

Structures of Impersonal Exchange in Economics and Politics: Theory and Statistics

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. They also provide a foundation to test the theory with statistics.

Not all scholars will be won over by such a formal and institutional approach, and statistics has yet to decide whether or not this approach accords with reality. This author 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 also believes that statistical verification will be a difficult but fruitful path to parsing the relevance of such nuanced theories. Theoretically, 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. The data suggests this hypothesis is plausible, showing evidence that institutions may either contradict their purpose or function in ways different from their intended purpose.

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. It proceeds to test the theoretical framework against a multi-national survey of firms, using several OLS models.

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 of community expansion are seen to outweigh the costs and when focus shifts to fostering interaction between strangers. We begin by understanding the scope of this problem – how to foster interaction between strangers – 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 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 mak-

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

ing 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 revolu-

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.

tion 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 involuntarily. 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 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

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

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.

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.

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

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 author 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.

TESTING THE THEORY

The formal literature on impersonal exchange is nuanced. This article, for example, includes models with different definitions for *impersonal*, different institutional requirements, different games, and even different players (which pit lender against borrower and

intra-group against inter-group). They share a similar goal though: to understand how societies (and the individuals within) can ensure contract enforcement by controlling asymmetric information, thus allowing reputations (and trust) to be built. They all agree that impersonal exchange will be better facilitated with indefinitely repeated play, identifiability of individuals, and a mechanism of accountability.

Ceteris paribus, the theory suggests that if a player trades successfully in the past, has better information about trading partners, and is subject to more/stronger institutions that formally enforce contracts, they will be more prone to trade with each other. The player need not be an individual; it can also be a firm. Though there is disagreement on what constitutes an *impersonal* exchange, the definitions directly or indirectly imply a separation between players. Furthermore, whether the exchange is defined as a problem of interacting between strangers, a separation between the *quid* and the *quo*, or a problem of group size, one can assume that a greater distance between trading partners and from each other's domestic community, makes trading more difficult. Indeed, geographic distance is at the center of each article reviewed in this article and distance will be at the center of the statistical analysis.

In reality, ceteris paribus is an ambitious assumption and one can easily point to scenarios in which, for example, larger distances make trading easier (i.e. less corruption or better institutions), where poor quality of previous trade does not induce less trade (i.e. trading with a monopolist or lower prices), or where trading within a smaller community is less attractive than trading in a larger one (that is, without additional institutions to protect against cheating). The goal of the models however, is not absolutist and they are meant to capture common characteristics of impersonal trade. As extensions of rational choice theory, they seek to describe impersonal exchange in all societies. Thus, testing the theoretical assumptions can be difficult. It may rely on clever techniques to isolate the smaller-group consequences of distanced trade. Habyarimana et al is one such example. More likely, to test the generality of the assumptions, a larger and more comprehensive (nationally) data set (not to mention reliable data gathering techniques) will be needed to address questions like how trade varies with distance, between communities, with the quality of past interactions, or with access to institutions (which improve information, enforce contracts, and reliably enforce rules), to name a few. Such a large data set should include a wide range of nations, poor and rich, and well crafted questions to comment on the general characteristics of impersonal trade. If the theory is correct, such a data set could provide evidence that the scenarios above are indeed exceptions, washing away their influence with a large account of normal behavior. If, on the other hand, such a data set contradicts the theory, it may be evidence that some of the scenarios *are* the norm (suggesting a theoretical flaw), or perhaps that we misunderstand how certain institutions function.⁵ In either case, testing the general characteristics can produce valuable testimony.

Fortunately, in 2002 the World Bank conducted a survey titled *Productivity and the Investment Climate: Private Enterprise Survey*, populating a data set which may fit

⁵ Some may argue that a data set will also obscure the facts that impersonal exchange functions differently in different societies, depending on size, cultural norms, etc. In general, we would need to assume that most, if not all, of the data stems from settings which are too large to rely solely on personal exchange. If size did vary, we would need to determine if common characteristics of impersonal change are more overt in larger communities. Luckily, both are consistent with the data set used in this paper.

this bill. With 53,185 surveys returned and firms from over 80 countries responding, it explicitly surveys firms about foreign vs. domestic trading partners (seen as a mixture of political and economic distance), community size, trade levels, and institutions, among others. Of many possible investigations, the author selects questions from the survey that can test assumptions about how good reputations, size of domestic trading community, and strong institutions impact trade levels across geographical and political distance. Specifically, it sets destination of sales (domestic or foreign) and location of suppliers (domestic or foreign) as response variables, using a variety of predictors, including; size of city of operation (population size of immediate trading community), quality of past inputs (reputation of supplier), loss of sale from poor delivery (reputation of 3rd parties in trading), membership/importance of Chamber of Commerce (existence of trade facilitating institution), and consistent/predictable government regulations (reliability of institutional environment). For each, a separate linear model is analyzed (consisting of one response variable and one predictor). With so subtle a topic (and so many potential exceptions) this article does not intend to come to conclusions about the size of the coefficients in the OLS models, but rather simply the sign of the coefficients (the main reason why one predictor is used for each model). As an initial inquiry, this article is meant as a first cut between the theory and reality. This simple ambition is further supported by problems with the data itself.

PROBLEMS WITH THE DATA ANALYSIS

Several problems complicate the analysis of this data set. Firstly, the set is a compilation of many different surveys (one or more per country) and as such, has problems with missing data. At this preliminary stage, the author considers the missing data sufficiently random to analyze the sign of the predictor coefficients (assuming each participant received a random survey, by country). Fortunately, the size of the data set is sufficient to provide tens of thousands of entries for each model (R focuses only on the entries which can be compared, leaving out the rows for which one or both of the entries are blank (or N/A)), giving ample space to analyze without worrying about significant misrepresentation (either by a small n or by non-random missing data). A more advanced study would likely need multiple imputations to overcome the problem of non-random missing data. Secondly, confounding may pose a significant barrier. Although the largeness of the data set is intended to dilute the effect of these confounders, I cannot ensure their absence. Thirdly, the survey includes many potentially influential variables, posing problems such as omitted variable bias. To check the model against OLS assumptions, a set of regression diagnostics is used, beginning with a test of the residuals.

To overcome the missing data problem, the predictions were padded (with the function `na.action=na.exclude`) so that the residuals have the same length as the predictors (vectors)⁶. For every model, the residual plots show the errors to be highly correlated with response variables and weakly correlated with the predictors. Fortunately, none violate the assumptions of homoscedasticity. As speculated earlier, these results

⁶ This function does not change the coefficient predictions and it allows us to have a residual vector length that is equal to the number of observations of our other variables (a similar vector length is needed to do a plot and check the homoscedasticity assumption).

likely suggest the existence of omitted variable bias. To investigate what effects the correlation has on the efficiency of the models, we can check for correlated errors. Using the Durbin-Watson test, we verify positive autocorrelation in all the models. There may be multiple reasons for this, the most likely being that the residuals indicate the omitted variable(s). The autocorrelation suggests that the errors are not normal, violating an OLS assumption upon which the model's efficiency rests. Other diagnostics reveal similar conclusions. With many potentially relevant variables, this article leaves aside an analysis of the omitted variable problem. Despite these problems, the diagnostics also suggest that the models are sufficiently unbiased to trust the sign of the coefficients. While reliable estimates on the size of the coefficients and their errors would be nice (nearly all of the t-values are below the .001 significance level), it has already been stated why – even without such errors – the story they tell would be difficult to interpret. Thus, for both analytical and theoretical reasons, this article is content to comment on the positive or negative relationship between the predictors and responses. Lastly, analyzing correlations in a data set of this size may be susceptible to Lindley's Paradox, where tests of statistical significance may yield inconsistent results across different priors. Thus, the sign of the correlation is also susceptible. Given the theoretical consistency found in sections to come, it seems unlikely that randomness is determining the correlation results. However, I will shelve this criticism until I better understand how to test for it.

Given the caveats above, the results suggest that the data is largely consistent with the theory and the institutional framework therein, with one notable exception: the function of the Chambers of Commerce (COC), which behaves opposite in every characteristic, suggesting that it may be an example of an antiquated institution which now functions counter to its intent. Below, I elaborate on this brief summary.

RESULTS FROM THE DATA ANALYSIS

Matching Destination of Sales and Location of Suppliers

To test the theory, we are first curious how the level of foreign/domestic sales corresponds to the dependence on foreign/domestic inputs. The theory is difficult to apply here. In one way, it predicts a reciprocal relationship between inputs and outputs, anchored by shared information about each other (built by repeated exchange). However, it is relevant only so far as inputs can be exchanged for outputs (the quid and the quo). This likely happens some times, so we expect there to be a positive relationship between home of inputs and the destination of outputs. The data shows (table 1⁷) support for the reciprocity argument. We see that there is a positive correlation between the level of a firm's domestic sales and the level of their domestic inputs, foreign (direct) sales and the level of their foreign (direct) inputs, foreign (indirect) sales and the level of their foreign (indirect) inputs, foreign (indirect) sales and the level of their foreign (direct) inputs. Likewise, we see a negative correlation between the level of a firm's, domestic sales and the level of their foreign (direct) inputs, foreign (direct) sales and the level of their domestic inputs, and foreign (indirect) sales and the level of their domestic inputs. Curiously, *indirect* foreign inputs (through a domestic third party) do not behave as expected – they behave like domestic inputs! At second look, this may be consistent with theory af-

⁷ See appendix for how I format my tables

ter all, as the party with which the firm trades most immediately is domestic. We see this again in later sections, making this interpretation a more likely candidate. The hypothesis that foreign indirect inputs behave like domestic suppliers is one worth exploring further.

Matching destination of sales and location of suppliers (inputs) (11a with 12)			
	Domestic Sales	Foreign Sales (Direct)	Foreign Sales (Indirect)
Domestic Inputs	0.194895 0.003916 49.77 <2e-16 ***	-0.149690 0.003462 -43.24 <2e-16 ***	-0.032388 0.001958 -16.54 <2e-16 ***
Foreign Inputs (direct)	-0.292879 0.004624 -63.33 <2e-16 ***	0.257263 0.004124 62.38 <2e-16 ***	0.028197 0.002308 12.22 <2e-16 ***
Foreign Inputs (indirect)	0.031693 0.006197 5.115 3.16e-07 ***	-0.066034 0.005375 -12.29 <2e-16 ***	0.039859 0.002868 13.90 <2e-16 ***

Table 1

Matching destination of sales and membership/importance of COC

All things being equal, the relationship between exchange and institutional strength should be weakly monotonic (weakly, because institutional strength does not guarantee the existence of trading partners for specific goods). The survey includes a variety of institutional strength questions. In relation to impersonal interactions, we are most interested in questions about the strength and reliability of contract enforcement. We are also interested in how well institutions provide information about reputations (roughly, how well they identify firms). This may include business ratings or how good the accreditation process is.

To address these questions, we look at how membership in a chamber of commerce (COC) corresponds to the level of foreign/domestic sales. Our theory predicts that, things equal, more domestic sales will be positively correlated with higher COC membership, assuming membership of the COC helps facilitate impersonal exchange (via regulatory transparency (lobbying government), dispute resolution, information about prospective traders/markets accreditation, and information about the domestic institutions themselves).⁸ The answers to the chamber of commerce question were YES and NO, recorded as 1 and 2, respectively.

We see, not surprisingly, that those who were part of a chamber of commerce did less foreign trade, on average, than those who belonged to a chamber of commerce. Surprisingly, we also see that every COC function is correlated with doing more foreign trade, on average. Why is this? Do domestic COC's provide more foreign-focused services than domestic? Is this an indirect consequence of providing a platform for lobbying, etc? Is it a network effect of many firms who have a similar interest of expanding to

⁸ Some may argue that COC's are not a good proxy for institutional strength because other institutions may predominate to an extent that COC's are largely irrelevant. This paper assumes that they are relevant, supported both by the large membership and by the consistency between its functions and theory.

foreign markets? Is it used as a credibility signal to foreign investors? The following analysis may help us rule out some of these possibilities.

Regressing each of the COC's functions against domestic sales, we see that all are negatively correlated with domestic sales, but some appear to be more negative than others. This suggests that perhaps some functions are used more than others to facilitate international exchange. As shown below, we see that the most negatively correlated function is of, perhaps as expected, *information and/or contacts on international product and input markets*, followed by *lobbying the government*. Also, perhaps as expected, the function of *information and/or contacts on domestic product and input markets* has the least negatively correlation. This suggests that even for the firms which rely on the COC for domestic sales information, the COC is still negatively correlated with domestic sales. My theoretical criticism is relevant here: as institutions overshoot, they are likely to be used in ways unintended by the designers. The COC could be an example of either this, or an interesting intended consequence of a primarily domestic institution.⁹

Matching destination of sales and membership/importance of Chamber of Commerce (COC) (11a with 25)		
	Domestic Sales	Foreign Sales (Direct)
Membership in COC	11.4740 0.2968 38.66 <2e-16 ***	-9.4603 0.2633 -35.93 <2e-16 ***
Lobbying the government	-2.7051 0.2121 -12.76 <2e-16 ***	2.2282 0.1994 11.17 <2e-16 ***
Resolution of disputes	-1.5836 0.2305 -6.871 6.64e-12 ***	1.1858 0.2163 5.483 4.26e-08 ***
Information and/or contacts on domestic product and input markets	-0.4497 0.2177 -2.066 0.0389 *	0.2213 0.2032 1.089 0.276
Information and/or contacts on international product and input markets	-3.9535 0.2159 -18.31 <2e-16 ***	3.3160 0.2030 16.33 <2e-16 ***
Accrediting standards or quality of products; reputational beliefs	-1.1883 0.2101 -5.654 1.59e-08 ***	0.9355 0.1969 4.752 2.03e-06 ***
Information on government regulations	-1.6018 0.2100 -7.63 2.49e-14 ***	1.3750 0.1964 7.00 2.66e-12 ***

Table 2

⁹ As Brandon Nelson suggests, another possibility may be that wealthy countries, which tend to engage more in foreign trade, tend to have a higher COC membership percentage than poorer countries. A test has not been run to verify whether or not this is the case.

Matching destination of sales and consistent/predictable government regulations

We are also concerned with the general regulatory environment. ‘Regulations’ can be seen as regulating which contracts, and thereby which exchanges, are condoned and which are not. Impersonal exchange theory predicts that the incentive to trade will decrease if they are not consistently applied. Question 35 asks firms to rate how consistent or predictable the application of government regulations are for issues affecting their establishment. We compare this to the proportion of foreign to domestic trade, and expect to see a weakly monotonic relationship between predictability and domestic trade. The assumption that all things are equal is too strict though. For example, a firm may choose to trade in a country with a poor regulatory environment if the goods they offer are either sufficiently scarce or sufficiently cheap (either by direct pricing or indirect benefits such as subsidies). On the other hand, a strong regulatory environment helps exchange occur *when available* (same point as above). Further, although it would seem like domestic sales and predictable government regulations would be positively correlated, it may well be that governments with a poor regulatory environment decrease the international competitiveness of domestic firms thus leading to a negative correlation (more domestic firms tapped in domestic market due to both high transactions costs for selling abroad and lack of ability to assure foreign buyers that their contracts will be fulfilled, independent of the government regulatory climate). **Over 55,000 surveys, we expect the monotonic relationship to be observable amidst such considerations. The evidence below, however, supports the last interpretation.**¹⁰

Matching destination of sales and consistent/predictable government regulations (11a with 35)					
	Domestic Sales		Foreign Sales (Direct)		Foreign Sales (Indirect)
	-0.3634		0.34021		0.02291
Predictability of Government Regulations	0.1066	-3.409	0.09648	3.526	0.04662 0.491
	0.000653	***	0.000422	***	0.623

Table 3

Matching input source (location of suppliers) and quality of inputs

All things being equal, greater distance means more impersonal (higher average transaction costs to trade). Thus, if a firm were to need good x from foreign location A and good y from domestic location B, if the distance exacerbates the prisoner’s dilemma, we expect that both the quality of goods and the reliability of the trading partner to be worse for good x.

aside

The questions talk about expectations – asking whether the *expectations* were unmet. This suggests that reputation is not as credible a signal. Assuming that a firm is aware of industry wide hurdles (i.e. institutional barriers, high transport costs, diminishing quality

¹⁰ From Brandon Nelson: the number of regulations may be a confounder because regulatory uncertainty may be correlated with fewer regulations.

(like on food)) and factors them into their expectations, we can conclude that foreign trading partners are less reliable if we see more unmet expectations in the foreign case. This assumption is not without danger though. A new firm, for example, may be unaware of industry wide quirks. So, looking at older firms can help address this (one of the questions is age of firm). We expect the % of unmet expectations to be lower for the older firm. This also assumes that the firms are aware of changes in the quirks (for example a policy shift).

If the quality/reliability questions are not expectation-based, a variety of factors may cloud the relationship between the answers to distance and quality. For example, the literature may neglect to include overshooting: foreign traders may realize that distance matters and seek to compensate. Domestic traders, on the other hand, may relax their concern for quality/reliability. We should assume that if overshooting occurs, the firms will update their expectations in the long run. If overshooting occurs enough, it may even replace the need for more formal institutions to facilitate long-distance trade. Identifiability by trading partner may not be necessary either if there is something like a domestic CRS that helps to assure that such overshooting occurs with foreign traders (a good reputation as a community (state)). This may be, to some extent, self reinforcing, as foreign traders – not only carrying the advantage of competitive pricing – are repeat partners because of their overshooting. If the data shows that foreign trade is associated with higher quality/reliability, it may be, for example, that the firm mostly trades with these over-compensators (we may expect a lower proportion of foreign to domestic exchange). Another factor to consider is that domestic firms may be more corrupt. Or, the domestic environment may be bad at policing defections, whereas a foreign firm may be liable for violations in their own country. If the data shows that foreign trade is associated with higher quality/reliability, we should go to the corruption data.

end of aside

Here, the theory is ambiguous, as discussed in the aside. One may argue that the theory suggests that a higher dependence on domestic suppliers should correlate with a higher proportion of inputs that meet quality expectations. This would be due to reputational constraints. However, as discussed above, there are other possibilities that could be integrated into the theory to suggest that foreign suppliers were actually more likely to meet quality expectations. For example, domestic firms may treat other domestic firms more poorly, relying on reduced transportation costs to assure domestic clientele. Outside it all though, if markets are perfect we expect there to be no difference between the quality of inputs and the supplier location – expectations would be adjusted in real time and firms would not trade with any firm which did not meet its quality expectations (which may be different for domestic and foreign suppliers (depending on transportation costs, for example)).

So, perhaps surprising to perfect market advocates and those who adhere tightly to the reputational constraints of the theory, here we see that domestic inputs are positively correlated with disappointing quality! To be sure, we see that foreign inputs (direct) are negatively correlated, which is consistent (foreign indirect inputs are not though!). This does not contradict the theory though. It supports the hypothesis, stated above, that foreign indirect inputs behave like domestic inputs because they operate through a domestic distributor.

Matching input source (location of suppliers) and quality of inputs (12 with 14)			
	Domestic Sales	Foreign Sales (Direct)	Foreign Sales (Indirect)
	0.16457	-0.35953	0.04558
Disappointing input quality	0.02125 7.744 1.01e-14 ***	0.02663 -13.50 <2e-16 ***	0.01795 2.54 0.0111 *

Table 4

Matching input source (location of suppliers) and loss of sale from poor delivery

Here, the theory predicts something very similar to the above IF the delays are the fault of the supplier. If the delays are the product of fluctuating postal reliability, then the theory is much less relevant (here, perhaps a transaction argument can be made – more distance, more chance for delay, thus more delays if foreign (this is of course subject to the exceptions above)).

Below, we observe the opposite correlation as with input quality: domestic inputs are negatively correlated with loss due to delivery delays! To be sure, we see that foreign inputs (direct and indirect) are positively correlated, which is consistent. We are left with the question of why loss due to delivery delay is different than unmet quality expectations of inputs? Do the causal arrows run in the opposite way?

Matching input source (location of suppliers) and loss of sale from poor delivery (12 with 15)			
	Domestic Sales	Foreign Sales (Direct)	Foreign Sales (Indirect)
	-0.17469	0.13022	.06036
Delivery Delays	0.03969 -4.402 1.08e-05 ***	0.04144 3.142 0.00168 **	0.03262 1.85 0.0643 .

Table 5

Matching location within country (population size) and destination of sales

Here, the theory suggests something very similar to the quality analysis. This is perhaps a more direct test of the impersonal exchange theory, as we can view how firms in towns trade versus how firms in capital cities do it. In line with the theory that smaller communities will have an easier time trading (less costly to community to facilitate), there is a positive correlation between smaller cities of operation and domestic sales. There is a negative correlation between smaller cities and foreign sales, which is consistent.

Matching location within country (population size) and destination of sales (7 and 11a)			
	Domestic Sales	Foreign Sales (Direct)	Foreign Sales (Indirect)
	0.9159	-0.70787	-0.13948
City Size	0.1010 9.069	0.08978 -7.885	0.04839 -2.883

	<2e-16 ***	3.22e-15 ***	0.00395 **
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Table 6

Matching location within country (population size) and input source (location of suppliers) consistent and predictable government regulations

Similar to above, the data is also in line with the theory that smaller communities will have an easier time trading (less costly to community to facilitate): there is a positive correlation (even more positive than above) between smaller cities of operation and the use of domestic suppliers. There is a negative correlation between smaller cities and foreign suppliers, which is consistent.¹¹

Matching location within country (population size) and input source (location of suppliers) consistent and predictable government regulations (7 and 12)			
	Domestic Inputs	Foreign Inputs (Direct)	Foreign Inputs (Indirect)
	2.5496	-4.0023	-0.30869
	0.1170 21.79	0.1105 -36.22	0.09056 -3.409
City Size	<2e-16 ***	<2e-16 ***	0.000654 ***

Table 7

CONCLUSIONS

Drawing on the theory of impersonal exchange and institutions, I created numerous single-variate OLS models to test the direction of statistical correlation with the direction predicted by theory. The main result supports the theoretical assumptions that good reputations, size of domestic trading community, and strong institutions are positively correlated with trade levels across geographical and political distance. Despite the various caveats discussed above, the large t-values and near unanimous theoretical consistency are enough to justify expanding this analysis.

The problem of impersonal exchange has deep theoretical roots, visible today in attempts to understand how micro- and macro-behavior can ensure contract enforcement by controlling asymmetric information. Statistics has yet to verify many of the literature's hypotheses but there are a growing number of routes for statistics to target. Among other examples, behavioral economists like Vernon Smith have attempted – with some success – to test the theory via economic experiments. Their findings should be subjected to a similar statistical critique. As it stands, this paper is an initial attempt to analyze the broadest hypotheses of impersonal exchange (based on indefinitely repeated play, identifiability of individuals, and a mechanism of accountability), and it may be a stepping stone to further verifications of the theory.

¹¹ There are possible confounders to this claim. One, as mentioned by Brandon Nelson is firm size. Paraphrasing; if firms in smaller cities tend to be smaller and smaller firms sell more things locally/domestically, firm size could be an intervening variable that explains away the relationship between city size and sale location. Similarly, very small companies may tend to purchase inputs locally. Although I will leave this question aside, countering it would support for my statistical analysis and strengthen the theory.

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APPENDIX

Table Format:

Table Name	
	Dependent Variable
Independent Variable	Estimate Std. Error t value Pr(> t)*** ¹²

¹² Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1