

Review Article
Structures of Impersonal Exchange
In Economics and Politics

By NOEL P. JOHNSTON

INTRODUCTION

FOR a long time the problem of impersonal exchange has accompanied the scholarship of market economies – as well as the study of large-group organizations in general. Recently, scholars in political economy have approached this concept within an institutional framework, using formal theory to digest its consequences. Now there is a body of scholarship built on formal models that is attempting to understand how cooperation can emerge if institutions can credibly incentivize honesty. In 1990, Paul Milgrom, Douglas North, and Barry Weingast took up the question of how the commercial revolution in the 13th century occurred without modern institutions. They argue that a private legal institution (the *Law Merchant*) incentivized honesty, enabling long distance trade and geographic specialization. In 2002, Avner Greif offered a different perspective, arguing that the medieval commercial revolution was enabled by a local institution (the *community responsibility system*) which allowed long distance trade to arise and flourish in the 10th-12th centuries without the use of impartial courts.

Other scholars from different areas of the IR field have argued similarly. James Fearon and David Laitin have studied the problem from the angle of interethnic interaction. In 1996, they modeled how institutions can be used outside of a central authority to compel individuals to cooperate in ‘opportunistic’ environments. In 2007, James Habyarimana, Macartan Humphreys, Daniel N. Posner, and Jeremy M. Weinstein (2007) performed an experiment to better understand why ethnic diversity and the provision of public goods are consistently highly correlated. These studies, like others in this body of scholarship, implicitly disregard the idea that similar preferences alone can enable strangers to cooperate. Habyarimana et al find no evidence to conclude otherwise.

Not all scholars will be won over by such a formal and institutional approach. This reviewer is convinced that the study of impersonal interactions is fundamental to our understanding of how large groups work, that institutions are necessary to facilitate them, and that the game theory models advanced in this scholarship provide insight into why. He disagrees with the austerity of the conclusions though. In three of the four articles, the authors assume that all members of a population view an impersonal exchange as conflictual. Beyond disagreeing which game is appropriate, none pay attention to the case in which individuals do not see the game as conflictual. Concepts like solidarity, fairness or honesty may go a long way to limiting defection, outside of their ability to improve the informational asymmetry. Although informal institutions can be expressed through the models, none are prepared to treat the question of whether a critical mass of

defectors can make exchange unattractive to the rest (see Axelrod (1984)). Habyarimana et al discuss this and demonstrate that only a subset of the population will defect fully and that non-defecting individuals play an active role in policing defectors. Thus, scholarship in this field may be promoting institutional designs that overshoot their target.

Some may also argue that such an approach remains too specific; too anecdotal to apply in practice. The reviewer agrees. For example, while each article agrees on certain points (namely, that impersonal exchange will be better facilitated with indefinitely repeated play, identifiability of individuals, and a mechanism of accountability), they include models with different definitions for ‘impersonal’, different institutional requirements, different games, and even different players. We are left to ask if a more general approach is available. In 1981, Andrew Schotter proposed an economic theory of social institutions by treating institutions as equilibria. In 1995, Randall Calvert used this framework to demonstrate that a more general approach is indeed possible. Although differing from the institutions-as-constraints perspective, Calvert’s model is an appropriate starting point to address the challenge of consolidating these models and verifying the generality of their theoretical claims.

Many of the biggest problems in political economy and IR continue to be related to how strangers interact with each other. How the body of scholarship has agreed on certain points, how formal models have differed, and what they have left out is vital to our understanding the character of these problems. The article first examines the problem up close and then analyzes the overlap and disagreement between these models. In the fourth section, it discusses how they can be improved by considering non-uniform populations. It concludes with an overview of how a general model can assist to verify and consolidate the theory.

THE PROBLEM OF IMPERSONAL EXCHANGE

In most group sizes, impersonal exchanges are common. It can be expected when communities migrate, grow in size, or are sufficiently close that individuals cross paths from time to time. It is also at the root of the benefits of large groups and community expansion (i.e. globalization). Thus, it is misleading to view interaction among strangers as simply a problem. Without it, human society would be much less able to specialize and exploit the benefits of economies of scale. The downsides, however, can be immense. In *The Great Transformation*, Karl Polanyi explains the irony of unprecedented aggregate wealth occurring alongside unprecedented individual poverty. He points to the commodification of individuals, land and capital as the reason why. Thinkers from John Stuart Mill to Karl Marx forecasted similar problems.¹ Beyond this problem there is a second, more practical problem upon which the literature in this review focuses. It occurs when the benefits are seen to outweigh the costs and when focus shifts to fostering interaction between strangers. We begin by understanding the scope of this problem and the solutions it provokes.

The problem’s definition varies from author to author. Some view it as simply the problem of interacting between strangers (Habyarimana et al). Others define it in

¹ This is the tip of a large discussion and although it is central to understanding the consequences of facilitating impersonal exchange, this paper leaves it aside.

economic terms, as a separation between the *quid* and the *quo* (Greif, Milgrom et al). As Greif writes, “this exchange was impersonal in the sense that in deciding whether to exchange or not, one did not rely on knowledge of the past actions of one’s partner in the exchange.”(169) To others still, it has to do with group size and the environment of opportunism it creates ~ “problems of opportunism in societies more ‘anonymous’ than a family of a business partnership.” (Fearon and Laitin, 718) However it is defined, it develops along a similar course, and calls for similar solutions.

Collective action problems and cheating can emerge any time there are separated groups of people. This separation, whether by endogenous difference and/or exogenous factors such as geography, increases the cost of information flows between groups making individuals more likely to trade within their own community than with another. When cross-group trade does occur, the higher information costs make it more expensive to hold defectors accountable. This leads to different collective action environments within the community and in-between communities (some authors model the difference as one of existence and non-existence of a collective action problem and others model it as a difference in degree). When there is enough separation and high enough information costs so that interactions become infrequent and the identity of trading partners is unknown, collective action problems can become severe. In such cases, institutions are needed to induce cooperation, aligning individual preferences with social preferences. The performance of such institutions has consequences, providing conditions for when – as the articles analyze – communities trade with each other, ethnic groups engage in violence and peace, and how communities allocate public goods.

AN INSTITUTIONAL APPROACH TO INCENTIVIZING COOPERATION IN IMPERSONAL EXCHANGES

Each article assumes that there is sufficient separation between people to make exchange problematic. The problem of impersonal exchange is framed as a problem of contract enforcement. All four articles view it as essentially informational and their institutional suggestions are built as responses to imperfect information. Greif for example, on Milgrom et al, explains their analysis of how a local system “could ensure contract enforcement in impersonal exchange...by controlling the information required for a multilateral reputation mechanism among the merchants.”(171) Not surprisingly, the four arguments have common descriptions of the problem, how to model it, and why institutions are necessary. However, there is enough variation in these descriptions to produce rival conclusions and uncover different insights.

If all agree that the problem is informational, we may at first assume that it stems from a similar point. To a degree this is consistent with the articles – the problem is one of asymmetric information. As Fearon and Laitin describe, their article is concerned with “a particular class of interactions that pose a difficult problem for interethnic cooperation due to information asymmetry and relative infrequency.”(721) The four articles also agree that individuals must be identifiable in order to hold them accountable for defections. In Milgrom et al’s article, merchants formed their own private code of laws (the *Law Merchant*) in which merchant judges kept information about trades and adjudicated disputes. This allowed reputations to be built and helped the process of finding trading

partners. Beyond these agreements though (asymmetric information and individual identifiability), the clarity of the information problem clouds.

Greif, Fearon et al, and Habyarimana et al suggest that identifying individuals by their community of origin can shift the costs of enforcement to the defector's community. Fearon and Laitin write that "ethnic groups cooperate to take advantage of each side's superior information about the behavior of individuals within the group, and this leads to the containment of interethnic violence." (719) Greif also exploits the benefits, arguing that *community responsibility systems*² (CRS) enabled the medieval commercial revolution to occur. Using the idea of CRS, Greif argues, the existence of *intra-community* contract enforcement mechanisms can overcome barriers to impersonal exchange if lenders can identify individuals by their community and their community can identify them and decipher their actions. He writes that his paper "thus indicates the importance of common knowledge regarding community affiliation and intracommunity contract enforcement institutions in facilitating impersonal intercommunity exchange." (171)

All four also agree that the information problem creates the need for accountability. The articles dispute how this problem should be handled. Greif and Habyarimana et al advocate for equilibriums with voluntary sanctions while the others suggest involuntary. Who is punished is also disputed. The models of Milgrom et al and Habyarimana et al rely on targeted punishment to incentivize honesty. On the other hand, Greif proposes an equilibrium in which indiscriminant punishment is enough to compel compliance (Fearon et al do also, but they argue that this equilibrium is less robust). These differences are significant when considering institutional costs.

So, the four articles agree that asymmetrical information requires the identifiability of individuals and accountability, but their equilibriums differ in who identifies the defector, how individuals are held accountable and how punishment is assessed. Beyond requiring different incentive structures, these differences produce institutional variations in costliness. Milgrom et al uses a conventional model (explained in the following section) to propose an equilibrium in which individuals receive a payoff of $1-Q$ by trading, where Q is the cost of using the law merchant system to gain information about a trader's history. These costs do not include off-equilibrium path costs, such as legal fees. But suppose there were no costs for consultation, let alone legal fees. This is a potential benefit of using Greif's and Fearon et al's model of community policing. In Greif's model, the offended party need only know the offender's community of origin. Assuming this is of negligible cost to assess, the only costs appear off the equilibrium path when the offended individual must forcibly take from an arbitrary member of the offender's community. Fearon and Laitin pit the two equilibria against each other. They "show that local-level interethnic cooperation can be supported in essentially two ways" (715): spiral (fear inducing cooperation) and in-group policing equilibriums (faith in outside sanctioning). They find that taking advantage of each other's superior information can be less costly and better at deterring violence.

Habyarimana et al have a unique approach out of the four articles. In addition to speculating formally, they pursue understanding via experiment. The authors accept the suggestion that "community-level ethnic diversity impedes the provision of public goods"(709). They propose three possible reasons why: homogeneous ethnic groups

² A CRS is a local institution, based on the rule that if an individual defects, any member of the community may be held responsible.

share similar preferences; similar technology³; a similar strategic mechanism that directs them to cooperate with co-ethnics more readily than with non-co-ethnics. They find that contrary to other scholarly work, preferences do not play a role: “If co-ethnics are more effective at producing public goods, this does not appear to be because they care about the same things or value the welfare improvements of fellow ethnic group members more than those of non-co-ethnics.” (724)

In a clever experimental design, they divide individuals in each community by their propensity to defect (egoists versus nonegoists). Using this division, they are able to demonstrate that technology and the strategic mechanisms are the key reasons for the lower public goods provision. They find that the identification of individuals in ethnic communities is easier than from the outside-in and that players (non-egoists) will sanction co-ethnics more than non-co-ethnics if they observe a defection (especially if that defection comes against another co-ethnic). Thus, they propose that players are (at least egoists) more likely to cooperate with co-ethnics because a norm of co-ethnic cooperation has developed and is reinforced by the expectation of repeated interaction and in-group sanctions. This is complimentary to Greif’s and Fearon et al’s idea of how the CRS or in-group policing can be used to identify individuals as well as a credible commitment to sanction defectors. Habyarimana et al suggest that the key is to design institutions in which, both in inter- and intra-group interactions, individuals “believe that their behavior is observed by others and that their reputation may influence opportunities for cooperation in the future.” (724)

The experiment by Habyarimana et al reinforce commonalities of the bunch. The information problem is one of asymmetry and one which is confronted by the problems of finitely repeated play, reputation building, and enforcement. They all conclude that cooperation does not require repeated trade with any two individuals⁴ but that institutions are needed to centralize authority. Their experiment also reminds us of the differences. Who is responsible to identify the individual: in-group, out-group, or intermediary? What information do we need about individuals: their last move, their community, whether they have outstanding decisions against them? How do we treat outcomes off the equilibrium path? These points will be elaborated in the next section.

MODELING THE INSTITUTIONAL APPROACH

The first type of model the articles offer for impersonal exchange is its *basic* form – unassisted by institutions. In this form, impersonal exchange can only avoid the infinite defection equilibrium under certain conditions, depending on the game. Each article assumes a conflictual nature, using some variation of the prisoner’s dilemma game. The second type is what I call the *institutional* form – where institutions enable cooperation. For each type, the authors propose a different set of SPE, responding to a different set of necessary and sufficient conditions. All four models rely on the conditions that exchange will continue indefinitely and that individuals can be identified and held accountable for defection.

³ ways to aggregate their preferences like networks, languages, common knowledge

⁴ Greif’s solution to this is fascinating (explained below)

Perhaps the most conventional model comes from Milgrom et al. They envision two equal traders, each with a decision to be honest or dishonest (classic repeated PD). They implicitly assume that both players exchange promises. Within this pure game, they offer the SPE strategy that each player will be honest unless their opponent *deviated* on their last turn (meaning, even if they were supposed to punish and did not) (see pg. 8). Thus, players do not need to repeat interaction with each other, but need to know whether their opponent deviated or not in their last interaction. The necessary and sufficient (N&S) conditions for exchange to be possible are as follows: the game must be infinitely or indefinitely repeated (although two players need never trade again) and the traders must value trading within the community sufficiently.

Greif also models impersonal exchange in pure form but he envisions a lender and a borrower (repeated one-sided prisoner's dilemma (OSPD)), where the borrower has a choice to cooperate or defect. His SPE (p. 176) depend on either the patience of the borrower or the future payoffs. Though similar, his N&S conditions for exchange are: infinitely or indefinitely repeated game; all players can identify the borrower; and each player's past actions are known to all. Greif argues that none of these conditions were fulfilled in intercommunity medieval trade and that "theory suggests that intercommunity impersonal exchange...could not have been sustained by fear of losing future gains from exchange." (176) Greif's model also accounts for off-equilibrium path outcomes. He explains that mistakes, biased judges, or the like may cause temporary cessations of trade. Ultimately, he argues that his model is robust to such outcomes.

Fearon and Laitin also use the PD as a basis, but instead of doing a repeated game with one population of players, they model two populations in a social matching game: part of the population trades *intra*-ethnic community and part trades *inter*-ethnic community. Players are randomly chosen and matched with only one person (who may be of either community). From here, their model proceeds directly to the second type: the *institutional* form. They proceed to disqualify SPE candidates focusing only on those that are efficient in equilibrium and robust to white noise. Finally, they are left with two SPE strategies: the *spiral equilibrium* in which punishment occurs "by members of the other group" (721) and the *in-group equilibrium* in which punishment occurs by "members of the defector's own group." These equilibriums each require a different set of N&S conditions. For the spiral equilibrium, the N&S conditions are: individuals want to participate in interethnic trading (if interactions are too infrequent, breakdown will not pose as great a threat); "cooperators cannot have an incentive to defect against other cooperators within their own group" (722); and "those who defect within the group must have an incentive to comply with their punishment." The N&S for the in-group equilibrium are: cooperators have no incentive to defect in either inter- or intra-ethnic trading; "defectors are willing to comply with their punishment in intraethnic interactions" (723); and defectors "have no desire to extend their punishment phase by defecting when paired with an ethnic order." Much like Greif's conclusion, they find that in-group policing is much more robust to the introduction of even small amounts of noise. They suggest that one way to toughen the equilibrium is to play the in-group equilibrium but threaten to switch to the spiral as a way of inducing in-group policing (723). The reviewer is unclear how the group would organize an equilibrium switch though.

In their *institutional* model, Milgrom et al model the 'cheat game' with the Law Merchant as an enforcement system. To their N&S conditions above, three are added:

traders must be adequately informed of their responsibilities; traders must be motivated to do their duties; and traders who are cheated must be motivated to document the episode, even though providing documentation may be personally costly. The authors include transaction costs for finding out the history of an opponent, taking the opponent to court, etc. As explained in the previous section, in the equilibrium each trader expects a payoff of $1-Q$. They explain that their model is “intended to represent certain universal incentive problems that any successful system would have to solve”(2). Milgrom et al argue that a model which gives $q < Q$ is possible, particularly if the model assumes trade is more valuable (higher δ). Greif offers a different way to reduce Q .

Greif's *institutional* model employs the CRS. He formalizes a way to facilitate impersonal exchange which does not include the transaction costs of paying Q (let alone litigation costs). To his *basic* form model, three N&S conditions are added: the harm of impound for borrower (B) is greater than the gain of default for borrowing; the gain of impound for lender (L) is less than the gain of continued relations; and the identifiability of the defector by the borrower's community. Given these conditions, he suggests an SPE exists such that

“each borrower is motivated not to default by the expectation of punishment by the BC. The BC is motivated to punish one who defaulted because a failure to do so would imply the loss of impounded goods and all future gains from exchange. The LC verifies any complaints, impounds goods, demands compensation if a default occurred, and distributes the proceedings to the lender who was cheated. The LC is motivated to do so because otherwise a cheated lender would not complain, leading borrowers to default and hence reducing the LC's payoff. Thus, each lender, knowing the the best a borrower can do is to pay, finds it optimal to lend.” (180-81)

Greif's model is also noteworthy for another reason. He designs it such that each individual has a finite horizon because of their lifespan, but the new merchants can hold them accountable in their final period, thus prevent the unraveling of cooperation. This is a way of aggregating many finite horizons and making an infinite horizon game. Although this tactic changes the game – the payoff structure no longer represents the OSPD – it is a clever fix to prevent the roll-back defections that would occur in a game with players of finite lifespans.

Habyarimana et al take a different approach altogether. Though they seek to analyze the problem of why heterogeneous ethnic groups provide less public goods to their community (leaving more of the provisions to localities), their model analyzes any situation – and thereby any game – in which there is a collective action dilemma that can be modeled by a normal form game comprised of a population, a technology, and preferences. They proceed to explore whether, in such models where cooperation and defection may occur (PD, stag hunt/assumes games, for examples), different outcomes stem from preferences, technology, or simply from a particular equilibrium strategy. If a model were fit to their experiment, they would use a social matching game similar to the Fearon/Laitin setup, though not necessarily using a PD game (they do however use the PD in their experiment to determine the effect of sanctions and demonstrate that co-ethnics are prone to cooperate more with each other).

Each model is unique and proposes different solutions to the informational asymmetry problem. In the three models preceding Habyarimana et al, no mention is

made of the possibility that some individuals may be more willing to cooperate than others. Habyarimana et al find that such variation exists and that it matters for what solutions arise.

HOW THE SCHOLARSHIP CAN BE IMPROVED

Is there a need for different types of players? In Habyarimana et al's experiment, the inclusion of two different player types enables them to argue a specific connection between ethnic diversity and public goods provision. It also suggests that communities are not as conflict-minded by nature and that some individuals are less swayed by solidarity. Their experiment gives evidence – perhaps not surprising – that people actually do confront the same impersonal scenarios in different ways. Even with geographical, ethnic, or class differences, a low probability of interacting again and a small chance of being held accountable for defection, they find that some individuals still cooperate. It is clear that this decision should not be considered irrational but instead as a signal that the rationale of a human in such situations is more nuanced. Regard for fairness, honesty, solidarity and other informal institutions may go a long way limiting defection on their own. In the three models above, it is therefore questionable how many individuals would need the proposed institutions to be honest. Indeed, when similarities increase between individuals and the possibility of both repeated interaction and accountability increases, it suggests that the number of cooperators would also. At least, we can reasonably ask how many in a population do institutions sufficiently constrain and for how many are they just another transaction cost.

Should facilitating impersonal exchange be considered as a critical mass problem instead? Here again, Habyarimana et al offers insight. From the last paragraph we see that different types do exist. Previous sections discussed how egoists cooperate with co-ethnics more often because a norm of co-ethnic cooperation has developed around the expectation of repeated interaction and of sanctions – primarily waged by non-egoists. Thus, players respond to the credible threat of sanctions by not defecting as much with co-ethnics. In other words, the variation enables non-egoists to do the work! Indeed, they find many cases where the ethnicity difference does not matter: it is the egoists that do the damage – they defect equally in each crowd if they can not be recognized – and the non-egoists who lay down the law. If a community were composed of only non-egoists, their model would predict no difference in the provision of public goods. If composed of all egoists, as assumed in the other three articles above, public goods would be as difficult to provide in either a homogeneous or a heterogeneous ethnic environment. One can foresee a model in which no judges are needed – just honest traders with a mechanism to hold dishonest traders accountable. Thus, instead of targeting the defecting population, one can reasonably expect that SPE exist that only involve incentivizing the majority of honest traders to actively enforce the rules. This however brings us squarely into the territory of the critical mass problem. Even without the help of the non-egoists, we could surmise from either the repeated games or the evolutionary games literature that there exists a tipping point where, for each of the three models above, the proposed institutions are either necessary or unnecessary to sustain impersonal exchange

(see chapter 2 in Axelrod for example). It seems likely that a critical mass model would be relevant to understanding the problem of impersonal exchange.

In a longer project, this reviewer would have liked to account for this diversity in the models above and analyzed the degree to which they are robust to it. How would the N&S conditions change? The SPE? The costs? In other words, to what degree, if any, have the proposed institutional designs overshot their target?

GENERALIZING THE INSTITUTIONAL APPROACH

Before addressing the problem of heterogeneous actors, a more immediate task resides afoot; to generalize the institutional approach. Each article in this essay uses a conflictual setting to model impersonal exchange, albeit represented by different games. Whether by a law merchant, community responsibility system, interethnic cooperation, or the policing of ‘non-egoists’, each attempts to explain how society (and the individuals within) can use an institution to facilitate indefinitely repeated play, identifiability of individuals, and a mechanism of accountability. Beyond these general anchor points though, we are left with a group models, each crafted to explain different institutions in different contexts. For the institutional scholar, while fascinating, it is difficult to digest the extent to which such theory relates to institutions in general. In other words, what the models conjecture is ultimately left hanging in the air, waiting for a more general model to verify its claims as characteristic to all institutions. To what extent can we generalize about institutions?

For any such attempt, there are a number of factors to address, such as the definition of an institution (including formal versus informal), the setting or context (the game), the generality of variables (payoffs, discount factor, population size, communication costs, monitoring and enforcement costs), competition failures (i.e. imperfect information), and consequences of those failures (i.e. underperformance and corruption). Some of these are more difficult to include than others. Indeed, some must be curtailed due to unwanted, or yet uncharted, complexity. In 1995, Randall Calvert explicitly addressed the problem of generalizing institutional effectiveness within a conflictual setting. With similar anchor points to the articles above, Calvert’s model is a significant step forward and a useful framework to verify and consolidate their hypotheses. The following section discusses the difficulty of generalization and how Calvert proceeded.

Like the definition of impersonal exchange, a fog surrounds the question of what constitutes an institution. From different perspectives, an institution can be explained in different ways. For example, it may be understood as the product of individual preferences for an optimal society, or of individual preferences for their own optimal welfare, or as the resultant behavior of individuals in a particular circumstance. In all perspectives, the conventional ‘rules of the game’ definition may be employed, but to different effect. Calvert decides to define institutions through the perspective of institutions-as-equilibria:

“The institutions-as-equilibria model suggests that we define an institution within a group of individuals as an equilibrium in which individuals’ actions are dependent upon the past actions of many others, or upon expectations about the future reactions of many others, to one’s present actions...it must be rational for nearly every

individual to almost always adhere to the behavioral prescriptions of the institution, given that nearly all other individuals are doing so“ (59-60).

Calvert also addresses variations in institutional formality and organizations:

“Within the class of equilibria that qualify as institutions by this criterion, there are institutions with various levels of formality and organizational complexity. A universally sanctioned reciprocity relationship, for example, is an institution in which all members of the group use the same strategy; the institution involves no differentiation of roles. On the other hand, many institutions involve official positions, with rights and responsibilities unique to each office...At the extreme of such complexity lie those institutions what are referred to as ‘organizations’.” (60)

Specifically, he characterizes a formal institution by its centralized communication, where “not only are certain acts of consultation and reporting required of the players, but one player is designated to play a special ‘official’ role.”(61) At the other end of the spectrum, he writes that informal institutions often use multilateral communication where “the whole group monitors and punishes deviant behavior.” (61) As with most definitions, Calvert’s are open to scrutiny. For example, some may argue that Calvert’s definitions conflate organization with institution, that they disregard the possibility of informal institutions operating through centralized channels, or that they do not enable us to detect an institution in society. Of the three, the latter criticism is perhaps the most formidable. If we are not able to detect an institution in reality, the theoretical claims will be ambiguous in reality. That withstanding, Calvert’s definition is theoretically useful and necessary for such an attempt.

The setting or *game* is also necessary to specify. In Schotter’s first chapter, he describes how different types of games can allow for different types of equilibria. The one-shot coordination games, such as Battle of the Sexes, are characterized by equilibria in which neither player has incentive to change their action once they have coordinated with each other (or *self-policing*). Conflictual games on the other hand, such as the Prisoner’s Dilemma (PD), are non-self-policing because the result of any coordination either leaves both players in a bad⁵ position or gives each player the incentive to switch actions. Some games may be mixtures of coordination and conflict as well. Unless a general ‘game-form’ exists (this reviewer does not know of one), the formal modeler must select a game, thus constraining the reach of their hypotheses. With explicit regard to the model of Milgrom et al, Calvert selected the repeated PD. Many social scientists view it as the more problematic case for institutions. However, the repeated PD is not relevant for all institutions, and certainly not for all problems of impersonal exchange (as exemplified by the variety of games in the articles). Calvert’s conclusion should be understood as strictly pertaining to a repeated prisoner’s dilemma setting, although it is feasible that his method would be successful with other games as well.⁶

Now that we are grounded in a definition of institution and a game theoretic context, we can address the issue of generalizing our payoff function. In his model,

⁵ Where the coordination cannot beat what the outcome would have been without coordination.

⁶ For the coordination games, it may even be simple enough just to show that coordination can occur for any value of the variables in the payoff function (within the design of the coordination game).

Calvert creates variables to account for the benefit of an exchange, a player's discount factor, population size, the cost of communication, the cost of having a central monitor/enforcer, and the cost of enforcing the enforcer. Defined in a continuous space, Calvert's model allows all variables to be unbounded except for the payoffs. To facilitate comparisons with Milgrom et al, Randy limits his model to prisoner's dilemmas with $(C, C) = (1, 1)$ and $(D, D) = (0, 0)$. Beyond this, the model is general:

General Form of PD	Milgrom et al PD																		
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C	e, e	b, a																	
D	a, b	f, f																	
	C	D																	
C	1, 1	b, -a																	
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<p>With $a > e > f > b$, and $a + b < 2e$</p>	<p>With $a > 1, b > 0$, and $a - b < 2$</p>																		

The conditions $a > 1$ and $b > 0$ are necessary to define a prisoner's dilemma and $a - b < 2$ is necessary to define the repeated PD. Given the flexibility of the other variables, Calvert's model goes a long way towards providing a general platform for analyzing institutional effectiveness within the PD context. That being said, future work may benefit from releasing the restraints on e and f, completing the full generalization of the repeated PD game.

Traditionally, this may have been our stopping point, but modern game theory has brought with it the nuance of competition failures such as asymmetric information. Before continuing, the reader may prefer to review a list of such failures (see *table 1*). They can be understood as a list of assumptions that are needed for perfect competition. Many refer to them as 'economic failures', but as I argue elsewhere (2007), they are inherent to all environments where individuals compete for ownership of scarce resources, be it in markets, schools, churches, or otherwise.

Competition Failures	Description
Product Homogeneity	Every product has a market
Price taking behavior	Each participant in a market is so small that they cannot unilaterally affect prices
Mobile Resources	Zero transaction costs
Perfect and Complete Information	Represents a group of reasons (below) why an individual may not be able to accurately judge the consequences of their interactions ⁷
<ul style="list-style-type: none"> • Misunderstanding the true costs or benefits of a 'product' 	Occurs when some of the costs and benefits are exaggerated in importance or not be considered at all
<ul style="list-style-type: none"> • Uncertainty about costs and benefits 	Similar to the above, but based on ignorance rather than miscalculation

⁷ List received from <http://www.tutor2u.net/economics/revision-notes/as-marketfailure-imperfect-information.html>

• Complex information	Information that is difficult to attain do to costliness or a lack of expertise
• Inaccurate or misleading information	Due to the receipt of faulty information
• Addiction	Continuing to make similar decisions even if perfect information would dictate a more beneficial course
• Asymmetric information	When the difference in the amount or quality of knowledge between two individuals creates a power imbalance and distorts the process of interaction, ⁸ leading to either unfair or fewer attempted exchanges. Examples of this failure are adverse selection ⁹ and moral hazard ¹⁰
• incomplete information	inability to predict how their an individual's actions will affect the decisions of other individuals, even if they assume rational behavior
Exclusion	Whether or not a person consumes a good depends on whether or not they pay the price
Rivalry	Consumption of a particular unit of a good, precludes anyone else from consuming the same unit
Free market entry/exit	Self-explanatory

Table 1: Competition Failures

To fully model reality, theorists must account for each failure. To do so, however, threatens to produce a heavily complicated model. Instead, modelers often choose a few at a time. Of the potential failures listed above, Calvert relaxes the assumptions of zero transaction costs (with nonzero communication costs) and perfect information (with incomplete knowledge of other's actions). As stated in the previous paragraph, Calvert allows all depths to which each failure may occur (in a continuous space). This is sufficient to encompass many repeated-PD games, including Milgrom et al. These two competition failures are enough to address many practical concerns, but Calvert's model may yet benefit from relaxing other assumptions as well (against the tradeoff of complexity).

Finally, one must consider the consequences of exploiting one of these failures. Each failure can be exploited in numerous ways, ranging from underperformance to more overt forms of corruption. Calvert focuses on the extortion of money by the central enforcer. Although not explicit, he assumes that every version of extortion from 'clients' will result in a higher cost of communication. He does not comment on whether all attempts to exploit the failures will be costly, and it is unclear to what extent his extortion cost (d) can be generalized. However, it is possible that *all* costs of failures can be justified by his model. One might argue, using a principal-agent problem where 'the people' are the principle and the 'agent' is the enforcer, that an agent always has incentive to report skewed information if their preference diverges with the principal. If

⁸ Of either 'production' or 'exchange' (meaning the exchange of 'products' for 'rewards.' I also see this as a process which evaluates products),

⁹ Where people have a higher likelihood of selecting an inferior 'reward'

¹⁰ Where, for example, a lender does not know how likely a borrower is to repay their loan in the future.

true, Randy's model can be extended to include all such costs (in d), which, however slight, would be necessary to sustain the equilibrium.

Calvert proceeds to suggest a general institutional equilibrium, given the factors discussed above. By doing so, Calvert's framework gives us an avenue to compare the other models, discussed above. We can ask how well those institutions resolve the problems of impersonal exchange in a repeated PD game. Calvert's model also suggests a further goal: to determine, given the factors above, which institutions will be more effective than others (cost/benefit) and perhaps, to identify a class of 'optimal institutions'. Indeed, by using this general institutional approach, we can better understand the structure of impersonal exchange in economics and politics.

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