 | 10.3 | 3.3** | 6.5 | 6.7 | 4.6 |
| Number of alliances/group | 1.1 | 0.8 | 0.6 | 1.2 | 1.5 | 1.0 |
| Share groups any alliance | 0.75 | 0.5 | 0.64 | 0.92 | 1 | 0.83 |
| Mean group earnings [!] | 867 | 870 | 312 | 851 | 838 | 315 |
| Mean individual earnings [!] | 217 | 218 | 78 | 213 | 210 | 79 |
| Equality (group Gini) [!] | 0.15 | 0.15 | 0.08 | 0.27*** | 0.18 | 0.09 |
| Gains minus losses | -58 | -55 | -63 | -74 | -87 | -60 |
| <i>Treatment change (M rounds)</i> | | 0.04 | -0.07 | | -0.07* | 0.11* |
| <i>Treatment change (AI rounds)</i> | | 0.01 | -0.09 | | 0.20** | 0.01 |
| <i>Treatment change (AR rounds)</i> | | -0.06 | 0.16 | | -0.13 | -0.13** |

Statistical comparisons of distributions of treatment measures are: Anon Rotation v Anon Baseline, Anon Low Rent v Anon Baseline, Primed Baseline v Anon Baseline, Primed Rotation v Primed Baseline, Primed Low Rent v Primed Baseline.

Statistical comparisons of distributions for *treatment changes* are: Primed Rotation v Anon Rotation, Primed Low Rent v Anon Low Rent.

p values from Wilcoxon signed-rank test * < 0.10, ** < 0.05, *** < 0.01.

[#] Of groups with any alliance.

[!] No statistical tests with low discretion treatment because of changed payoff structure.

Recall that all of our groups play two consecutive treatments during continuous game play, and

that the first round allocator in the policy treatments received the payment in the final round of the baseline treatment. These averages are hence capturing a ‘policy plus learning’ effect with this setup, meaning that we can only identify the relative policy effects. To this end, the final three rows in Table 4.4 shows whether the combined effect is significantly different in the primed groups. We find that for the Rotation treatment the change in Meritocratic choices is 0.04 in Anonymous groups, and -0.07 for Primed groups ($p = 0.06$), while the change in Alliance Initiation choices is 0.01 in Anonymous groups, and 0.20 for Primed groups ($p = 0.02$), indicating that Primed groups are more likely to form two alliance pairs under Rotation than anonymous groups resulting in fewer meritocratic choices and lower groups payoffs. In contrast, the Low Rent treatment resulted in a -0.07 change in meritocratic choices in Anonymous groups and a 0.11 change in Primed groups ($p = 0.02$), while also creating a 0.16 change in AR choices for Anonymous groups and a -0.13 change for Primed groups ($p = 0.03$), suggesting that Primed groups responded to the Low Rent policy in a way that increased their group outcomes, while Anonymous groups did not. To visualise these relative differences, Figure 4A.4 of the Appendix plots these three choice types by round across all treatments, with these difference in the direction of treatment effects visible by the change in the trend lines for AI and AR choices between anonymous and primed groups in each treatment.

In order to separate learning from policy effects, we can look at whether the choices in the experiments converge at some point before the 25 rounds of play, which would allow us to compare later rounds in the baseline with later rounds in the treatment experiments. To this end, Figure 4.4 shows the proportion of alliances in the 6 types of experiments (baseline plus 2 treatments, with anonymous and primed groups). Whilst there are clear trends in many of these six groups in the early periods, there are no significant trends in the anonymous groups from round 12 onwards, which we take as an indication that learning effects have been incorporated by that round.¹⁰

To isolate the policy effects from group composition and other effects, we analyse two success variables. The first is the relative change in the frequency of meritocratic choices across the whole 25 rounds of the baseline and policy treatment, calculated as $(M_{2j} - M_{1j})/M_{1j}$. The second removes the learning effects by using only rounds 12 to 23, which reflects the period of stable alliances¹¹, calculated as $(M12_{2j} - M12_{1j})/M12_{1j}$. We have 40 observations on these two success variables S_j , which we then model as

$$S_j = X'_j(\alpha_j + \beta_j X'_j) + \epsilon_j$$

where S_j is either $(M_{2j} - M_{1j})/M_{1j}$ or $(M12_{2j} - M12_{1j})/M12_{1j}$; and X' represents a matrix of group-specific variables, such as the number of alliance reciprocation decisions in the baseline, the policy treatment and a control for the primed groups, together with a group level error term. The interaction effects between these variables are of particular interest. The results are in Table 4.5.

Table 4.5 goes through different specifications with each having a limited number of variables. The closest fit is found in column 4, which shows that the primed group has a 0.34 lower ratio of meritocratic plays than in the baseline rounds, but a 0.14 higher meritocracy ratio ($= -0.34 - 0.19 + 0.67$) in the Low Rent treatment. The Low Rent intervention in the anonymous group (the default) reduces the meritocratic ratio by 0.19, significantly different from the positive effect

¹⁰We also tried using the interval 15-24 rounds, or 10-25, which qualitatively made no difference to the analyses.

¹¹Alliances were observed to be significantly more likely to break down in the final two rounds of every treatment.

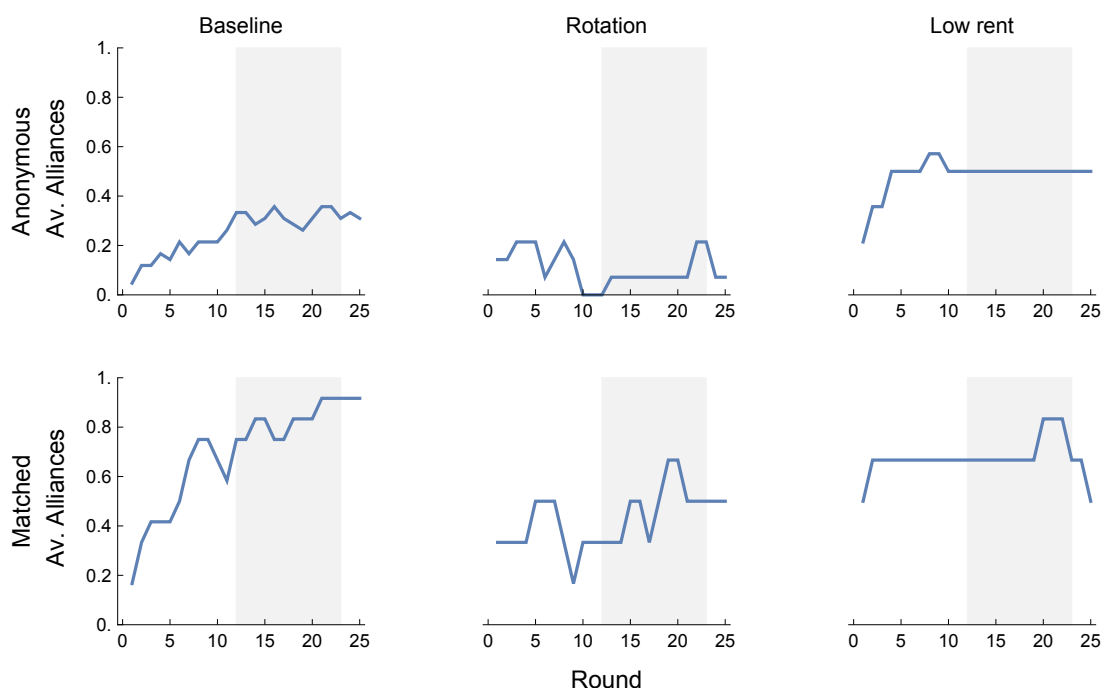


Figure 4.4: Establishment of stable norms in treatments

amongst the primed groups. None of the other treatments affects the ratio $(M_{2j} - M_{1j})/M_{1j}$ significantly.

The bottom panel shows that the same results hold qualitatively for the ratio $(M12_{2j} - M12_{1j})/M12_{1j}$ as well: Rotation has no significant effects; primed groups play less meritocratic; Low Rent policies reduce meritocratic play in the anonymous groups; and amongst the primed groups Low Rent leads to relatively more meritocratic play.

We can summarise this as:

Result 1: Anti-corruption policy success is conditional on existing relationships

This result means that neither of our first two research questions can be answered with confidence. Rotation policies were not successful in breaking up primed pairs and merely allowed for sequential ‘reigns’ of the two existing pairs in a group. Amongst anonymous groups, rotation policy similarly had no net significant effect. Low Rent policies do turn out to be relatively more successful in situations where loyal alliances already exist, though they have no success in anonymous situations.

Result 2: Primed groups have longer lasting alliances

In line with our third research question, we can say that aligning player expectations with our priming device does result in faster alliances and longer lasting alliances, though it does not preclude the situation of players finding new alliances within the game outside of their primed alliances, as shown in the centre panel of Figure 4.3. Choosing personnel without existing loyal relationships is then arguably a prerequisite of establishing a group norm of meritocracy.

Table 4.5: Policy success models

| | $(M_{2j} - M_{1j})/M_{1j}$ | | | | | | |
|----------------|----------------------------|---------|---------|---------|---------|-------|-------|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| AR_{1j} | 0.02** | | 0.01 | 0.02** | | 0.02 | 0.00 |
| Primed (Pri) | -0.01 | | 0.28 | -0.34* | | 0.00 | 0.02 |
| Rotation | -0.06 | 0.11 | 0.07 | | 0.04 | 0.04 | |
| LR | -0.08 | -0.09 | | -0.19* | -0.17 | | -0.17 |
| Pri x R | | -0.21 | -0.58** | | | | |
| Pri x LR | | 0.52*** | | 0.67*** | | | |
| AR_{1j} x R | | | | | 0.00 | -0.02 | |
| AR_{1j} x LR | | | | | 0.04*** | | 0.03* |
| Adjusted R^2 | 0.05 | 0.16 | 0.18 | 0.24 | 0.12 | 0.07 | 0.11 |

| | $(M12_{2j} - M12_{1j})/M12_{1j}$ | | | | | | |
|------------------|----------------------------------|--------|--------|---------|--------|--------|-------|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| $AR12_{1j}$ | 0.09** | | 0.07** | 0.09*** | | 0.08** | 0.04 |
| Primed | -0.09 | | 0.24 | -0.58* | | -0.09 | -0.06 |
| Rotation | -0.13 | 0.14 | 0.02 | | -0.06 | -0.05 | |
| LR | -0.15 | -0.06 | | -0.28** | -0.23 | | -0.22 |
| Pri x R | | -0.19 | -0.72* | | | | |
| Pri x LR | | 0.73** | | 0.96** | | | |
| $AR12_{1j}$ x R | | | | | 0.05 | -0.03 | |
| $AR12_{1j}$ x LR | | | | | 0.11** | | 0.07 |
| Adjusted R^2 | 0.12 | 0.08 | 0.18 | 0.24 | 0.15 | 0.12 | 0.15 |

Pri is primed group, R is Rotation treatment, LR is Low Rent treatment, AR_{1j} and $AR12_{1j}$ are the Alliance Reciprocation frequency in a treatment.

4.4.3 Individual characteristics

Another option available to combat back-scratching is to select group members on observable socio-demographic characteristics. But which ones are more likely to be associated with meritocracy?

We look at three individual level choices - meritocratic play, alliance initiation and alliance reciprocation - across the all decisions in the experiments. There are 1,126 M choices across out of the 2000 opportunities to be meritocratic in all treatments, 411 AI choices (out of 1126 opportunities), and 465 AR choices (out of 697 opportunities). We model the decision variables $M_{ijt}, AI_{ijt}, AR_{ijt} \in \{0, 1\}$ as a linear probability model:

$$D_{ijt} = X'_{it}\alpha_D + v_t$$

where D_{ijt} denotes one of the three choice variables ($M_{ijt}, AI_{ijt}, AR_{ijt} \in \{0, 1\}$) by player i in group j in round t . X' represents a matrix of player-specific variables, α_D is the vector of coefficients, and v_t is an error term clustered by group, being $e_j + e_{ijt}$. We adopt a number of specifications to explore the relationship between socio-demographic variables and their impact on player choices in the game. Table 4A.2 in the Appendix shows the regression results.

First, we see that males are indeed 9% less likely to make meritocratic choices which is significant at the 10% level), 5% more likely to initiate, and 19% more likely to reciprocate alliances. Business students show a similar pattern, with 9% fewer meritocratic choices and 10% more likely to initiate alliances. In terms of predicting meritocratic choices, each additional year of age makes one 2% less likely to play meritocratic, a small but significant negative effect. Somewhat unexpectedly, higher family wealth was not associated with less meritocratic choices or more alliance initiation: if anything, it was associated with less alliance reciprocation.

When we look at the effects of social opinions in the middle panel, we first see very low explanatory power¹², which disappears as soon as we add the demographics back in, so there is no indication of separate contributions from social views and opinions. This can be summarised as:

Result 3. Men and business students are more alliance-prone

This result adds further evidence to a growing body of literature that looks at the socio-demographic determinants of cooperation in general, and corruption in particular. Males have a higher tendency to form alliances, as do business students, suggesting that back-scratching is likely to be more prevalent in institutions and sectors of the economy dominated by men with a financial or business education.

Looking at the effects of the policies in these choice models, we see the same effects earlier observed: primed pairs are more likely to reciprocate in their alliances, and Low Rent policies seem to have positive effects amongst primed groups, but not in anonymous groups. This suggests that the fear of ‘missing out’ is a much bigger factor in anonymous groups than in primed groups where individuals are more secure in their partnering. Support for this contention also comes from participant’s hand-written notes, with many commentators noting the risk involved in attempting to form alliances due to conflicting expectations. Notes to the effect of “I hope my friend trusts me” were common. A list of such notes about strategies and friendships are Table 4A.1 of the Appendix. In terms of policy interventions pertaining to existing institutions, it is perhaps the clearest message of the paper: with strong crystalised pairings, one can more easily coordinate on a new equilibrium wherein everyone abandons alliance play altogether, whereas with uncertain pairings the introduction of additional uncertainty of lower rents does not diminish the fear that others may form alliances at all.

4.5 Theoretical analysis

The main experimental results do not correspond to that of selfish rational agents under which meritocracy is the only Nash equilibrium. Yet, the reality is a murky mess of alliance seekers, back-scratchers, back-stabbers, and meritocrats: in the baseline experiments, stable alliances only emerge after round 10 or so, with the first alliance initiation typically taking till round 8. At best, players seem to be using a trial-and-error process of moving towards an equilibrium in strategies, or types, that would represent the establishment of stable expectations.

To capture some of this behaviour, we want to see here whether the main results can be rationalised if we presume that there is a small set of types that individuals belong to; a type which is chosen prior to any of the 25 rounds of the experiment. We restrict the set to three strategies

¹²Apart from the AR coefficient for the Skills v people variable, which may represent an opinion based on the experience within the experiment itself, whereby those in alliances answered the survey that people matter more than skills.

with one round of memory and two strategies relying on two previous rounds of play to inform the choice. The three one round strategies we consider are

1. Meritocratic (M) - makes the meritocratic choice every time.
2. Reciprocator (R) - allocates to the previous allocator.
3. Loyal partner (LP) - allocates exclusively to one player.

The two round prior strategies allow strategic interaction and the development of social norms.

1. Tit-for-tat reciprocator (TFT), who is a conditional alliance reciprocator.
 - (a) If the previous round is meritocratic
 - i. And two rounds prior allocator is not me (or it is the second round)
 - A. If productivity 2 player is not previous allocator, then productivity 2 player (this is the first round default)
 - B. If productivity 2 player was previous allocator, then productivity 1 player
 - ii. And two rounds prior allocator is me, then chooses previous round allocator (reciprocate)
 - (b) If the previous round is not meritocratic
 - i. Chooses the previous round allocator (reciprocate)
2. Social Norm follower (SN), who is a conditional group cooperator.
 - (a) If the previous round is meritocratic
 - i. And two rounds prior allocator is not me, then chooses productivity 3 player (this is the first and second round default)
 - ii. And two rounds prior allocator is me, then chooses previous round allocator (reciprocates)
 - (b) If the previous round is not meritocratic
 - i. Chooses the previous round allocator (reciprocates)

These five strategies were selected for this analysis following participant feedback, observed prevalence of conditional cooperation strategies in repeated public goods games¹³ (Chaudhuri, 2011), and from players' decisions in the experiments: the meritocratic strategy is consistent with 60% of all experiment decisions, while the reciprocator strategy is consistent with 21% of decisions. From the two round strategies, SN is consistent with 61% of decisions, and the TFT with 35% of decisions.

4.5.1 Strategy equilibria

We calculate the expected payoffs to a first-round allocator who is one of these five types, conditional upon the expectation of a single type for all others, by simulating the 25 rounds of a treatment 10,000 times with that mix of player types, which allows us to look for pure

¹³Whereas TFT reciprocates in order to form an alliance conditional on the other players reciprocating, and SN allocates meritocratically, conditional on others allocating meritocratically, or else reciprocates.

Table 4.6: Best response to type expectations

| | | Baseline | | | | | Rotation | | | | | Low Rent | | | | |
|--------------|-----|------------|-----|-----|------------|------------|------------|-----|-----|------------|------------|-----------|----|-----------|-----------|-----------|
| Expect. | | M | R | SN | TFT | LP | M | R | SN | TFT | LP | M | R | SN | TFT | LP |
| Alloc. strat | M | 231 | 216 | 231 | 60 | 64 | 231 | 212 | 231 | 165 | 178 | 94 | 75 | 94 | 52 | 52 |
| | R | 225 | 205 | 316 | 179 | 159 | 225 | 206 | 256 | 205 | 186 | 88 | 69 | 88 | 66 | 63 |
| | SN | 231 | 210 | 231 | 108 | 110 | 231 | 210 | 231 | 175 | 186 | 94 | 69 | 94 | 57 | 58 |
| | TFT | 225 | 210 | 328 | 207 | 131 | 225 | 206 | 262 | 205 | 183 | 86 | 69 | 88 | 69 | 60 |
| | LP | 225 | 203 | 316 | 164 | 206 | 225 | 206 | 251 | 194 | 207 | 88 | 69 | 88 | 64 | 69 |

symmetric strategy equilibria. Table 4.6 documents the results of this exercise, presenting the expected payoff for the row type conditional on the type of others in the columns.

In Table 4.6 the best-response types for the allocator are shaded, and of these the symmetric pure Nash equilibria in types occur along the diagonals and are denoted in bold. The equilibria in the baseline treatment are meritocratic (M), loyal partner (LP), and tit-for-tat reciprocator (TFT). The logic of why it is not an equilibrium for all players to be the reciprocal type is that if I believe that others will play strategy R, then my best response is to play M.¹⁴ A similar logic holds if I expect all others to play SN, for which the best response is TFT.

Note here that the existence of multiple equilibria depending on expectations aligns very closely with the story so far in that early rounds of play create a persistent social norm, which in the parlance of this exercise translates to ‘early play aligns expectations about strategies’, hence allowing groups to settle on an equilibrium in strategies by way of the reasoning “if that’s how everyone else is going to play, then I’ll do the same”. The bimodal distribution of experimental outcomes in Figure 4.2 closely match the distribution of group and player payoffs from the meritocratic and alliance equilibria. Hence, this analysis leads us to believe that the emergence of groups norms is the product of aligning strategy expectations.

Can this exercise provide insights into the divergent policy treatment effects? The key change to equilibria in the policy treatments is that the SN strategy can potentially be rationalised as an equilibrium under a Low Rent policy, though here the strategy choices are like to collapse back to the meritocratic equilibrium. How a group moves from an alliance equilibrium of either LP or TFT to SN or M in response to a policy change is not clear, and our experimental evidence suggests that only groups on the LP equilibrium are more likely to move to an SN or M equilibrium under the Low Rent treatment. Clearly though, the three equilibria in strategies in the baseline are not themselves affected by the policy treatments.

4.5.2 Evolutionary strategy fitness

To account for the existence of a mechanism allowing groups to move from one equilibrium to another, we simulate the evolutionary competition between strategies as follows. We take a random selection of four out of our five strategies to play a 25 round selection stage. Selection occurs after each stage, whereby the player with the lowest payoff updates their strategy to one

¹⁴Obviously this relies on prior reasoning, as observing someone playing strategy R will be indistinguishable from playing M, SN, or TFT if the reciprocate to the highest productivity player.

of the other four available strategies, randomly chosen, and the group plays another 25 round stage. We look at 10,000 simulations of a sequence of 50 selection stages.¹⁵ Under this selection mechanism, no strategy can become fully extinct, as it has a 0.2 chance of being randomly chosen as a replacement strategy in any selection stage, and hence a minimum limit of the fitness measure (how widespread the strategy is in the population) in this selection process is 0.05, and the maximum is 0.5.¹⁶ What this means is that all strategies are potentially available when we introduce a policy change in this evolutionary simulation after a sequence of 50 baseline selection stages, and hence can look at the direction of change in the fitness of each strategy under each of our two treatments.

In Figure 4.5 we plot the results of these simulations. The top left panel shows the relative fitness of LP, and while it is relatively fit compared to the other strategies under the baseline conditions, neither the Low Rent or Rotation policy, significantly alters its fitness. For the Low Rent treatment the first few selection stages after the policy change do see a slight decline in the fitness of LP and TFTR being matched by an increase in M and SN; a change that is not persistent, though in keeping with the direction of policy treatment effects in the primed groups in which the Low Rent treatment appeared to generate a shift towards meritocratic play.

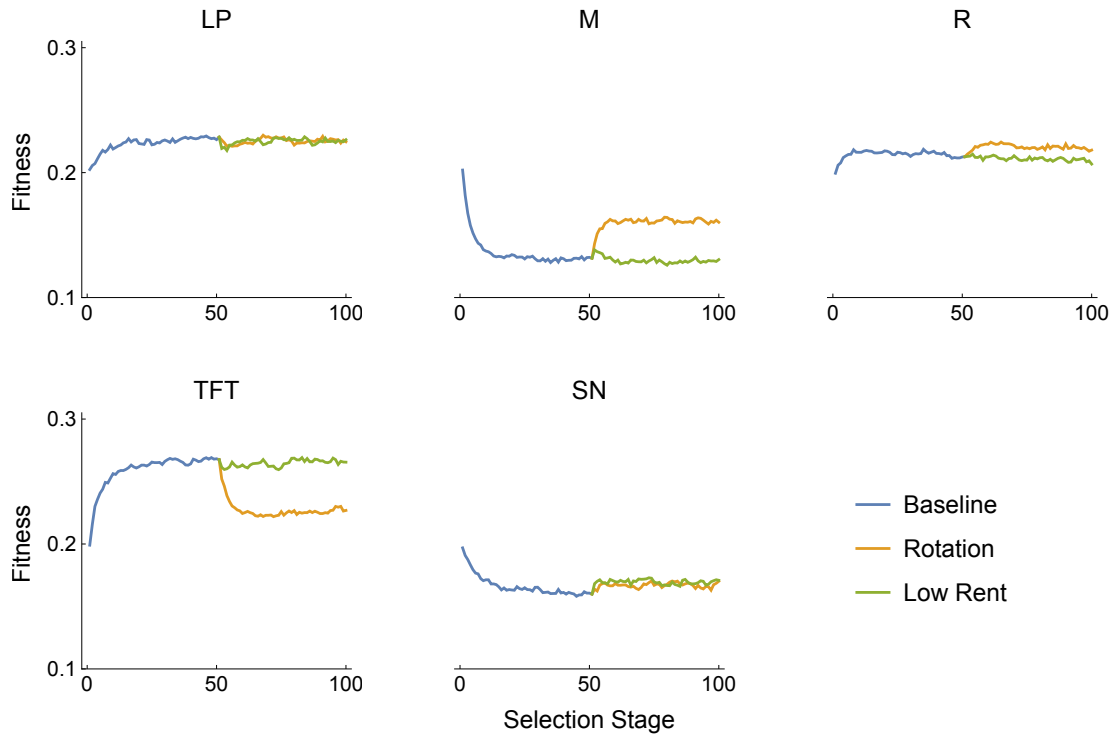


Figure 4.5: Evolutionary strategy fitness

The bottom left panel shows that under the Low Rent policy a TFT strategy maintains a high level of relative fitness, while the Rotation policy clearly reduces the fitness of the strategy, a

¹⁵The results are robust to the number of rounds in each selection stage, and equally apply with 5 or 25 rounds. After just ten selection stages the fitness of each strategy shows stability.

¹⁶A one fifth chance of being randomly chosen by the lowest one of four players generates the minimum of 0.05, while any fitter strategy at best can sustain two out of four players who form an alliance in the group.

reduction matched by an increase in the fitness of M and SN strategies, which again supports our main experimental results. If players in our anonymous experimental groups rarely settle into a LP strategy, they are likely to be following an alliance-forming strategy that is indiscriminate in partner choice, such as TFT. It makes sense that the policy treatments led to different results for primed groups (which are more likely to find the LP equilibrium), and anonymous groups (which are more likely to find the TFT equilibrium). In all, the consistency of these changes in evolutionary fitness of strategies with the direction of our experimental results suggests that in a trial-and-error process of strategy selection is a useful way of approaching this problem.

Result 4. Policy success may depend on the composition of strategies within a group

Analysing collective behaviour in this environment of potential back-scratching as a repeated interaction of strategies shows a high degree of consistency with the experimental results. Not only do multiple equilibria exist in the static sense, which reflect potential meritocratic and alliance-forming norms, but implementing a trial-and-error process of players finding, or shifting between equilibria reveals that the direction of policy effects will be conditional on prior strategies or norms. In particular, our simulation result that a Rotation policy will be more effective in groups where players are anonymous to their alliance partners, consistent with the actual difference we find when we compare the primed and anonymous groups.

4.6 Discussion and conclusions

In this paper we introduced a new experimental design aimed at producing welfare-reducing reciprocity, or back-scratching, in the laboratory. The basic design involves three alliance-related choices: alliance initiation, whereby a player not yet in an alliance chooses a receiver non-meritocratically; alliance reciprocation, where a player reciprocates non-meritocratically to the previous round's allocator and hence is seeking to sustain an alliance; and meritocratic, where players choose meritocratically that round. We looked at the frequency of these choices and the characteristics of who makes them, as well as the effect of policy interventions.

In our baseline setup, 26% of rounds could be identified as part of an alliance, defined as a sequence of at least two reciprocating rounds following an alliance initiation and involving an alliance reciprocation. These alliances were established by the 8th round and lasted for 6 rounds on average. The primed group baseline treatment had 70% of rounds as part of an alliance, and much longer lasting alliances of 15 rounds on average. Alliance reciprocation increased from 14 to 44% of rounds while meritocratic rounds decreased from 60 to 47% on average. Males were 20% less likely to play meritocratic, and business students 21% less likely, suggesting that these groups quickly recognised the opportunities to gain from alliance formation. We were thus able to generate significant back-scratching in the laboratory even within groups of anonymous student participants.

Our staff rotation policy, whereby the next round allocator is the previous receiver with only a 50% chance, reduced alliance rounds from 26% to 11% in the anonymous groups. Yet, the share of meritocratic decisions was unchanged showing that the entire effect is due to rotation policy breaking alliances rather than reduced intentions to form and reform alliances. The increase in alliance initiation attempts from 23% to 31% of rounds, coupled with the decrease in the number of alliances per group (from 1.1 to 0.8) and mean alliance length (6.2 to 3.8 rounds on average), show that attempts to reinitiate alliances were more frequent but less successful, and that players attempted to form new alliances rather than remain loyal to their partner.

For the primed groups this policy led to a slight reduction in meritocratic rounds (from 47% to 42%), with a significant increase in alliance (re)initiation from 8% to 31%, and an increase in the number of alliances per group, showing rotation didn't prevent members from the two established alliances pairs in each group reforming their alliances whenever possible.

The Low Rent treatment did not increase the frequency of meritocratic rounds in the anonymous groups, and even significantly decreased it when we compare the stable periods of play, apparently because alliances that were already formed persisted, increasing the average alliance length from 6.2 to 18.8 rounds. In the primed groups, there was an increase in meritocratic choices (from 47% to 57% of rounds).

The prima facie policy conclusions from these experiments are that existing alliances matter in terms of the success of institutional interventions aiming to curtail back-scratching. Rotating staff from a pool of people with already established alliances is unlikely to deter them from taking advantage of their temporary position to favour their alliance partners. This points to a significant trade-off in the choice of personnel for regulatory agencies between greater industry experience and being free of previous alliances. Having low rents from alliance formation helps to induce more meritocratic play amongst groups with strong existing alliances, though not with weak existing alliances, perhaps because with weak alliances the role of the fear of losing the dominant position and then being punished is stronger.

Our design can be extended in many directions, such as increasing the transparency of previous choices, varying the groups size, varying the cultural background of participants, and introducing the possibility of punishment. An open question is to how to nudge groups towards coordinating on the meritocratic equilibrium in the first place and hence preventing alliance formation from ever happening.

Appendix

YOU ARE THE ALLOCATOR

Please choose who you would like to allocate the \$25 payment to this round by selecting the tick-box under their location, then click Allocate.

You are

Phase 1

Round 1

| | | | |
|---------------------|--------------------------|--------------------------|--------------------------|
| Productivity number | 3 | 2 | 1 |
| Player | | | |
| | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

ALLOCATE

YOU ARE AN OBSERVER

Your position in the game for this round is shown below

You are

Phase 1

Round 1

The allocator is

| | |
|---------------------|---|
| Productivity number | 1 |
| Player | |

Continue

You are

Payment allocated by

| | |
|-------------------|---|
| Your bank balance | 2 |
| Phase | 1 |
| Round | 1 |

Continue

You are

Payment allocated by

The payment was allocated to you

| | |
|-------------------|----|
| Your bank balance | 27 |
| Phase | 1 |
| Round | 1 |

Continue

Figure 4A.1: Clockwise from top left: Allocator decision screen, non-allocator wait screen, notification of decision for non-receivers, notification of decision for receiver

Player Information

Not all players in the game are equal.

In the game you are friends with the player whose symbol is



The two of you always helped each other in the past. This player found you a job with their uncle when you finished school. You are each always ready to repay the favour of the other, because you know that helping each other out is what friends do.

You have no history with other players in the game - they have never done you any favours, nor have you done any for them.

Your friend is also being reminded of your shared history together.

Remember to play the game to earn as much money as you can.

Figure 4A.2: Instructions given to players in Friendship condition to simulate ongoing social relationship and manipulate expectations

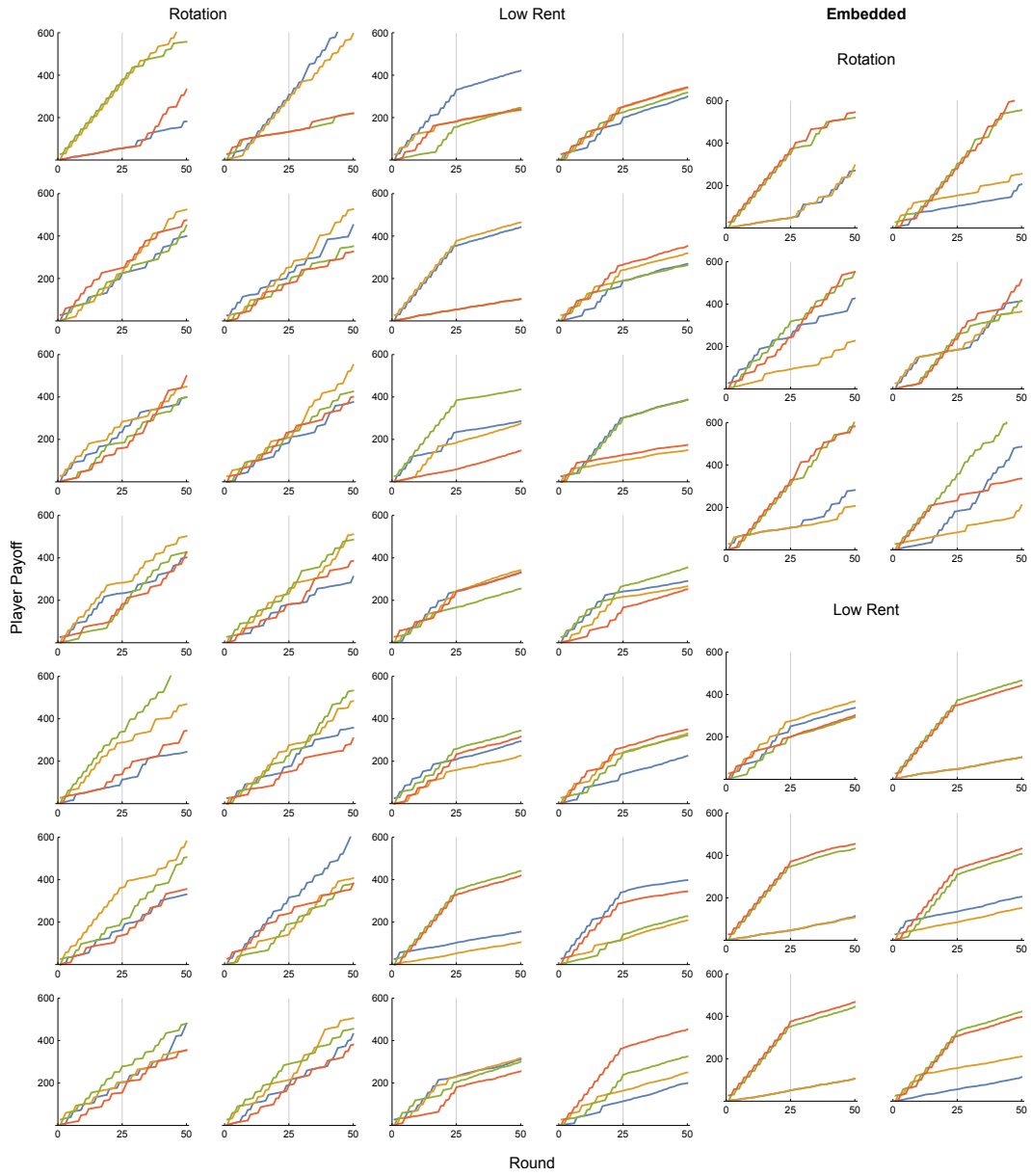


Figure 4A.3: Accumulated player payoffs by group, round and treatment

Table 4A.1: Examples of participant's written comments

*My friend and I are greedy except when they are 1 and others are 3.
Not going to get it back until I get a 3 again*

*Hope the player information is correct with who trusts me to pay them so they repay me.
Never use productivity number 1 even if it's a mate. Always go for highest productivity.
Check to see if he repays me, try to get repayment continuous b/w the two. Same tactic for round 2*

*Seems best to continuously allocate to the player with the highest productivity number
Round 20 didn't get from hexagon. Then they didn't give to me when I was 3 despite me giving it to
them when they were 2 and others were 3. But I took it they were 1.*

It's always good to have support. If they support you, you should support them

Choose red circle every time and hopefully they realise they are best off choosing me.

*For one note that this game would be played very differently if people were face to face.
Secondly, I am pretty sure a cultural bias exists, where Asians (the majority) would exhibit
more group consciousness. My guess is however that you are testing the relationship between
leadership and group consciousness? (altruism / egotism)*

*Strategy: pick one player and always allocate to that person. What if I get isolated?
Isolate the other two?*

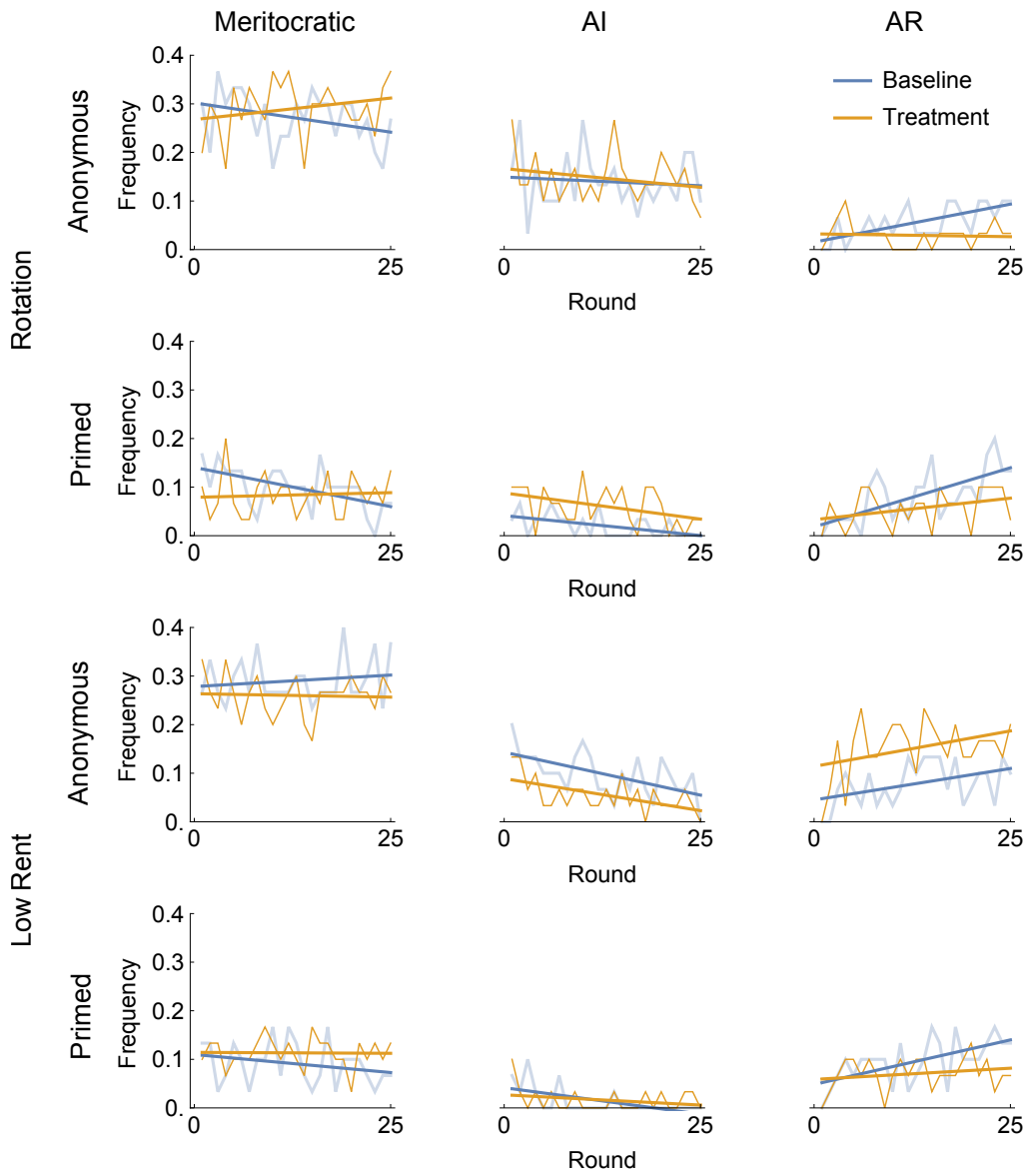


Figure 4A.4: Choices by round and treatment including fitted linear model

Table 4A.2: Choice models

| | Demographics | | | Social | | | Treatments | | | Combined | | |
|-----------------------|--------------|-------|-------|--------|-------|--------|------------|-------|---------|----------|-------|---------|
| | M | AI | AR | M | AI | AR | M | AI | AR | M | AI | AR |
| Age | -0.02* | 0.01 | 0.01 | | | | | | | -0.01 | 0.01 | 0.00 |
| Gender | -0.09* | 0.05 | 0.19* | | | | | | | -0.08 | 0.06 | 0.07 |
| Relationship | -0.05 | 0.01 | 0.10 | | | | | | | -0.04 | 0.01 | 0.08 |
| Inter. student | 0.02 | 0.03 | -0.10 | | | | | | | 0.01 | 0.04 | -0.08 |
| Bus. student | -0.09 | 0.10 | 0.11 | | | | | | | -0.09 | 0.11 | 0.05 |
| Happiness | -0.02 | -0.00 | 0.05 | | | | | | | -0.03 | 0.01 | 0.06 |
| Family wealth | 0.05 | -0.01 | -0.11 | | | | | | | 0.04 | -0.01 | -0.05 |
| Politics | | | | -0.00 | 0.01 | -0.02 | | | | -0.01 | 0.00 | -0.02 |
| Skills v people | | | | 0.03 | 0.01 | -0.09* | | | | 0.01 | 0.01 | -0.03 |
| Clubs | | | | 0.01 | 0.00 | -0.01 | | | | 0.01 | -0.00 | -0.01 |
| Leadership | | | | -0.01 | -0.03 | 0.18 | | | | 0.02 | -0.05 | 0.08 |
| Rotation | | | | | | | 0.02 | 0.02 | -0.23 | 0.02 | 0.02 | -0.21 |
| Low Rent | | | | | | | -0.04 | -0.11 | 0.33*** | -0.03 | -0.10 | 0.27** |
| Primed | | | | | | | -0.13* | -0.09 | 0.46*** | -0.07 | -0.10 | 0.40*** |
| Rotation x Pri | | | | | | | -0.07 | 0.21 | -0.01 | -0.10 | 0.22 | -0.01 |
| Low Rent x Pri | | | | | | | 0.14 | 0.09 | -0.39* | 0.11 | 0.06 | -0.33 |
| <i>N</i> | 2000 | 1318 | 697 | 2000 | 1318 | 697 | 2000 | 1318 | 697 | 2000 | 1318 | 697 |
| <i>R</i> ² | 0.03 | 0.02 | 0.11 | 0.00 | 0.00 | 0.06 | 0.02 | 0.02 | 0.31 | 0.04 | 0.04 | 0.30 |

p values are * < 0.10, ** < 0.05, *** < 0.01 with standard errors clustered by experiment group.

Gender = 1 for male. People skill is 1-5 where mostly skills is 5, and mostly people is 1. Politics is 1-10 where 1 is Left and 10 is Right.

Chapter 5

Whose back are you scratching? Transparency's dual effect on corruption

Abstract

We look at the effect of improving information transparency and implementing identification via photographs on the incidence of costly back-scratching in a laboratory setting. In our experimental design players have an incentive to form a bilateral alliance in which they favour each other at the expense of other players. We find the probability of alliance formation is unchanged when photographs identify players, a result which is the product of two countervailing forces; more rapid alliance formation due to the use social cues from the photos as a coordination device, and more prosocial forces at the group level that lead to shorter alliances. For policy makers there are lessons about when and where transparency may curtail corruption, and where it may in fact facilitate it.

5.1 *Quid pro quo* corruption

In recent decades many international organisations have adopted transparency in their charters with the expectation of reducing corruption. This includes the Extractive Industries Transparency Initiative (EITI), whose signatories include the US, UK, France, and many African countries, which commits resource companies to disclose all payments made to governments. It includes the 2005 United Nation Convention against Corruption that calls on each State Party to “enhance transparency in its public administration”. The IMF includes the “transparency of government accounts” in its 1997 definition of good governance, and the EU 2011 Transparency Register was similarly developed to provide citizens with information about who is involved in European decision making. These initiatives and others build on a large development literature on corruption summarised by Tanzi (1998), who concludes that “[i]n many countries, the lack of transparency in rules, laws and processes creates a fertile ground for corruption”. Kolstad and Wiig (2009) re-emphasise that conclusion 10 years later, though they also draw attention to the importance of factors accompanying transparency, such as accountability.

Obtaining empirical evidence of the success of anti-corruption transparency policies is hampered by the strong incentive for concealment by corrupt parties, leading many researchers to seek evidence of the potential success of anti-corruption policies in laboratory experiments (see Abbink & Serra (2012) for a review of this literature). In this paper we study the importance of the visibility of back-scratching on corruption in the laboratory, where corruption entails a reciprocation of favours between parties that incurs a cost on others. To this end we use a new experimental game specifically designed to allow for mutual back-scratching at the expense of others, and then ascertain whether having all the players see pictures of all other players reduces the amount of backscratching observed, even in the absence of official punishment possibilities.¹ The main contribution of our paper over and above the experimental literature we add to is to use a simple experiment that specifically captures the ‘I scratch your back, you scratch mine’ bilateral nature of corruption in a setting that allows for the choice of back-scratching partners (players can renege on alliances with one partner and establish new alliances with another) and a salient negative externality from corruption.

Our study explores a process somewhat outside the standard definition of corruption of “acts which utilise the power of public office for personal gain in a manner that contravenes stipulated rules” (Jain, 2001). Yet contravening poorly designed rules may be both corrupt and economically beneficial, ‘greasing the wheels’ of economic production (Aidt, 2009).² We instead focus on a particular social process that is sometimes classified as corruption, depending on the rules in place at the time, but which contains the important economic elements of corruption. We call this process back-scratching, and define it as forming loyal reciprocal groups by trading favours for mutual gain at the expense of others.³ This view differs from traditional notions of rent-seeking insofar as there is no lottery-type contest for rents Konrad (2007). Instead we consider that the process of alliance, or group, formation dominates the allocation of rents when the opportunity to preference loyal group members is available in a long run game of *qui pro quo* (Reuben, 2002). This approach has a long history in the study of the political influence of interest groups (Olson, 1965; Heinz *et al.*, 1990; Mitchell & Munger, 1991; Reuben, 2002; Beyers *et al.*, 2008; Grossmann & Dominguez, 2009), and broadly incorporates the phenomena of nepotism, cronyism, and the revolving door of personnel between elite positions in government and private sector (Etzion & Davis, 2008; i Vidal *et al.*, 2012; Moore, 2014).

To capture this back-scratching process in our experiment, in each of the 25 rounds of a treatment there is a discretionary decision made by a single subject (the ‘allocator’) from a group of four or six subjects about which of the other subjects will receive the payment (the ‘receiver’). Non-allocator players are given a randomly drawn productivity number⁴ each round which determines the group payoff for that round (an amount received by all subjects). Each subject’s payoff equals the chosen receiver’s productivity number that round, while the receiver’s payoff includes

¹The game we use to study transparency is an extension of Murray *et al.* (2015) and sits in between the traditional experimental corruption literature centred around the repeated bribery game (RBG) of Abbink *et al.* (2002), and a number of literatures on coordination in repeated games such as the public goods game, and games of group formation and in-group bias (Abbink & Serra, 2012; Burnham, 2003; Andreoni & Petrie, 2004; Hewstone *et al.*, 2002; Efferson *et al.*, 2008; Abbink *et al.*, 2002; Lamsdorff & Frank, 2010; van Veldhuizen, 2011; Schikora, 2011b; Burnham, 2003; Charness & Gneezy, 2008).

²The social losses arising from systemic corruption are widely recognised and the ‘greasing the wheels’ hypothesis is not widely supported empirically (Aidt, 2009; Rose-Ackerman & Søreide, 2011). Indeed, if corruption greases the wheels for some, it typically comes at a cost to others (Kaufmann, 1997).

³Loyalty to a political connection or political party is repeatedly observed in empirical analysis of lobbying and political donations, adding to the evidence that corruption is a relationship-based process (Harrigan, 2008; Koger & Victor, 2009; Bertrand *et al.*, 2011; i Vidal *et al.*, 2012).

⁴Productivity numbers are a shuffled set of sequential integers up to the number of non-allocating players.

the discretionary payment for that round⁵ in addition. The ‘twist’ is that the receiver is the decision maker next round. Group payoff maximisation arises from allocating the payment to the highest productivity player each round, which we call a meritocratic strategy, but there is a strong incentive for individuals to form alliance pairs and keep the allocator position within that alliance at the cost of the other players. Players face the conflict of maximising individual earnings through forming an alliance pair, and maximising group earnings by playing meritocratically.

Within this experimental setup we study the effect of transparency on alliances in two experiments. Our first *Transparency* experiment implements a treatment which improves information available to subjects from a prior ‘veil of ignorance’ baseline treatment. This is achieved by publishing to all players each round the monetary loss compared to meritocracy (if any) from the choice made, and publishing the allocation choice that would have maximised the group payoff. Our main *Identity* experiment implements a treatment where the six subjects in a group are shown photographs of each other, rather than being anonymously represented by coloured symbols, in order to provoke a cooperative response. In short, we systematically lift the ‘veil of ignorance’ under which back-scratching alliances typically operate by mimicking possible transparency regulations, such as publishing occurrences of favourable treatment or the identities of decision makers and their favoured partners.

While improved information should increase the importance of a social norm of meritocracy and thus to reduce the incidence of alliance formation, because player photos also convey information about other members of the group, we anticipate that particular types of players who are recognised to be alliance-prone would be more likely to form an alliance simply because the odds of mistakenly trying to form an alliance with someone who does not want to are lower when they are identifiable. We do find that providing photos allows some players to use visible social cues to more rapidly form alliances, particularly business students and players rated as more beautiful by their group, confirming a number of previous findings (Solnick & Schweitzer, 1999; Rosenblat, 2008; Frank & Schulze, 2000). On balance however, neither the transparency nor identity treatments resulted in greater meritocratic play, and hence higher group payoffs. Men and business students are found to be more prone to form costly alliances, while religious subjects, particularly Buddhists, are much less so; a finding that supports previous studies (Lambsdorff & Frank, 2011; Chuah *et al.*, 2014). These results suggest a degree of caution regarding blanket calls for greater transparency as an anti-corruption policy, particularly where transparency is not a precursor to the option for punishment.

5.2 Background

The experimental literature on the micro-level dynamics of corruption, and the broader literature on the role of transparency on cooperation and group behaviour, inform our approach. Abbink *et al.* (2002) pioneered an experimental design, the repeated bribery game (RBG), to look at the micro-level dynamics of corruption whereby repeated bribery opportunities were encountered by two subjects, one in role of a firm (a potential briber) and the other a public official, and where acceptance of a bribe is associated with a cost to other players in the experimental session. This setup has since been extensively modified to examine a number of elements in corruption, with the most relevant to our paper being Schikora (2011b), who implement a *four eyes policy* in which the role of public official is given to two players who must jointly make the decision to accept or reject the bribe, and how to allocate payoffs between themselves and the potential

⁵20 experimental currency units (ECU) in the four player version, and 25 ECU in the six player version

briber. Rather than a reduction in bribery from this transparency policy, the 10 round *four eyes* treatment lead to a higher frequency of corrupt transactions, even when the bribe was split between the two public officials. Transparency of corruption to a third party in this case merely fostered that third party's involvement and more efficient bribery and favouritism between the new corrupt group of three. This result is supported in a field study by Olken (2007), who found that grassroots monitoring is ineffective at reducing missing expenditures in construction projects.

Where our game differs substantially from the RBG is the nature of externalities arising from corruption. Typically either of two *ad hoc* approaches are used; a small deduction is made from the earnings of other subjects in the same laboratory session (but who are not part of the matched briber-official pair), or a deduction is made from a charity donation by the experimenter (Abbink *et al.*, 2002; Lamsdorff & Frank, 2010; van Veldhuizen, 2011). In either case there is relatively low salience of the externality insofar as the choice as to who suffers it remains detached from the choice whether or not to engage in corruption. A more common corruption situation involves direct discretionary choices about favouring a future alliance partner over identifiable others who suffer the cost, but could have been favoured instead. For example, a public officer choosing between contractors will, by explicitly choosing the winning contractor to be their alliance partner, implicitly choose the loser as well, and by doing so potentially forgo the chance of forming an alliance with the losing bidder.

In our setup transparency provides additional information to those subjects who are suffering the negative externality from corruption, but who could be favoured instead, whereas the *four eyes* variation of the RBG does not offer transparency to those suffering the externality, nor can they be chosen to be part of a corrupt alliance. The incentive change from transparency in our setup is therefore quite different, though Schikora's (2011b) results suggest that knowing corrupt alliances can be observed may serve to reinforce them; continuing to be corrupt even when being observed could signal a greater commitment to the alliance.

Our experiment differs from other cooperative games, such as dictator games, ultimatum games, public goods games in the sense of having more complex payoff conflicts, but transparency in these setups has been extensively studied and is hence informative. Bohnet & Frey (1999) find cooperative behaviour increases nearly twofold in a one-shot prisoner's dilemma game when individuals can see each other in the laboratory, increasing further when they can also communicate, indicating that cooperation is not only reciprocity-based but also identifiability-based. Burnham (2003) runs standard dictator games that allow sharing a \$10 endowment with take-it-or-leave-it offer. In the anonymous treatment only 1 in 26 dictators offered a 50-50 division, yet when either recipients or dictators could see a picture of the other player 25% of dictators offered an equal split, demonstrating the importance of visibility for the social norm of equality to affect choices. However, no significant difference in the frequency of \$0 allocations between treatments was found, indicating that the effect of revealing visibility is conditional on the decision to already make a positive offer and cooperate to some degree. In a public goods game where the level of information available on the group members was varied, Andreoni & Petrie (2004) find that providing both photos of the other group members, and information as to their contributions, increased public good contributions by around 80%, though the effect of photos or information alone was insignificant.

Using a slightly different form of transparency, Charness & Gneezy (2008) finds an almost 50% increase in offers in the dictator game if the dictators are given the last name of the recipient, though they find a non-significant increase in offers in the ultimatum game where receivers could reject an offer and where the initial offers were higher to begin with. In a group dictator game

Burnham & Hare (2007) find that adding a set of ‘robot eyes’ to the screen of the dictator increased public good giving by 29%, again indicating a direct effect of being watched.

One would expect from these existing papers, particularly the two most closely aligned studies of Burnham (2003) and Andreoni & Petrie (2004), that providing photos would increase pro-social behaviour. Yet, in the context of back-scratching it is not entirely clear what ‘pro-social’ behaviour actually is; cooperating with one other player increases payoffs for both ‘partners-in-crime’ at the cost of the anonymous others, though playing meritocratically represents a wider form of pro-sociality to the group as a whole. More fundamentally, sustaining a back-scratching alliance relies on some form of trust, but only between a particular pair, in order to overcome the Nash equilibria of whole group cooperation which arises by backwards induction.

Experiments by De Kwaadsteniet *et al.* (2012) support the idea that transparency is not automatically effective at improving cooperation at the broadest level and that information about others can be a cue to facilitate tacit coordination. When players in their experiment were faced with choosing a colour that matched the colour choice of another player, information about the gender, field of study, or a player’s additional choice of a university building, facilitated coordination. In ultimatum games where photographs of players are revealed, men and attractive players were offered higher allocations (Solnick & Schweitzer, 1999), suggesting some underlying biases in preferences for cooperative partners. In terms of the strength of in-group favouritism when choosing team mates, Hammermann *et al.* (2012) conduct experiments where players choose team mates given a group signal (of their field of study) or a performance signal based on a real effort task, and find a strong bias towards team mates choices being made on group, rather than performance, signals. In terms of our setup, these results suggest that revealing players identities through photographs may offer social cues about players that facilitate particular alliances in addition to providing incentives for pro-social behaviour at the group level.

Where we add to this considerable literature is our new experimental design capturing the process of corruption as costly back-scratching, and whereby players are able to choose alliance partners from a group, hence implicitly choosing who will bear the cost of the alliance, and where players are able to break and reform alliances with other subjects. The effect of transparency on choices in our experiment is not clear cut; revealing player’s identities via photographs may generate social pressure from the group and encourage cooperation, but it may also provide social cues as to which other players are more likely to reciprocate and form an alliance. Improving information about other player’s choices may have little effect as it does not fundamentally change the nature of the ‘who is with me, who is against me’ identification problem of corruption as a back-scratching alliance.

5.3 Experimental Design and Research Questions

5.3.1 Basic design

We report two experiments, which we call Transparency and Identity, featuring a common design first developed in Murray *et al.* (2015). The baseline computerised experiment consists of subjects in groups of 4 (Transparency) or 6 (Identity)⁶ whose composition is the same for the

⁶We increase the group size for the Identity experiments to ensure greater anonymity of subject choices under the baseline condition. Identifying players to each other with photographs enables subjects to determine who may have been an alliance pair in the anonymous treatment. A larger pool of players increases the difficulty of identifying any alliance pairs after the experiment. Earlier experiments showed that subjects excluded from

whole duration of the experiment, and who are identifiable to each other by a coloured shape on the screen. Each round one player, the allocator, chooses which of the other players to receive a 20 experimental currency units (ECU)⁷ payment (with the first round allocator randomly chosen). This payment represents a discretionary allocation of rent. The receiver of the payment in a round becomes the allocator for the next round, providing the potential for back-scratching to emerge.

The payoff structure creates a conflict between maximising group and individual payoffs via back-scratching with a ‘productivity number’ device that determines the group payoff in a round. Each round the players not allocating are given a randomly shuffled productivity number, from the set $\{1, 2, 3, 4, 5\}$ which the allocator can observe before making their decision.⁸ Each of the players in the group receives a payoff in each round equal to the receiver’s productivity number. The receiver’s payoff that round includes the payment in addition. We call a choice meritocratic if the payment is allocated to the player with the highest productivity number as it maximises the total group payoff that round. The payoff matrix for a single round is summarised in Table 5.1.

Table 5.1: One round payoff structure

| <i>Choice</i> | Player 1 Allocator | Player 2 Prod. 1 | Player 3 Prod. 2 | Player 4 Prod. 3 | Player 5 Prod. 4 | Player 6 Prod. 5 | Group Total Payoff |
|---------------|-----------------------|---------------------|---------------------|---------------------|---------------------|---------------------|-----------------------|
| Player 2 | 1 | 21 (26) | 1 | 1 | 1 | 1 | 26 (29) |
| Player 3 | 2 | 2 | 22 (27) | 2 | 2 | 2 | 32 (33) |
| Player 4 | 3 | 3 | 3 | 23 (28) | 3 | 3 | 38 (40) |
| Player 5 | 4 | 4 | 4 | 4 | 24 | 4 | 44 |
| Player 6 | 5 | 5 | 5 | 5 | 5 | 25 | 50 |

Transparency experiment payoffs are shown in parentheses. They differ due to the 25ECU, rather than 20ECU, payment.

Randomising productivity numbers captures the idea that choosing an alliance partner to favour when making a discretionary decision often means forgoing the most efficient choice for the group - choosing the less talented person for a job, choosing the less efficient contractor for a job, and so forth. Meritocratic choices are, in contrast, always the most efficient, or productive, choice for the group as a whole. The conflict between incentives to form an alliance pair or play meritocratically are made clear in Table 5.2, which compares the expected payoffs to players within a bilateral alliance and others in the group under fully meritocratic play (all players make all decisions meritocratically and maximise the group payoff) and under full alliance play (two players allocating only to each other) from the first round of a 25 round treatment. Notice that although the number of players and size each round’s payment is different, the incentive in terms of a 56-57% increased payoff from forming an alliance is almost identical in both experiments, and comes at a cost to the remaining players, and at cost to the efficiency of the group as a whole.

Under standard rationality assumptions the only behaviour that is individually optimal is meritocracy. Any another strategy unravels with backward induction; in the last round, income-maximisation requires choosing the player with the highest productivity, independent of the

alliances could be quite emotional about the experiment result, and we wanted to avoid any real life conflict after the completion of the experiment. Subjects in groups were also randomised in their seating position in the lab, and between treatments the location of players on screen was randomised.

⁷In the four player Transparency experiment the payment was 25 ECU.

⁸Set is $\{1,2,3\}$ in the four player Transparency experiment

Table 5.2: Expected payoffs from successful alliance and meritocratic strategies in ECU

| Experiment | Strategy | In my alliance | | Out of my alliance | | Group | |
|--------------|--------------|----------------|--------|--------------------|--------|--------|--------|
| | | Payoff | Change | Payoff | Change | Payoff | Change |
| Transparency | Meritocratic | 231 | | 231 | | 925 | |
| | Alliance | 363 | 57% | 50 | -78% | 825 | -11% |
| Identity | Meritocratic | 208 | | 208 | | 1,250 | |
| | Alliance | 325 | 56% | 75 | -64% | 950 | -24% |

Meritocratic play maximises group payoff in Transparency ($25 \times 25 + 3 \times 25 = 925$) and Identity ($20 \times 25 + 5 \times 25 = 1,250$), which is equally divided amongst players as their expectation prior to the first round. For alliance play in the Transparency experiment the expectation for players able to form an alliance by being the first round allocator or receiver is jointly ($25 \times 25 + 2 \times 25 = 725$), which under an equal share is 362.5 per alliance member, though the first allocator will receive 337.5 and the first receiver will receive 387.5 due to the sequence of play and the odd number of rounds in a treatment. In the Identity experiment the joint alliance payoff is ($20 \times 25 + 3 \times 25 \times 2 = 650$), an equal share being 325, with the first allocator getting 315 and the first receiver 335. For alliance play the players not in the alliance will each receive ($2 \times 25 = 50$) in Transparency and ($3 \times 25 = 75$) in Identity.

history of the game. This makes it optimal to also be meritocratic in the penultimate round, and so on, till round one. Hence, non-meritocratic behaviour only makes sense where expectations that others will reciprocate can be generated. It is these expectations that can be affected by improving the transparency of decisions being made, and by revealing the identity of players in the group using photographs.

5.3.2 Treatments

Transparency

In the Transparency experiment, 14 groups of 4 first play a baseline treatment for 25 rounds, before receiving further instructions about the transparency treatment. The baseline treatment involves withholding some information from players about the state of the game in any round. Under the ‘veil of ignorance’ the players not making the allocation decision are unable to observe the productivity numbers of others. Nor, once the allocation decision is made, do they see the resulting group payoff from that round, or their own earnings for the round. Only their new total balance of earnings is displayed on the screen as per the top left panel of Figure 5A.1 of the Appendix. While in principle all players can still infer whether a decision was optimal for the group as a whole from their new earnings balance in a round, and from observing which player becomes the allocator in the next round, making this connection requires active recording and monitoring by each player.⁹ This setup mimics the situation whereby monitoring of back-scratching alliances is imperfect to those outside the alliance.

The transparency treatment involves a change to the information profile such that all players are fully informed of all the conditions of the game each round, including the productivity numbers of all players, and after a decision is made each round they are informed of their

⁹Players who receive the payment without the highest productivity number can immediately see they have been given a favour by virtue of receiving the payment, while the player with the highest productivity number can infer whether a group-optimal decision or an alliance-forming decision was made.

earnings, the allocation decision, what was the meritocratic decision, and the earnings of the player chosen to receive the payment (as per the top right panel of Figure 5A.1 of the Appendix). In this experiment the receiver of the payment in the 25th round of the baseline becomes the allocator in round one of the transparency treatment, thus representing a continuous environment of players and relationships in which the transparency policy is implemented. We adopt this setup in order to understand the likely effect of a policy change in an institutional environment where ‘resetting’ people is not viable. Such regime-change experimental settings are uncommon in the RBG literature, yet as Abbink (2004) noted, such a setup is much more reflective of possible real life policy implementation. The interpretation of the treatment effect is therefore whether implementing transparency reforms outweighs both the incentive to sustain already formed alliances and prevent the formation of new alliances.

Identity

In the Identity experiment 10 groups of 6 subjects play either two baseline treatments, or one baseline and one identification treatment in either order, with 30 groups in total. Instead of improving information about decisions and payoffs like the transparency experiment, the identification treatment subjects see a photo of the others in their group instead of a symbol, which they take using the iPad camera immediately prior to the identification treatment. Players maintain the same baseline information profile in both treatments.

Unlike the Transparency experiment, the first round of a treatment involves a new random draw of the first round allocator, as well as randomising player positions on the screen so that subject cannot tell who played what in a previous treatment. Rather than a test of whether revealing identities within a continuous social environment can break down or deter new alliance formation, this experiment tests the raw effect of identification monitoring compared to anonymity in two different institutional setups of the back-scratching game.

For clarity a diagram of the design of the two experimental setups, including treatment order, groups details, number of subjects, and other details, is in Figure 5.1, where B is a baseline, T is transparency treatment, and I is identity treatment.

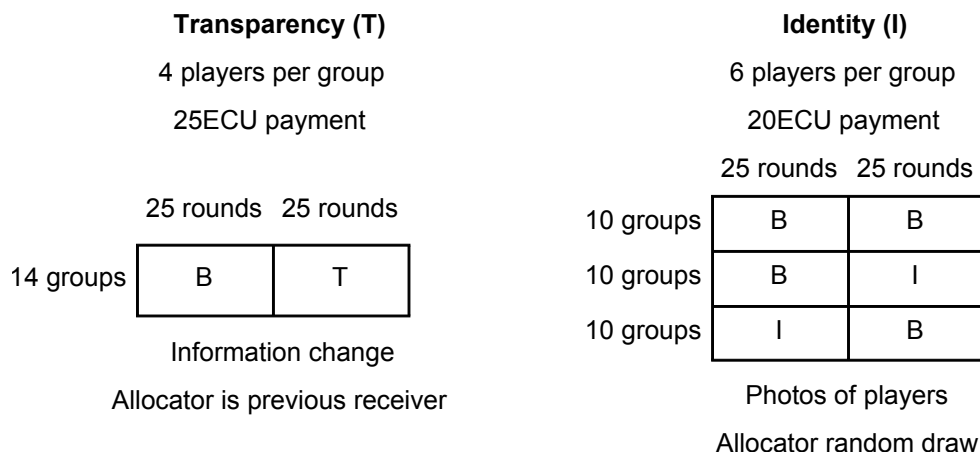


Figure 5.1: Experimental setups compared

5.3.3 Procedures

The experiments were conducted between April and July 2013 with 236 students participants¹⁰ recruited from the University of Queensland and Queensland University of Technology in Brisbane, Australia, using ORSEE (Greiner, 2003). They took place in university computer labs, using desktop computers for the Transparency experiment, and iPads for the Identity experiment, using CORAL software (Schaffner, 2013). Each subject played two treatments with 50 rounds in total and received their accumulated experiment earnings converted to Australian Dollars at a ratio of 20:1 (25:1 in Transparency), making the average payoff \$AUD 21 for an average of 50 minutes of play, above the minimum wage.

After receiving experimental instructions subjects went through a set of hypotheticals to ensure they understood the instructions and the basic dynamics of the game. At the end of the experiment subjects completed a socio-demographic survey. Participants playing identification treatments were asked additional survey questions at the end of the experiment about whether they recognise the other subject in their group, and if so, what their relationship is, as well as being asked to rate attractiveness of other subjects and answer a series of questions about their strategic considerations during the experiment. For selected analyses, we are also able to draw upon the basic data of Murray *et al.* (2015) in order to inform us about the characteristics of individuals in alliances, and by doing so obtain data on an additional 28 groups of 4 subjects. In those experiments the alternative treatments involved variations on the institutional design, reflecting staff rotation and low payment policies.

5.3.4 Research questions

We are mainly concerned with choices involved in the dynamics of alliance formation and maintenance, and we define a number of choice types to that end. First, a meritocratic (M) choice is any allocation of the payment to the player with the highest productivity number in that round. An alliance initiation (AI) is defined as a choice to allocate the payment in a round to a player with a productivity number less than the maximum, and where those players are not already in an alliance. This choice variable captures intentions to form alliances through costly signals, or favours, that a player hopes will be reciprocated in future rounds. An alliance reciprocation (AR) choice is a non-meritocratic reciprocal allocation of the payment in the round immediately following an alliance initiation, or any other non-meritocratic decision within an alliance period. AR choices capture a slightly different element in alliance formation, which is the willingness of players to respond to the choices of others, or in general terms, to follow social norms being set by others after an alliance is formed by being loyal to that alliance. A round is classified as in an alliance (IA) if it forms part of a period of exclusive dealing between two players in which the first decision is an AI, and at least one other is non-meritocratic (being an AR). We look closely at the effect of the experiment treatments on this suite of choice types, along with other basic descriptive measures of group outcomes, in order to answer the following research questions.

Question 1: Does transparency decrease alliance play and increase group payoffs?

Implementing a policy of increased information transparency in corruption and cooperation games has previously found to be ineffective (Schikora, 2011b; Azfar & Nelson, 2007). Because our experimental design captures a different type of cooperation, whether these results can

¹⁰56 in the Transparency experiment and 180 in the Identity experiment

be replicated in our back-scratching setting, where the choice of alliance formation is directly linked to the choice of those who suffer a negative externality, is of interest. We assess changes in alliance play as changes to the alliance choice types.

Question 2: Does identification decrease alliance play and increase group payoffs?

Our expectation from the literature is that there will be a decrease in alliance formation in the identification treatment, and hence an increase in group payoffs representing an efficiency dividend (Bohnet & Frey, 1999; Burnham, 2003; Andreoni & Petrie, 2004; Charness & Gneezy, 2008). We look at the net effect identification on the alliance choice types of AI, AR and M, and on other metrics of group performance.

Question 3: Who are more likely to form alliances, and do social cues from identification facilitate alliance formation between these players?

In general the demographic determinants of alliance choices is of interest. More importantly, the cooperation literature suggests that social cues from improved information, such as photographs, can be used as a coordination device (De Kwaadsteniet *et al.*, 2012; Hammermann *et al.*, 2012). In our setup this would mean an increase in the likelihood of back-scratching alliances between certain player types in the identification treatment compared to the baseline. Even if alliance formation declines on the whole from identification, an observed increase in the incidence of particular types of alliances will condition any policy guidance offered by these experiments.

5.4 Results

5.4.1 Descriptive statistics

We present in Table 5A.2 descriptive statistics for our two experiments encompassing patterns of play, payoffs and player characteristics, and in the Figure 5A.2 of the Appendix we plot individual player earnings for each group in the identification experiment by round, visually displaying the complexity of actual alliance behaviour.¹¹ On average groups in the Identity experiment earned 173ECU (or 14%) less than the maximum possible, while groups in the Transparency experiment earned 60ECU (or 6%) less. Meritocratic choices made up a little over half of all choices and 32% of rounds were in an alliance on average.

Some other features are worth highlighting. First is the wide range of outcomes in terms of experimental earnings for individuals and groups in both our experiments. The highest Identity group earnings were 39% higher than the lowest group, with group Gini coefficients varying between 0.38 and 0.05, with such variation the result of some alliances lasting a whole 25 round treatment. For individuals the highest earning subject in Identity made a payoff five times higher than the lowest earner, with the same difference being nine times in Transparency. Given the repeated nature of the game such divergence is to be expected, and is in accordance with the idea that a social norms of meritocracy *or* back-scratching can emerge in response to early decisions which generate expectations about the play of others and the likelihood of reciprocation from attempted alliance formation.

¹¹An alliance is observable in these graphs as an alternating step-change in payoffs of two players in a group.

Additionally, we see that players often renege on an alliance, only to later form an alliance with a different player, with groups in the Identification experiments having up to 5 unique alliance pairs formed in a treatment (with an average of 1.3), and groups in Transparency having a maximum of 4. This possibility is a new feature in our experimental setup, and allows our later analysis on the socio-demographic determinants of back-scratching to be more robust to the experimental design, since players are able to choose in and out of alliances repeatedly during the experiment.

In terms of socio-demographics our participants cover a broad sample of university students, though with a large share of international students (38% in Identity, 46% in Transparency), a high representation of business students, and a roughly even gender split. In order to look at social cues in the identification treatment, racial appearance is of interest, as it offers one social signal upon which to base decisions about with whom form an alliance. Subjects are classified by the experimenter¹² in categories of Caucasian, Black, Indian and Asian, and are predominantly Asian (46%) and Caucasian (44%). Subjects in the Identity experiment also self-report their religion, with most subject reporting being Atheist (42%) or Christian (28%). For groups playing the identification (photo) treatment the attractiveness of subjects was rated by others in their group, and they also recorded whether they were friends with other subjects, with only 7% of subjects having a friend in their own group.

5.4.2 Treatment effects

To answer our first two research questions we compare indicators of alliance behaviour across treatments for each experiment. Table 3 summarises the mean treatment outcomes of a variety of indicators of interest, including the earlier-defined alliance choice types, and compares the distributions of baseline and treatment effects in both experiments. The frequency of these alliance choice types by treatment and round is plotted for the Identity experiment in Figure 5A.3 of the Appendix in order for a visual comparison. In the Identity experiment we are able to compare the pure change between the baseline and the identity treatment, ignoring learning effects, though we can extract the average learning effect by comparing the first and second treatments played by groups in this experiment. We thus make two comparisons for the Identity experiment; between the baseline and identity treatments, and between first and second treatments played by groups. In the Transparency experiment the treatment involved a change in the rules during continuous group play, meaning there may be additional learning effects to consider over the course of the game.¹³

In the Transparency experiment, the treatment condition had significantly fewer alliance initiation (AI) decisions than the baseline, but this was counteracted almost completely by increased alliance reciprocation (AR), leaving the number of meritocratic (M) rounds statistically indistinguishable across treatments. While the average number of AR decisions is much higher in the transparency treatment, 37% instead of 18% in the baseline, the change in the distribution of the number of AR choices across groups means they cannot be statistically distinguished. While more groups have zero AR choices under transparency (6 groups instead of 4), those groups who

¹²Classifications were made based on inspection of player photos immediately following the experiment. Players classified as Indian may merely have some South-Asian ancestry, while players classified as Black may have some African ancestry.

¹³In Section 5.4.7 we check for the robustness of these results by comparing specific sets of rounds in each treatment. However we believe that the groups in this experiment had found an equilibrium prior to the 25th round, and that had the rules not changed, the latter round dynamics would have been sustained for an additional 25 rounds.

Table 5.3: Treatment effects: Transparency and Identity (photo) experiments

| | Transparency | | Identity | | | |
|--------------------------------------|--------------|---------|----------|------------------|-----------------|------------------|
| | Baseline | Trans. | Baseline | Identity (photo) | First Treatment | Second Treatment |
| Share M rounds | 0.61 | 0.58 | 0.53 | 0.50 | 0.55 | 0.50 |
| Share AI rounds | 0.25 | 0.08*** | 0.23 | 0.30* | 0.30 | 0.21*** |
| Share AR rounds | 0.15 | 0.34 | 0.24 | 0.20 | 0.16 | 0.29** |
| Share IA rounds | 0.25 | 0.49 | 0.34 | 0.30 | 0.24 | 0.41** |
| Share of groups (any IA) | 0.71 | 0.57 | 0.83 | 0.80 | 0.80 | 0.83 |
| Mean alliance length [#] | 5.8 | 15.7** | 7.3 | 4.9 | 4.3 | 8.9*** |
| Round of first alliance [#] | 10 | 3** | 11 | 7** | 11 | 9 |
| Unique alliances/group | 1.0 | 0.7 | 1.1 | 1.6 | 1.4 | 1.1 |
| Mean group earnings | 867 | 862 | 1,078 | 1,076 | 1,086 | 1,068 |
| Mean individual earnings | 217 | 216 | 180 | 179 | 181 | 178 |
| Equality (group Gini) | 0.13 | 0.23* | 0.15 | 0.13 | 0.12 | 0.16* |
| Gains minus losses (ECU) | -58 | -63 | -172 | -174 | -164 | -182 |
| Share same gender alliance | | | 0.48 | 0.48 | | |
| Share same race alliance | | | 0.56 | 0.31 | | |
| Share friends alliance | | | 0.00 | 0.06 | | |

*10%, **5%, ***1% p-value significance of two-sided Mann-Whitney-Wilcoxon test: Transparency compared to baseline; Identity to baseline; second to first treatment in Identity experiment.

[#] Of groups where there as any alliance.

Same gender, race and friends alliances are only for the 20 groups who played the Identity treatment where such data was able to be collected.

do have AR choices have more of them (mean of non-zero group AR frequency of 15 rounds instead of 5 in the baseline). This reflects the creation and stability of norms of alliance formation that were created in the baseline and sustained through the treatment.

A number of additional results support the broad view that simple information transparency policies are ineffective at curtailing corrupt behaviour from existing alliances. First, the round of first alliance reduced significantly in the transparency treatment, meaning that many existing alliances continued without change. Second, the mean alliance length was far higher in the transparency treatment. Third, the number of unique alliance pairs per group decreased from an average of 1.0, to 0.7 in the transparency treatment, indicating that the few alliances that existed in the baseline where sustained through the treatment. In all, this evidence offers support for our prior expectation with regard to our first research question of no effect from information transparency, and corroborates earlier results on the effect of Schikora (2011b) and Azfar & Nelson (2007).

Regarding our second research question about the effect of player identification via photographs, we find very little support for our expectation that providing photos of players in our game improves group outcomes on average. The share of M rounds is marginally lower in the identity treatment, yet the mean alliance length and share of rounds in an alliance is also marginally little lower, though none of these are significant changes. Together with the observed increase in AI rounds and unique alliance per group, these results suggest that the effect of photos in this

game is to both facilitate more rapid alliance formation, and also to increase the social pressure to renege on ‘unfair’ long alliances. The net effect of these competing effects is no change in the observed individual or group earnings across treatments. In all there is no clear directional effect of the identification policy in this experiment, but the results suggest a quite complex behavioural response to player identification as an institutional change in the back-scratching game.

In terms of alliances between particular players of recognised groups, we find no significant change in the same race and same gender alliances due to the identity treatment, however we see that players who identified each other in the experimental survey as being friends outside of the lab were able to find each other and form alliances. Thus, at this level the results provide little support for our expectation that players will use photographs to form alliances with others from recognisable social groups, such as race and gender.

Lastly, our comparison of first and second treatments of the Identity experiment appear to show a learning effect in terms of alliance formation, whereby second treatments had significantly higher AR choice frequency (0.29 share of all rounds instead of 0.16 in the baseline). Additionally, there are more rounds in alliances (0.41 compared to 0.24), longer alliances (8.9 rounds on average compared to 4.3), and subsequently lower group earnings and greater group inequality.

5.4.3 Who initiates an alliance?

Our third research question regarding who is more prone to form alliances motivates us to explore the characteristics of players seeking to form alliances based on alliance choice types. As described earlier, an alliance initiation attempt (AI) is defined to occur if a player i chooses player j to receive the payment when player j does not have the highest productivity in that round and where those players are not already in an alliance. We first wish to know what the characteristics of an alliance initiator are, for which we estimate a linear probability model of the decision variable $AI_{igt} \in \{0, 1\}$,

$$AI_{igt} = W_i X'_{it} \alpha + v_{igt}$$

in which an individual i in group g is said to initiate an alliance at time t if at that time (s)he is the allocator and makes an AI choice. For most individuals and periods, AI_{igt} is thus a missing variable since the only players who can make an AI choice are the allocators of a round who are not currently in an alliance. X'_{it} is a matrix of socio-demographic variables and treatment controls. The error term v_t is clustered by group g , being $e_g + e_{igt}$.

We deal with the unbalanced sample of decisions across players by also weighting each decision by the inverse of the frequency of decisions by that player in the vector W_i , to provide a player-balanced estimation of the vector of coefficients, α , in addition to the estimation results in an unweighted model. Table 5A.3 of the Appendix shows the results of these estimations, which are estimated for the Identity experiment, the combined Identity and Transparency, and also including the baseline data from earlier comparable experiments in Murray *et al.* (2015).

A number of socio-economic variables closely relate to individual AI choices. International students are around 12% more likely to initiate an alliance when given the opportunity, while men and subjects in relationships are around 10% more likely. In terms of the Identity experiment only, for which data on race¹⁴ and religion was available, we also observe a number of interest-

¹⁴For players who played the identity treatments only

ing results. Indian and Asian participants are 10% and 27% more likely to initiate alliances, though the small number of Indian participants may be contributing to the size of that result. Participants identifying with a particular religion had not-significantly lower alliance initiation activity compared to the non-religious players. Participants from wealthier families and private schools showed no differences in their initiation behaviour. As expected, players who believed that forming an alliance was a fair way to play the game, after they played it, were more likely to have initiated alliances.

In terms of our research question about whether some types of people are more likely to form alliances, we can summarise that non-religious international student males in relationships appear the most ‘alliance-prone’ in terms of their initiation choices. In terms of our question on the effect of identification policies on alliance formation, identification (photo) treatment results in 5% more alliance initiation attempts, with second treatments seeing a 3% decline in initiation attempts, supporting the previous treatment comparisons.

5.4.4 Who reciprocates an alliance?

Each individual j who is subject to an alliance initiation has the choice whether or not to reciprocate the next round (if available) and choose individual i . Further, even when players have reciprocated at least once, they face the decision of how long to sustain the alliance, knowing the limited number of rounds and the losses from doing so to the group as a whole. The degree to which players reciprocate is thus another variable of interest in order to understand who forms an alliance with whom. The choice space of this variable is when the previous round was an alliance initiation, or a non-meritocratic allocation during an alliance period (the first round of which was an alliance initiation, and at least one round of which is a non-meritocratic decision).

In the Identity experiments, 158 of the 180 participants found themselves at least once in a position to reciprocate (or not), of which there are 544 opportunities to do so. On average, we can already say that 62% of individuals reciprocate, whereas one would only expect this to be 20% under full meritocracy because the odds that i happens to be the highest productivity person the next round is 20%. More formally, we estimate a linear probability model of Alliance Reciprocity $AR_{jt} \in \{0, 1\} : :$

$$AR_{jgt} = W_j X'_{jt} \alpha + v_{jgt}$$

in which an individual j in group g reciprocates an alliance, X'_{jt} is a matrix of socio-demographic variables and treatment controls, and the error term v_t is clustered by group g , being $e_g + e_{igt}$. Again we weight the observations to balance the data at the player level. Table 5A.4 in the Appendix shows the characteristics of alliance reciprocators using the Identity experiment data, combined with Transparency data, and again combined with baseline data from Murray *et al.* (2015).

Subjects in relationships show similar propensity to reciprocate alliances as they did to initiate them, being 22% more likely to reciprocate. However business students, who showed little propensity to initiate alliances, are 23% more likely to reciprocate, indicating that they are better at responding to alliance play than creating it themselves. The reverse is true of international students, who show no greater tendency to reciprocate, but who were 12% more likely to initiate

alliances.¹⁵ The second treatments played had 12% more AR choices, perhaps due to learning effects, while the direction of impact of the identity treatment is not clear, supporting previous treatment comparisons. Again, player reporting that forming an alliance is a justifiable strategy were 15% more likely to have reciprocated.

5.4.5 Who are in an alliance?

To answer the question of whether players use social cues from photos to coordinate back-scratching, we first look at the effect of the combined characteristics of players in an alliance, even in the absence of visible signals about the other player. Even though mostly anonymous, the joint characteristics of successful alliances can matter merely as a result of interaction of heterogeneous players in the repeated experimental setting. To this end estimate a Probit model of the odds that person i is in an alliance with j at round t , denoted as $A_{ijt} \in \{0, 1\}$, with errors clustered by individual, $v_{ijt} = e_i + e_{ijt}$, in the following form:

$$A_{ijt} = X_i' \alpha + X_{ij}' \beta + v_{ijt}$$

where the variables of particular interest are now in X_{ijt}' , denoting joint variables, including whether or not both players are of the same gender, same ethnicity, same age, students in the same degree course, and so forth. The high number of observations comes from the many potential alliance combinations in each round, which for a group of n players is $(n^2 - n)/2$. For each individual in a group we know in each of the 25 rounds whether or not they have formed an alliance with each of the others. Table 5A.5 of the Appendix shows model results for both Identity and Transparency experiments and for the extended dataset.¹⁶

We see again that males and subjects in relationships are more likely to be in alliances, and that subjects reporting as religious (either Buddhist, Christian, or Hindu) have a lower prevalence of being in an alliance. Though self-reported club membership and leadership roles had no significant relationship to alliance initiation or reciprocation, such characteristics are related to whether a subject is in an alliance, though not a common joint characteristic of alliance partners. Considering the joint characteristics of potential alliance partners, we see negative coefficients in political views, wealth, age, happiness and marital status indicating a mixing of these players in alliances pairs. International students are more likely to be in an alliance when their alliance partner is also an international student (joint coefficients from 0.12 to 0.22), and business students, who displayed on tendency towards reciprocation, are less likely to be in an alliance with each other than expected by chance, even though they are more likely to be in some alliance. Hence there is a suggestion that player types with a higher level of alliance initiation choices, rather than reciprocation choices, will establish alliance pairs with common

¹⁵The pattern for international students suggests that the AI result could partly be driven by player error rather than planned alliance formation. As a robustness check we test the same models using only rounds 10 to 24 of a treatment and compare with results using only rounds 1 to 15. If the result holds more in later rounds compared to earlier rounds we have a clue that either there are more persistent mistakes occurring. We find that in later rounds the coefficient for alliance initiation is higher and significant, while for reciprocation it is lower and remains insignificant, suggesting the possibility that international students both form alliances and renege on them faster than other players.

¹⁶The low Pseudo R^2 and low marginal average effects (for example the marginal average effect is 1% for the marital status dummy variable which has a coefficient of 0.23 in the Probit model) are due to the large counterfactual sample size. Of the 45,000 observations, alliances can at most occur in 3,000 observations in the case that one out of the 15 potential alliance pairs in a group occurred in every round of the full experiment. The significance and direction of the effect is the primary interest in this analysis.

characteristics. When using the data from groups who played the identity (photo) treatment only, the change in magnitude and direction of the fitted coefficients for some joint variables, such as happiness (-0.23 to 0.11), clubs (0.05 to 0.27), and business students (-0.09 to 0.04), suggests that indeed the identity treatment had some influence of the joint characteristics of alliance partners.

5.4.6 The effect of identification

The previously estimated effects of joint characteristics of alliance partners might of course be due to an accident of selection of group composition. We now take the additional step of conditioning these joint characteristics on the identity (photo) treatment to answer our question of whether social cues from identification of players facilitates the formation of certain alliances. To that end we use the data from the 20 groups who played the identity treatment to estimate the Probit model with errors clustered by individual:

$$A_{ijt} = \alpha + X'_{it}\beta + X'_{ijt}(\gamma + Z_{it}\delta) + v_{ijt}$$

where Z_{it} now includes indicators for whether we are looking at the baseline or identification treatments. Results are in Table 5A.6 of the Appendix. The coefficients on particular joint player characteristics interacted with the identity treatment show that identification can increase the ability of some ‘alliance-prone’ individuals to find each other, while deterring others.

Subjects in relationships are more likely to be in an alliance (marital coeff. 0.27), though in terms of joint characteristics they are more likely to match with similar marital types only in the identity treatment than in the non-identifiable baseline. Wealthy subjects follow a similar patterns of being more likely to be in alliances, but find similarly wealthy alliance partners only when photos of other players can be seen. Business students, while not being in alliances more than the average, seem able to find each during the identity treatment (coefficient of joint interaction 0.37), though not at other times (coefficient of joint business -0.09). Identification did not facilitate common gender or age alliances, and alliance pairs that had a common race or religion, or were common club members, formed alliances to a greater extent without identification, and reduced their alliance formation when being monitored in the identification treatment.¹⁷ In general certain types of players are able to use social cues in terms of wealth, field of study, and marital status, to find each other, though certain types of players are more sensitive to the monitoring effects of identification, such as alliance pairs of the same race or religion, or involvement in club activities.

5.4.7 Robustness checks

A number of checks are made to examine the robustness of these results. First, we look at the problem of interpreting the finite experiment as a proxy of an infinitely repeated one. In the Identity experiment we reverse the treatment order to control for backwards-induction during later rounds biasing the treatment effect, yet in the Transparency experiment we conflate both

¹⁷Players who reported being friends outside of the experiment were more likely to find each other in the identity (photo) treatment. Though our statistical analysis is limited due to the very low prevalence of friends being assigned into the same experimental group, and the zero number of cases of friends forming alliances outside of the identify treatment.

a learning effect and an ‘end-of-game’ effect in the treatment effect. We check the frequency of alliance breakdown near the end of each treatment with a Wilcoxon signed rank test of the changes to alliance frequency in the final three rounds of the second treatment played by each group. We find a significant increase in alliance breakdown in only the final three rounds or less of a group’s second treatment played (p value 0.03 for third last round). To control for these ‘end-of-game’ effects we reproduced the above analysis stripping out the choices made in the final three, four and five rounds, and also the first five rounds to account for a degree of learning. In all cases the direction and magnitude of regression coefficients are similar, and our interpretations thus appear robust to learning and ‘end-of-game’ and learning effects.

A further question arises about player motivations as they relate to the two apparent effects of revealing identities; the social pressure to be fair, and the ease of forming alliances. It is of interest to see whether those players observed to be in an alliance attempted to conceal these alliances, and how justified they believed alliance formation was. Our survey at the end of the Identity experiment asked “Were you part of an alliance that excluded the player with highest productivity number at any point throughout the whole game?”. The multiple choice answer allowed players to reveal in which treatment they formed an alliance, if any. We match these answers with our own alliance specification to determine the degree of honesty in self-reported alliance formation, with results in Figure 5.2. Players not in an alliance did report being in one to some degree, which we attribute to recollection errors. Assuming errors are symmetric, the high level of dishonesty by those who were in alliances suggests a degree of public concealment or self-deception at play, perhaps due to guilt from acting ‘unfairly’.

Another survey question asks “In your opinion, forming an alliance in this game is...” with multiple choice answers from never justifiable to always justifiable. We find a large and significant correlation¹⁸ between player’s actual and self-reported alliance formation and their reported justifiability. This suggests a degree of *ex post* rationalisation of alliance behaviour coexisting with efforts to conceal such behaviour from others. Moreover, players who formed alliances in the

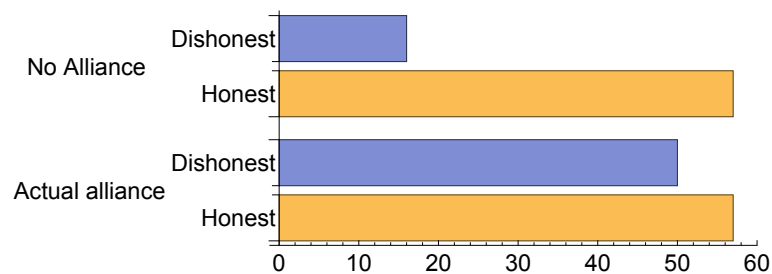


Figure 5.2: Frequency of player self-reported alliances according to observed alliances

A high degree of path-dependence has been observed in this experimental setup (Murray *et al.*, 2015), and we test for whether player outcomes are sensitive to early round play. We find a slight negative correlation between a player’s first round being allocator and their total payoff, though first round allocators are significantly more likely to be the highest earning player in a group.¹⁹ Groups themselves appear to learn social norms over time, with the number of M

¹⁸Coefficient of number of alliances in a linear model predicting 1..5 justifiability survey response is 0.64, $p = 0.00$.

¹⁹P-value = 0.01 of MannWhitneyWilcoxon test that the distribution of top-ranked first allocators differs from the expected one-sixth result.

choices in the first 10 rounds of each treatment strongly predicting the number of M choices in the last 10 rounds.²⁰

In terms of the alliance behaviour, we should expect a degree of rationality to be adhered to, in that initiating an alliance with the second-highest productivity player would be preferred to initiating an alliance with players of lower productivity. In the Transparency experiment 60% of alliance initiations were signalled to players with the second highest productivity (productivity or 2)²¹, while in the Identity experiments only 32% of initiation attempts were to the second highest productivity player (productivity of 4).²² We also observe greater initiation towards players with a productivity of 1 in the Identity experiment, suggesting that payoff-maximisation behaviour may be dominated by the process of establishing alliances, and that initiating alliances with lower productivity players may provide a more costly but reliable signal of the intention to form an alliance. We also check to see whether the observed alliances between friends were longer lasting in the identification treatment, as the interaction of established relationships and transparency-based anti-corruption policies is an important question. The two friendship alliances observed lasted only 6 and 2 rounds, which is a below average alliance length even under the identification treatment.

5.4.8 Summary of results

Will transparency policies curtail back-scratching?

Our transparency experiment lifted the ‘veil of ignorance’ under which back-scratching behaviour could occur, allowing players negatively affected by alliances to fully observe the individual and social costs of alliances. Using a within-group policy test, suggested by Abbink (2004) as reflecting implementations of transparency policies in existing institutions, our comparative analysis between treatments showed that more rounds were in an alliance under the transparency treatment, though with fewer unique alliance pairs. We observed no treatment effect in terms of increasing the frequency of meritocratic choices which would improve the overall group payoff.

This result is supported by our series of choice models, where the coefficient of the transparency treatment control was large and significantly negative in terms of alliance initiation choices, but positive and significant in terms of reciprocation choices, indicating a commitment to existing alliances but a hesitation to form new alliances. Thus, the policy of transparency in a game of potential repeated back-scratching could at best be said only to assist if the social norm of meritocracy is already established by the actions of players. Such divergence of effects of transparency aligns with results of Burnham (2003), who found that improving transparency in the dictator game by means of photographs, had no effect on frequency of players giving zero, but a strong effect on shifting amounts given upwards for players already giving non-zero amounts.

Will identification decrease alliance formation and increase group payoffs?

Our Identity experiment showed that providing photos of players in our setup did not provide any observable increase in group payoffs. Moreover, alliance initiation choices increased, as did the number of alliance pairs formed per group, in the identity treatment. However, we also

²⁰In a linear estimation of group meritocratic decisions, $M_{16-25} = \alpha + \beta M_{1-10} + \epsilon$, we find that $\alpha = 1.43$ ($p = 0.01$), $\beta = 0.62$ ($p = 0.00$).

²¹63 out of 105 decisions

²²119 out of 337 decisions. AI to Prod. 1= 24%, Prod. 2= 19%, Prod. 3 = 26%, Prod. 4 = 32%

observe a decrease in the length any alliance is sustained, which could indicate that a fairness norm of hindered longer alliances, but was insufficient to shift groups towards the meritocratic equilibrium. Our choice models reinforce these results.

Who are more likely to form alliances, and do social cues from identification facilitate alliance formation between these players?

On this question we find a number of reliable results. First, men and players in relationships are much more likely to both initiate and reciprocate alliances. In general, players identifying as religious, particularly Buddhists, are far more likely to make meritocratic choices in the interests of the group as a whole and avoid alliance behaviours in general. Business students showed no tendency towards higher rates of alliance initiation, though they do engage in much higher levels of alliance reciprocation. These results are consistent with those of Lambsdorff & Frank (2011), who found that men are more confident that bribes will be reciprocated, and Armantier & Boly (2008) who found religious fervour negatively associated with corruption.

As expected, the identification treatment facilitates the formation of certain types of alliances. Business students are much more likely to be in alliances together when they have photos to identify potential alliance partners, and less likely otherwise. Players seem to respond to cues about a player's wealth and attractiveness, and we find alliance pairing based on these characteristics in the identity treatment but not the baseline. Lastly, players who were already friends also found each other under the identification treatment which they did not under the baseline anonymous treatment.

5.5 Discussion and conclusion

In this paper we have studied the effect of transparency-improving anti-corruption policies in an experimental game designed to capture the costly back-scratching process underlying corruption. In our setup such a process entails a violation of meritocracy in order to establish an alliance based on reciprocation of discretionary favours, and in which the costs of this process are directly borne by those players not chosen to be in an alliance. Our main results are that introducing information transparency policies to existing groups, by publishing the loss arising from alliance-forming non-meritocratic decisions alongside the meritocratic choice each round, is ineffective at curtailing costly back-scratching alliances. Identifying all participants by photographs also generated no overall improvement in group payoffs compared to the baseline treatment where allocation decisions were anonymous. More importantly, our Identity experiment showed that additional information from photographs can both facilitate the coordination of alliances between certain players, such as business students and attractive people, while at the same time increase social pressures to act fairly by cutting short any alliances.

These results corroborate a number of previous experimental results on the link between cooperation and transparency (Bohnet & Frey, 1999; Burnham, 2003; Andreoni & Petrie, 2004; Charness & Gneezy, 2008). The unique part of our setup is that there are conflicting pro-social choices; either cooperate as an alliance pair, or cooperate meritocratically with the whole group. Identification by photographs improves both types of cooperation simultaneously. Social cues about other players increase cooperation in alliance pairs, particularly the speed of alliance formation. Alliance pair matching on certain characteristics in the identity treatment, in this case business students and subjects from wealthy families, is consistent with previous results (De Kwaadsteniet

et al. , 2012; Hammermann *et al.* , 2012), though the finding that identification also deterred certain alliance pair types, such as those with common race or religion, highlights the dual effect of transparency where there are conflicting pro-social alternatives. In terms of group level cooperation, more alliance pairs and shorter alliances in the identification treatment indicate increased cooperation of some type at this level as well. Together these dual effects resulted in no net benefit to identification in our experiment.

Understanding our results in terms of preferences is a challenge. While the lack of effect of Transparency conforms to the expected utility result based solely on payoffs, such an approach cannot predict the results of the Identity experiment in which a decrease in alliance length and increase in the number of alliance pairs per group was observed. Nor does it predict the frequent use of the most costly alliance initiation attempts (allocating to the lowest productivity player, rather than the second highest). We consider therefore, that players are operating in a world of simple strategies, the success of which is conditional in the evolving strategies or heuristics of others, and which is not conducive to traditional analytical utility-maximisation analysis (Nowak *et al.* , 1993).


A key remaining question is how our results might inform the design of institutions, and how transparency policies in public institutions need to balance these competing coordination effects. This trade-off is made clear the proposal by Ayres & Bulow (1998) to mandate the anonymity of political donors in order to disrupt the trade in political favours. Without knowing who has donated politicians have one less signal about who to favour in order for future reciprocal favours. Our evidence confirms this reasoning. Other examples where anonymity, rather than transparency, might reduce corruption is where highly discretionary decisions will be made by public committee, such as the case of tendering for government contracts. If committee members are anonymous, those firms seeking favourable treatment will be unable to focus on exploiting relationships and establishing expectations of reciprocation with committee members, and instead may be forced to compete on the quality of their tenders. We are thus hesitant to support transparency as an anti-corruption policy in cases where discretionary choices are able to be made without fear of punishment. However, this is not to say that where punish opportunities exist that transparency is not a favourable policy direction, since transparency is likely to be the first step towards punishment.

Appendix

Baseline
(Not receiving payment or making decision)


YOU ARE AN OBSERVER




Your position in the game for this round is shown below

You are 

Phase 1

Round 1


The allocator is 


| Productivity number | 1 |
|---------------------|---|
| Player |    |

Click continue when you have understood the game for this round

[Continue](#)

AN ALLOCATION DECISION WAS MADE

You are 

The rent was allocated by 

| | |
|-------------------|----|
| Your bank balance | 29 |
| Phase | 1 |
| Round | 4 |


Click continue to advance to the next round

[Continue](#)

Transparency
(Not receiving payment or making decision)


YOU ARE AN OBSERVER




You are an observer this round. Your position in the game is shown below

You are 

Phase 2

Round 3


The allocator is 



| Productivity number | 1 | 2 | 3 |
|---------------------|---|---|---|
| Player |  |  |  |

Click continue when you have understood the game for this round

[Continue](#)

ALLOCATION DECISION HAS BEEN MADE

The allocator was 

They allocated the \$25 payment to  The best choice for the group was to allocate to  with a productivity of 3

The receiver's productivity is 2

Their payoff is 27


| | |
|----------------------|-----|
| Your payoff | 2 |
| Your bank balance is | \$6 |
| Phase | 2 |
| Round | 2 |

Click continue to advance to the next round

[Continue](#)






YOU ARE THE ALLOCATOR

Please choose who you would like to allocate the \$25 payment to this round by selecting their shape, then click Allocate.

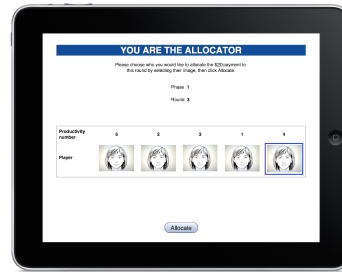
You are 

Phase 1

Round 4


| Productivity number | 2 | 1 | 3 | 5 | 4 |
|---------------------|---|---|---|---|---|
| Player |  |  |  |  |  |

[ALLOCATE](#)




YOU ARE AN OBSERVER






Your position in the game for this round is shown below

You are 

Phase 1

Round 1

The allocator is 

| Productivity number | 2 |
|---------------------|---|
| Player |      |

Click continue when you have understood the game for this round


[Continue](#)






YOU ARE AN OBSERVER

Your position in the game for this round is shown below

Phase 1

Round 2

The allocator is 

| Productivity number | 4 |
|---------------------|---|
| Player |      |

Click continue when you have understood the game for this round

[Continue](#)

Figure 5A.1: Experiment screenshots

Table 5A.1: Survey questions

| Variable | Survey question | Response type |
|-----------------|--|---|
| People v Skills | Reflecting on your own life experience, how important do you think it is to know the right people versus having the rights skills in order to succeed? | 1= Mostly People ... 5 = Mostly Skills |
| Club | Are you a member of a student club, society, or sports club? | 0 = No, 1 = Yes |
| Leader | Did your parents encourage you to be in leadership positions at school? | 0 = No, 1 = Yes |
| Wealth | Would you say that your family is ... | 1 = Wealthy, 2 = Average, 3 = Poorer than average |
| Religion | I identify as a... | Christian, Muslim, Buddhist, Hindu , Atheist, Other |
| Politics | In political matters, people talk of ' the left' and ' the right'. How would you place your views on this scale, generally speaking? | 1 = Left ... 10 = Right |
| Fair | In your opinion, forming an alliance in this game is... | 1 = Never Justifiable ... 5 = Always justifiable |
| Friend | Before today, when did you last communicate with this person? | 1 = Yesterday, 2 = Last week, 3 =In the last month 4 =In the last year, 5= Over a year ago, 6= Never |
| Beauty | How attractive do you think the average Australian would rate this player? | 1 = Very unattractive... 7 = Very attractive |
| Happy | All things considered in your life, how happy would you say you are usually? | 1 = Very unhappy ... 5 = Very happy |
| Age | Please enter your age in years | Numerical whole year variable |
| Gender | I am | 0 = Female, 1 = Male |
| Inter. stud. | Are you an international student? | 0 = No, 1 = Yes |
| Marital | I am | 0 = Single, 1 = Partnered, 2 = Married |
| Bus. stud. | Please enter the name of you current degree | Free form text input. Experimenter coded. |

For the analysis partnered and married responses are groups together to create a binary single or not-single variable.

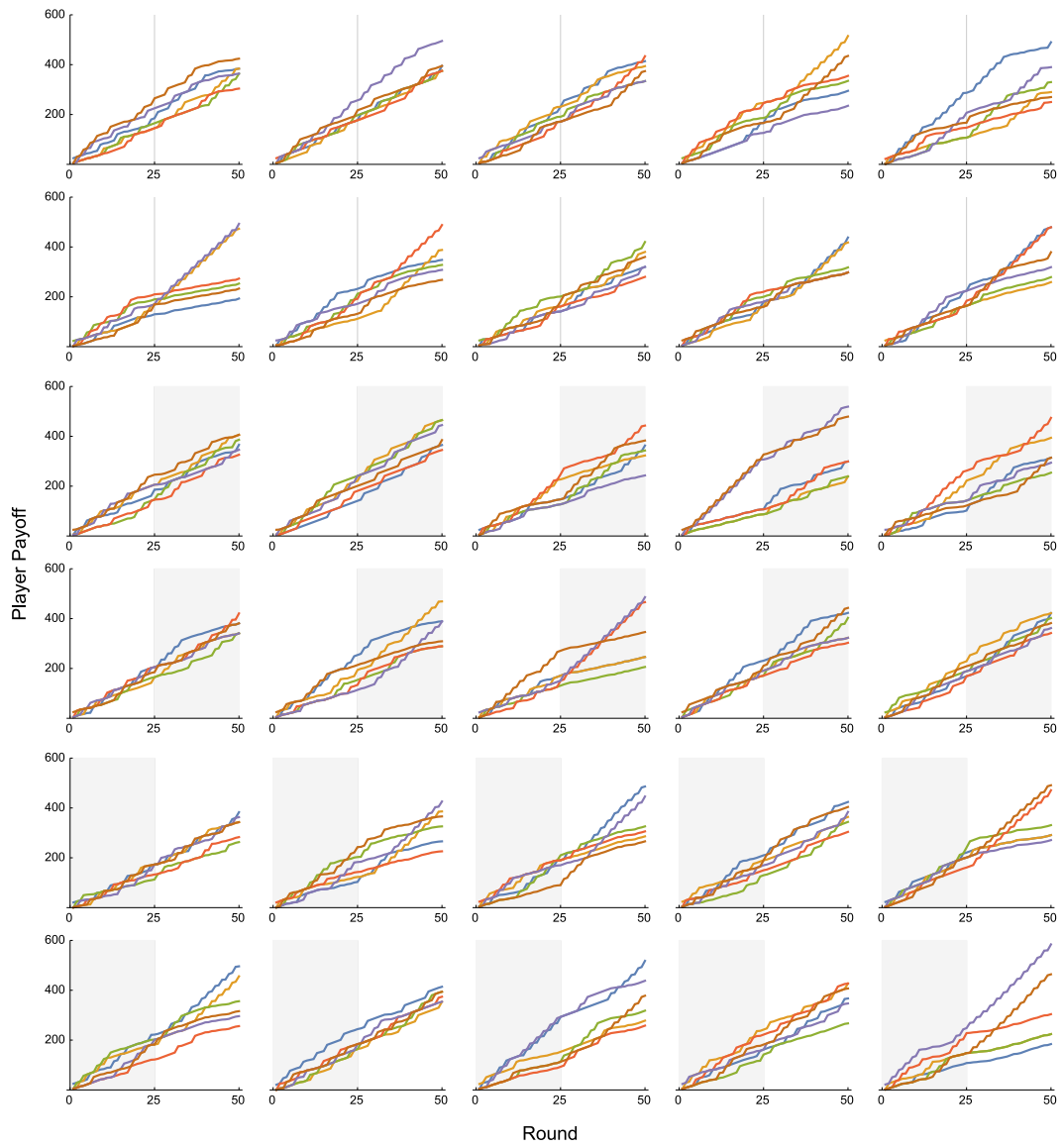


Figure 5A.2: Accumulated player payoffs, by group and round, with identity treatment shaded

Table 5A.2: Descriptive statistics for Identification and Transparency experiments

| | Identity | | | Transparency | | |
|---|----------|-------|------|--------------|------|------|
| | Mean | Max | Min | Mean | Max | Min |
| Group payoff (ECU, all treatments) | 1,077 | 1,224 | 878 | 856 | 925 | 801 |
| Individual payoff (ECU, all treatments) | 180 | 336 | 63 | 216 | 384 | 44 |
| Group Gini | 0.14 | 0.38 | 0.05 | 0.18 | 0.39 | 0.02 |
| Share of meritocratic decisions | 0.52 | 0.96 | 0.12 | 0.59 | 1 | 0.16 |
| Share of groups with any alliance | 0.93 | | | 0.70 | | |
| Round of 1st alliance (if any) | 10 | 23 | 1 | 7 | 23 | 1 |
| Unique alliances/group | 1.3 | 5 | 0 | 0.9 | 4 | 0 |
| Share of rounds in alliance | 0.32 | 1 | 0 | 0.37 | 1 | 0 |
| Alliance length ¹ | 6.3 | 2 | 25 | 10 | 2 | 25 |
| Gains minus losses per group | -173 | -6 | -372 | -60 | 0 | -124 |
| Age | 21.7 | 37 | 17 | 21.5 | 41 | 18 |
| Group male share | 0.54 | 0.83 | 0.33 | 0.48 | 1 | 0 |
| Happiness (1= V. Unhappy ...5=V. Happy) | 3.81 | 5 | 1 | 3.86 | 5 | 2 |
| Political (1= Left ...10= Right) | 5.53 | 10 | 1 | 5.52 | 10 | 2 |
| Family wealth (1= Wealthy ...3= Poor) | 1.95 | 3 | 1 | 1.89 | 3 | 1 |
| Marital status (1= Partnered) | 0.26 | | | 0.23 | | |
| International student (1=Yes) | 0.38 | | | 0.46 | | |
| Business student (1=Yes) | 0.21 | | | 0.27 | | |
| Club members (1= Yes) | 0.56 | | | 0.65 | | |
| Private School (1=Yes) | 0.40 | | | NA | | |
| People v skills (1=People...5=Skills) | 2.49 | 5 | 1 | 2.84 | 5 | 1 |
| Has friend in own group [#] | 0.07 | 0.50 | 0 | | | |
| Group share Black [#] | 0.02 | 0.17 | 0 | | | |
| Group share Asian [#] | 0.46 | 0.83 | 0 | | | |
| Group share Indian [#] | 0.08 | 0.17 | 0 | | | |
| Group share Caucasian [#] | 0.44 | 0.83 | 0 | | | |
| Group share Christian | 0.28 | 0.67 | 0 | | | |
| Group share Buddhist | 0.14 | 0.50 | 0 | | | |
| Group share Hindu | 0.04 | 0.17 | 0 | | | |
| Group share Atheist | 0.42 | 0.42 | 0 | | | |
| Subject attractiveness * | 4.0 | 6.4 | 1 | | | |

¹ Of groups with any alliance

[#] Friendships, and racial character statistics are for groups who played the identification treatment. The data was unable to be collected in the completely anonymous treatment groups.

* Mean rating for each subject by other group members.

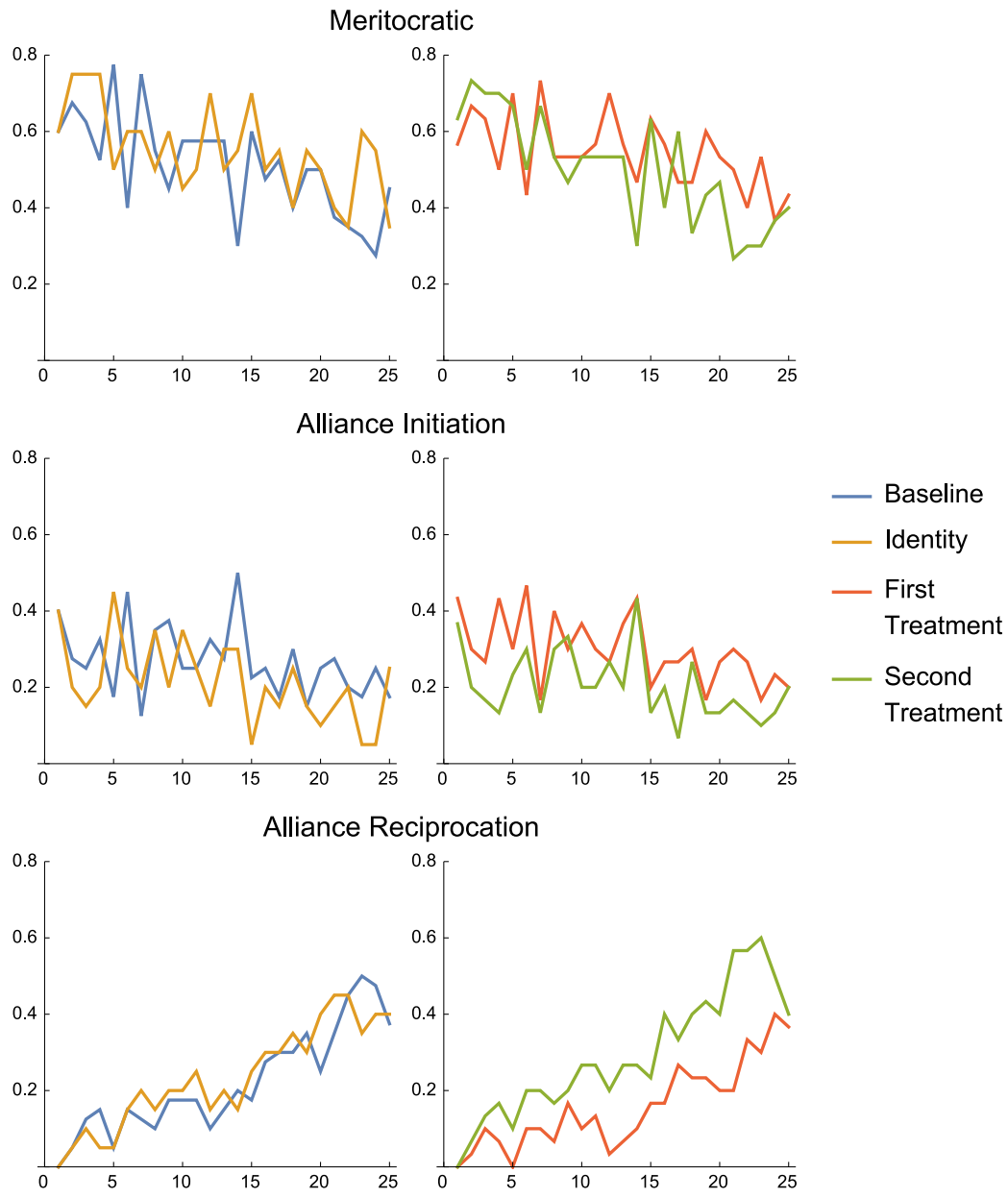


Figure 5A.3: Choice frequency by treatment and order for Identity (photo) experiment

Table 5A.3: Alliance Initiation choice models

| AI | Identity | | | | | Id. & Trans. | Combined ¹ |
|------------------|----------|-------|--------|---------|-------|--------------|-----------------------|
| Age | -0.01 | | | | | -0.01 | -0.01 |
| Gender | 0.06 | | | | | 0.11** | 0.10 |
| Beauty | -0.04 | | | | | 0.03 | |
| Black | -0.09 | | | | | -0.07 | |
| Indian | 0.23** | | | | | 0.32** | |
| Asian | 0.08 | | | | | 0.07 | |
| Buddhist | | -0.10 | | | | -0.12 | |
| Christian | | -0.02 | | | | -0.02 | |
| Hindu | | -0.00 | | | | -0.19 | |
| Inter. stud. | | | 0.11** | | | 0.13** | 0.13** |
| Bus. stud. | | | 0.00 | | | 0.02 | -0.02 |
| Marital | | | 0.10 | | | 0.10* | 0.09 |
| Happy | | | 0.00 | | | 0.02 | 0.03 |
| Politics | | | -0.01 | | | -0.02 | -0.01 |
| Wealth | | | -0.02 | | | -0.00 | -0.01 |
| Private sch. | | | | 0.02 | | 0.05 | |
| Fairness | | | | 0.07*** | | | |
| Clubs | | | | -0.03 | -0.05 | -0.05 | -0.02 |
| Skills | | | | -0.00 | | | |
| Leader | | | | -0.01 | | | |
| Identity (photo) | 0.02 | 0.05 | 0.04 | 0.04 | 0.02 | 0.04 | 0.04 |
| Transparency | | | | | | -0.06 | -0.09 |
| Identity Exp. | | | | | | 0.02 | 0.01 |
| Order | -0.04 | -0.02 | -0.02 | -0.03 | -0.03 | -0.03 | -0.03 |
| Obs. | 1,090 | 1,090 | 1,090 | 1,090 | 1,090 | 1,556 | 2,106 |
| N (AI= 1) | 377 | 377 | 377 | 377 | 377 | 492 | 670 |
| R ² | 0.03 | 0.01 | 0.03 | 0.03 | 0.07 | 0.04 | 0.03 |

¹ Identity and Transparency experiments and baseline treatment data from Murray *et al.* (2015).

Models weighted by inverse of individual player decision frequency.

p values from Wilcoxon signed-rank test * < 0.10, ** < 0.05, *** < 0.01.

Order is 1 for second treatment played by a group, 0 for first treatment.

Table 5A.4: Alliance Reciprocation choice models

| AR | Identity | | | | | Id. & Trans. | Combined ¹ |
|------------------|----------|-------|-------|---------|-------|--------------|-----------------------|
| Age | -0.00 | | | | | -0.00 | -0.01 |
| Gender | 0.17* | | | | | 0.21** | 0.17 |
| Beauty | 0.06 | | | | | | |
| Black | -0.05 | | | | | | |
| Indian | 0.01 | | | | | | |
| Asian | 0.06 | | | | | | |
| Buddhist | | -0.15 | | | | | |
| Christian | | -0.07 | | | | | |
| Hindu | | 0.01 | | | | | |
| Inter. stud. | | | -0.04 | | | -0.01 | -0.02 |
| Bus. stud. | | | 0.23* | | | 0.16 | 0.09 |
| Marital | | | 0.22* | | | 0.19 | 0.18 |
| Happy | | | -0.04 | | | -0.00 | 0.01 |
| Politics | | | -0.00 | | | -0.02 | -0.02 |
| Wealth | | | 0.08 | | | 0.07 | 0.06 |
| Private sch. | | | | -0.01 | | | |
| Fairness | | | | 0.14*** | | | |
| Clubs | | | | -0.01 | -0.03 | 0.04 | 0.03 |
| Skills | | | | -0.05 | | | |
| Leader | | | | 0.10 | | | |
| Identity (photo) | -0.05 | -0.02 | 0.01 | -0.07 | -0.02 | 0.01 | 0.00 |
| Transparency | | | | | | 0.24 | 0.016 |
| Identity Exp. | | | | | | 0.09 | 0.02 |
| Order | 0.15 | 0.18* | 0.15 | 0.14 | 0.12 | 0.12 | 0.13 |
| Obs. | 544 | 544 | 544 | 544 | 544 | 785 | 995 |
| N (AR= 1) | 338 | 338 | 338 | 338 | 338 | 508 | 609 |
| R ² | 0.07 | 0.05 | 0.10 | 0.20 | 0.17 | 0.16 | 0.11 |

¹ Identity and Transparency experiments and baseline treatment data from Murray *et al.* (2015).

p values from Wilcoxon signed-rank test * < 0.10, ** < 0.05, *** < 0.01.

Details of variable construction in Table 5A.3 footnotes.

Table 5A.5: Individual and joint characteristics of alliance partners

| In Alliance | Identity | | | Id. & Trans | Combined |
|----------------------------|----------|----------|----------|-------------|----------|
| | | | Photo | | |
| Age | -0.01 | -0.02* | -0.02* | -0.03* | -0.03 |
| Gender | 0.26*** | 0.22** | 0.15 | 0.23** | 0.18 |
| Beauty | -0.00 | 0.01 | -0.02 | | |
| Black | 0.08 | 0.04 | -0.01 | | |
| Indian | -0.02 | 0.10 | -0.24 | | |
| Asian | 0.04 | 0.04 | 0.02 | | |
| Buddhist | -0.17 | -0.15 | -0.17 | | |
| Christian | -0.13 | -0.11 | -0.00 | | |
| Hindu | -0.14 | -0.12 | 0.40 | | |
| Happy | 0.02 | 0.04 | 0.03 | | |
| Inter. stud. | -0.01 | 0.05 | 0.09 | 0.13 | 0.08 |
| Bus. stud. | 0.04 | 0.01 | 0.06 | -0.10 | -0.18 |
| Marital | 0.23*** | 0.21** | 0.25** | 0.20* | 0.20 |
| Wealth | 0.08 | 0.10 | 0.25** | 0.01 | -0.03 |
| Private Sch. | 0.01 | -0.00 | 0.02 | | |
| Club | 0.15* | 0.16* | 0.18* | 0.14 | 0.10 |
| Leader | 0.23*** | 0.22** | 0.22** | 0.23* | 0.17 |
| Age _{ij} | | -0.22*** | -0.28*** | -0.20* | -0.19 |
| Gender _{ij} | | 0.11 | -0.01 | 0.09 | 0.11 |
| Beauty _{ij} | | -0.10 | -0.10 | | |
| Race _{ij} | | 0.05 | 0.07 | | |
| Religion _{ij} | | 0.14* | 0.13 | | |
| Inter. stud. _{ij} | | 0.13 | 0.12 | 0.22** | 0.22* |
| Bus. stud. _{ij} | | -0.09 | 0.05 | -0.12 | -0.23* |
| Marital _{ij} | | -0.06 | -0.15 | 0.06 | -0.01 |
| Happy _{ij} | | -0.24** | 0.11 | -0.22* | -0.17 |
| Politics _{ij} | | -0.14* | -0.16* | 0.05 | 0.08 |
| Wealth _{ij} | | -0.08 | -0.19** | -0.27*** | -0.18 |
| Private Sch. _{ij} | | 0.05 | 0.13 | | |
| Club _{ij} | | 0.05 | 0.27*** | 0.14 | 0.11 |
| Leader _{ij} | | 0.08 | 0.02 | 0.11 | 0.01 |
| Friends _{ij} | | 0.11 | 0.19 | | |
| Obs. | 45,000 | 45,000 | 30,000 | 53,400 | 61,800 |
| N (A= 1) | 974 | 974 | 638 | 1,305 | 1,574 |
| Pseudo R ² | 0.006 | 0.015 | 0.027 | 0.020 | 0.014 |

p values * = 10%, ** = 5%, *** = 1%.

Joint common characteristics are all binary variables: Wealth_{ij} is same response of alliance pair on 3 point family wealth scale. Age_{ij} is age of alliance pair within 4 years. Politics_{ij} is within 2 on a 10 point scale. Friends_{ij} is having any identified relationship between alliance partners from the survey. Beauty_{ij} is within 1 of each other on a 7 point scale. Happy_{ij} is alliance pair within 1 on 5 point scale. All others joint variables are 1 is binary responses for alliance pairs are the same.

Table 5A.6: Identification effects on alliance partner choices

| <i>In Alliance</i> | | | |
|-----------------------------|----------|----------|----------|
| Age | -0.02* | | -0.03* |
| Gender | 0.11 | | 0.15 |
| Beauty | 0.01 | | -0.02 |
| Black | 0.19 | | -0.02 |
| Indian | -0.04 | | -0.23 |
| Asian | -0.00 | | 0.07 |
| Buddhist | | -0.18 | -0.15 |
| Christian | | -0.01 | 0.02 |
| Hindu | | 0.16 | 0.43 |
| Inter. stud. | | 0.09 | 0.08 |
| Bus. stud. | | 0.02 | 0.13 |
| Marital | | 0.27*** | 0.28*** |
| Wealth | | 0.24** | 0.25** |
| Private sch. | | -0.02 | -0.01 |
| Club | | 0.24** | 0.20* |
| Leader | | 0.22** | 0.21** |
| Age _{ij} | -0.32*** | | -0.17 |
| Gender _{ij} | 0.09 | | 0.02 |
| Beauty _{ij} | -0.21** | | -0.06 |
| Race _{ij} | 0.21** | | 0.19 |
| Religion _{ij} | | 0.61*** | 0.54*** |
| Inter. stud. _{ij} | | 0.07 | 0.00 |
| Bus. stud. _{ij} | | -0.07 | -0.09 |
| Marital _{ij} | | -0.25* | -0.27** |
| Wealth _{ij} | | -0.52*** | -0.52*** |
| Private sch. _{ij} | | 0.15 | 0.12 |
| Club _{ij} | | 0.66*** | 0.59*** |
| Leader _{ij} | | -0.04 | -0.04 |
| Friends _{ij} | 0.06 | | |
| Age _{pij} | 0.01 | | -0.18 |
| Gender _{pij} | -0.08 | | -0.08 |
| Race _{pij} | -0.25* | | -0.29 |
| Beauty _{pij} | 0.12 | | -0.08 |
| Inter. stud. _{pij} | | 0.13 | 0.24 |
| Private sch. _{pij} | | -0.01 | 0.04 |
| Bus. stud. _{pij} | | 0.28* | 0.37** |
| Religion _{pij} | | -1.16*** | -1.05*** |
| Wealth _{pij} | | 0.66*** | 0.73*** |
| Marital _{pij} | | 0.19 | 0.24 |
| Club _{pij} | | -0.61*** | -0.56*** |
| Leader _{pij} | | 0.07 | 0.10 |
| Obs. | 30,000 | 30,000 | 30,000 |
| N (A= 1) | 638 | 638 | 638 |
| R ² | 0.005 | 0.057 | 0.070 |

* = 10%, ** = 5%, *** = 1% significance.

Chapter 6

Reflections

Abstract

Because of the losses in economic efficiency, curtailing back-scratching is beneficial for society as a whole. In this chapter I discuss some key points about how exactly the introduction of rules to reduce or eliminate the ability to back-scratch might be implemented. I first look at the barriers to undertaking research on this type of behaviour, and in particular the problems of concealment and the privacy regulations that sustain it. Exposing to outsiders that a back-scratching game exists, and demonstrating the costs of the game, is the first step towards making policy changes to benefit the larger group. Second I look at some example cases where successful ‘anti-backscratching’ policies have been implemented in particular settings. The common thread in these examples is that outsiders could appeal to a higher group within which they were nested to enact rule changes. Finally, I look at the most challenging case where back-scratching insiders are the ones who set their own rules, and where outsiders have no higher group to appeal to in order to make institutional changes to curtail back-scratching.

6.1 Introduction

This thesis began with an introduction to the framework of groups and networks as a way to conceptualise the cooperative process of back-scratching, where discretionary favours are made to related others which come at a high cost to the non-favoured, generating losses in economic efficiency. Subsequent chapters then studied in detail particular elements of the process of back-scratching, and in Chapters 4 and 5 a selection of policy changes to combat back-scratching in the absence of punishment were tested in an experimental setting. The logical next step is to discuss some practical questions about the implementation of anti-backscratching institutions, which is the purpose of this chapter.

A first comment in regard to these practicalities must centre on the question of exactly how to observe back-scratching behaviour. The key ingredient in any process of change is to first observe the behaviour one seeks to change. As argued in Chapter 3, there is a strong incentive for back-scratchers to conceal their behaviour, particularly where there exists an external rule-maker who might make changes that prohibit their activities. Where accounting and corporate structures allow for concealment of interests, identifying the winners and losers from backscratching in

the political realm becomes exceptionally difficult. More so when the disclosure requirements of elected politicians are minimal, and their family financial interests are not required to be disclosed at all. While much of the evidence on corruption suggests that transparency alone is rarely sufficient to combat corruption (Kolstad & Wiig, 2009), a finding supported experimentally in Chapter 5, it is often a crucial first step to the implementation of other reforms. It is worth recounting some of the current limitations to accessing sufficient data to observe and quantify back-scratching in Australian politics encountered during the research reported in this thesis.

Currently legal and accounting structures in Australia allow for a great deal of concealment of information in terms of company and property ownership. It is rarely clear exactly who has a controlling or financial interest in which properties or companies. The national regulator, the Australian Securities and Investment Commission (ASIC), maintains all corporate registration records but only allows public access to those records in small batches for a fee, between \$19 and \$38 per individual company record type, of which multiple record types might be needed for each company to establish a fair picture of ownership structures. A request for bulk data of over 1,000 records in order to determine corporate relationships for the work in Chapter 2 was denied by the ASIC legal department under the guise that such a request could be used to generate a mailing list, and as such should not be made public. Moreover, the use of private trusts and other legal entities, which can involve many layers of ownership, can easily conceal the identity of ultimate decision makers in these entities and makes systematic studies very difficult for anyone but the regulator itself. In Queensland, as elsewhere, finding out who actually controls property is also difficult, expensive, and sometimes impossible. State records are kept by the Land Titles Office, and data can be accessed for a \$25.80 fee one property at a time unless data is purchased through a monopoly reseller of public records. Quite frustrating also is that state level taxation departments, such as the Office of State Revenue (OSR) in Queensland, actually do keep track of the controlling corporate structures of all land owners in the state, but are unable to release any of this information, as it is protected by confidentiality requirements in the tax law. Taken together, the expensive and cumbersome access to public records, in tandem with the ability to almost conceal ownership through trust structures, makes the observation of back-scratching between politicians and business interests a slow and difficult, and sometimes impossible process in Australia currently.

In terms of disclosure requirements for elected politicians, the current reporting system appears on the surface to be rather effective. It requires political parties to disclose all donors over \$10,000 by the end of each year, and elected politicians to disclose their financial interests annually. Unfortunately the system provides almost no ability to observe political involvement in back-scratching. For example, multiple political donations can be made under the disclosure limit by the same individual through their various corporate holdings. Nor do even properly completed financial interest disclosures by politicians provide the information necessary to observe major conflicts of interest. For example, disclosing property ownership does not require disclosing property addresses or values. Disclosing share holdings can be concealed through trusts and superannuation accounts. Beyond spouses, family member interests are not disclosed yet families are likely to be a common ‘in-group’ in back-scratching, nor are identities of family members themselves disclosed. At the local council disclosure requirements are even less stringent.

In both the case of public records and of disclosure of political interests, the driving force behind the limited availability of information for public access are privacy concerns. Yet if back-scratching in politics is as large an industry as suggest by the results of Chapter 2, these privacy concerns probably do not outweigh the value of public knowledge of these important relationships. Even if privacy concerns are paramount, then the public institutions who collect and

maintain the data could also play a role in monitoring of relationships and seeking out cases of favouritism in order to make public the situations where back-scratching is occurring. Yet the incentive to monitor back-scratching and make this information available to outsiders is also a product of meso-level group structures, and in politics this type of meso-level analysis reveals just how difficult change can be.

6.2 Meso-level considerations for reform

In whose interest is it to combat back-scratching? The instinctive answer is that it is in the interests of outsiders who suffer the negative externality. But in the case of *corruption class* back-scratching, that generates not only a redistribution to the insiders but losses to joint ‘insider plus outsider’ payoffs, it is in the interests of larger encompassing groups in the meso structure that nest within them both insider and outsider groups. Figure 5A.1 demonstrates how rule changes to combat back-scratching can arise where there is a larger group which has an incentive to reduce back-scratching, and has the ability to enact and enforce rules on the back-scratchers. On the left hand side is meso-level group structure where back-scratching insiders are a subset of a larger group which also encompasses the outsiders and are able to appeal to this group to make changes in their interests. A good example to demonstrate this idea is a corporate structure where senior managers in one department may engage in trade in favourable pay rises and promotions. The externality from this back-scratching will be imposed on other shareholders and other parts of the company. Yet because there exists an encompassing layer to the hierarchy of groups at the company, there is an interest in combatting back-scratching to increase the aggregate company profits.

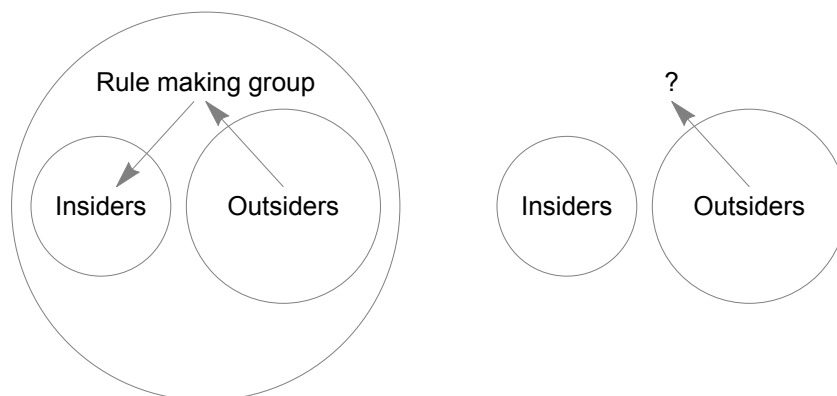


Figure 5A.1: Outside group able to appeal to larger group in which it is nested to change rules (LHS). When insiders are the rule-makers outsiders have no appeal to a larger group (RHS).

On the right hand side of Figure 5A.1 is an example that applies to politics. Here, if back-scratching insiders are politicians themselves, there is no obvious rule-making group within which the politicians and the public at large are contained, and indeed it is the politicians themselves who are the rule makers. One might prefer to think that in a functioning democracy that outsiders could vote out politicians who engage in extensive back-scratching, but as noted earlier, making public political back-scratching is extremely difficult with the amount of concealment options available in Australia and many other countries leaving many outsiders ignorant of the extent

of their losses. Thinking about back-scratching reform as a problem of nested groups guides the following brief examples where rules and laws have been successfully enacted to help combat back-scratching, along with some recent examples where a lack of a larger group in the hierarchy had hindered change.

6.3 Reforms in practice

6.3.1 Successes

Successfully implemented anti-back-scratching policy is best exemplified by the case of executive pay, though the examples of transparency in public procurement and the public disclosure of tax records in many countries is also informative. Typically executives are able to set their own salaries and benefits with approval by the board of director, who together form an insiders group able to back-scratching, while any salaries gains to this group are a transfer from a clearly defined group of outsider shareholders. Moreover, the inside and outside groups are nested within an encompassing nation-state group that sets the rules by which companies must operate, providing an avenue for outsider shareholders to seek rule changes to their benefit, and to the cost of insider executive back-scratchers.

Across the world non-binding shareholder votes on executive remuneration have been mandated in the past decade, with a number of countries now increasing the binding power of shareholder votes in the wake of a pattern of rapidly growing executive pay that is highly suggestive of back-scratching Ferri (2015). Australia for example, implemented a “two strikes” rule in 2011 through the *Remuneration Amendment Act 2011*, which introduced the opportunity to force a re-election of the board of directors if a 25% or greater dissent vote to executive remuneration occurs for two consecutive years. A legal change intended to have similar effects of reducing powers of executive to set their own pay was enacted in Germany in June 2009, known as the “Vorstandsvergütungsangemessenheitsgesetz” (VorstAG), which mandates that executive compensation be “(1) customary, (2) reflect management performance (pay for performance), and (3) be tied to long- term performance measures” (Hitz & Müller-Bloch, 2015). In October 2013 the UK introduced a binding vote for shareholders of listed companies, where a 50% approval vote is required for remuneration packages to be passed. Together these changes represent a successful appeal by outsiders to implement rules to reduce the ability of back-scratching insiders to trade in favours by building on previous rules that ensured transparency. Once there was transparency of potential back-scratching additional rules making shareholder votes binding provided for recourse to a third party to enforce limits to back-scratching and incentivise executives to act in the joint interests of themselves *and* the shareholders.¹ This additional step beyond transparency to enforcement was not available in the experiments in Chapter 5, yet highlights the necessity for transparency prior to creating rule changes that directly target back-scratching.

Another area where anti-backscratching policy has been quite successfully implemented is in public procurement, where there is a potential for government decision-makers to form back-scratching groups between themselves and specific private contractors. Ohashi (2009) studied the situation in Japan when the Mie government replaced an “opaque and discretionary procedure with a transparent and rule-based one in order to qualify bidders” for government contracts.

¹The evidence of the financial effect of exercising these additional shareholder rights is mixed Monem & Ng (2013); Hitz & Müller-Bloch (2015).

Rather than pure discretion by public officials the new procedure implemented a set of rule-based minimum financial and technical requirements of bidders, allowing any firm who met the rules to qualify as a bidder, removing the discretion of public officials in this selection phase of the procurement process. Using a difference-in-differences (DID) analysis they show that firm bid prices are lower under the transparency policy, resulting in a reduction in procurement costs of approximately 8%, or JPY 200million in their sample. This type of rule-based change by a higher-level group that removes discretion at lower levels is the type of policy is similar in type to the low-rent experimental treatment in Chapter 4, which in that controlled setting also reduce back-scratching behaviour.

Yet slightly different policies aimed at transparency and accountability in the same setting of public procurement can have quite different results. A randomised field experiment in Indonesia that increased audit rates from 4% to 100% on road projects did reduce discrepancies between project costs and independent cost estimates by around 8% (Olken, 2007). However the high auditing treatment also increased the number of project jobs given to family members of project officials, suggesting that either alternative forms of corruption are present, or that the trust inherent in family relationships was necessary to ensure that team members did not engage in activities that could have been picked up by the audit. In that same study a set of treatments involving ‘grass-roots monitoring’ via village-level “accountability meetings”, or the ability to anonymously report corruption to officials, made little difference overall but did lead to peculiar reductions in missing labour costs, but not in materials costs, indicating that plugging one corruption leak creates incentives for groups to find alternative methods of back-scratching.

Taking this theme to a broader level, the public disclosure of tax records is another way to make recipients of back-scratching financial favours unable to conceal their activities and provide outsiders the information needed to seek rule changes from an encompassing rule-making group. A marked difference in the public disclosure of individual and firm tax information exists across the developed world. Finland, Sweden, Iceland, and Norway are exceptional in that they publicly disclose individual level tax information, with Norway’s online searchable access of tax records making it the most transparent of any country at the current time. This is in stark contrast to the other countries such as the UK, US and Australia, where tax information is confidential and tax authorities cannot release information collected while administering relevant tax laws. The question at hand is whether the potential privacy benefits from such a system are outweighed by the benefits to group cooperation from the transparency of behaviour of potential back-scratchers. Evidence suggests that when tax returns go online business owners, who have some discretion about self-reporting incomes, go up approximately 3% (Bø *et al.* , 2015). This indicates that simply making behaviour transparent improves the compliance with proper tax reporting. Exactly what group dynamics lead to the stark difference in terms of tax disclosure are not clear by looking at this broad country level, as the exceptional northern European countries disclosing tax information have a long and convoluted governance history that resulted in current laws.

A good recent example to understand the group dynamics involved with making policy changes towards tax disclosure occurred in Australia, where legislation was passed in 2013² to make public the tax records of all companies with a turnover above \$100million annually, which would be published on a federal government website starting in July 2015. This push towards public disclosure also resulted in an Senate Inquiry into corporate tax avoidance, which aimed to further expose incidents of back-scratching amongst corporate interests, auditors, accountants, lawyers and others involved in shielding incomes from the tax authority. In this case the tax authority was itself an outsider, losing out from back-scratching, and made appeals the encompassing

²The relevant legislation is the *Tax Laws Amendment (2013 Measures No. 2) Bill 2013*.

political body that was able to use its rule-making power to provide the transparency necessary to gather the relevant information to guide new anti-back-scratching policy changes.

What makes the Australian case of tax disclosure so interesting is that the new Liberal Party government, elected in late 2013, reversed the tax transparency bill prior to any information being made public. Like debates in other countries, the ‘ransom defence’ was used as the argument against this transparency. The premise of this defence is that publishing the incomes and assets of the largest companies would make their senior personnel targets for kidnapping. However what this political behaviour indicates is that the new political party in power was probably more involved in the back-scratching trade of favours amongst large companies than the prior government, and the tax authority was left with no encompassing group to appeal to in order to make policy changes. This is the classic problem faced when trying to combat back-scratching in political environments.

6.3.2 Failures

Failures to combat back-scratching typically occur in the political realm where no encompassing group exists with an interest in stopping the cost behaviour. Political decisions of winners and losers occur in many areas, from choosing winners of government contracts, to approving private sector development proposals, to locations of public infrastructure. Because these decisions occur regularly amongst a fairly consistent cohort of politicians and businesses there is a large scope for back-scratching to emerge. Exactly this type of scenario was studied in Chapter 2. While the ability to elect a different group of rule-makers by outsiders is available in a well-functioning democracy, often many political parties are involved in the same back-scratching groups, essentially limiting the scope for change in the absence of the rise of new political parties formed by disaffected outsiders.

Some recent Australian examples demonstrate how back-scratching groups that contain both major political parties, such as the hedging groups observed in Chapter 3, lead to back-scratchers being somewhat protected from political retribution. In 2014 the New South Wales Independent Commission Against Corruption (NSW ICAC), a statutory body with powers to investigate corruption in the public sector, made findings against thirteen state politicians involved in misconduct, from bribery to concealing political donations and gifts, and other exchanges of favours with property developers who had been given approvals beyond the scope of normal planning requirements. This led to calls by the national Greens political party to institute such an authority at the national level to make similar investigations of national politicians. Yet when the vote went to parliament both major parties, Labor and Liberal, voted unanimously against it. In the framework of back-scratching in groups this merely serves to indicate that the interests of these political parties is not one encompassing the insiders and the outsiders from corruption, but is aligned with that of the insiders. In essence by voting against the reform they had implicated themselves in a game of back-scratching.

As a direct example relating to Chapter 2, the new Queensland Labor government in 2015 announced a review of planning laws. Yet their public release of this review was made at a property industry function hosted by the largest property lobby group, the Property Council of Australia. The confusing behaviour of implementing a process of planning reform, ostensibly to combat back-scratching, while at the same time signalling reputations to the industry involved in that back-scratching, suggests that the reforms will not arise in the interests of outsiders, but rather will continue to facilitate a trade in favours amongst insiders. Further evidence in favour of this ‘reform illusion’ interpretation comes from the analysis in Chapter 2 where hedging

donors where the dominant type in the rezoned landowner sample, indicating the participation in a favour exchange game by both sides of Queensland politics.

6.4 Concluding remarks

Taken together this thesis has offered a coherent framework within which to view the economically important behaviour of back-scratching as an exchange of favours within a group at the expense of outsiders. Each main chapter has then looked at specific elements of this broad theme to demonstrate the magnitude of the transfers associated with political back-scratching in even routine policy decisions, the expected patterns of signalling behaviour in various political environments, and used experiments to test types of policy rules that might deter back-scratching in the absence of direct punishment possibilities. Finally, this chapter has remarked on the challenges of implementing rule changes to combat back-scratching when there is no obvious encompassing rule-making group with an interest in maximising joint payoffs of back-scratching insiders and outsiders. The main policy lesson from this body of work is that institutional changes to combat back-scratching require an encompassing rule-making group that has an interest in the joint outcomes of insiders and outsiders.

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