

Transactional Governance Structures: New Cross-Country Data and an Application to the Effect of Uncertainty*

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Abstract: To what extent are personal trust, mutual interests, and third parties important in enforcing agreements to trade? How do firms combine these to form transactional governance structures? This paper answers these questions in a whole-economy, cross-country setting that considers a full spectrum of transactional-governance strategies. The data collection requires a new survey question answerable in any context. The question is applied in six South American countries using representative samples, with the resultant survey weights facilitating a whole-economy analysis. Without imposing an a priori model, latent class analysis estimates meaningful governance structures. Bilateralism is always used. Law is never used alone. Bilateralism and formal institutions are rarely substitutes. Within country, inter-regional variation in governance is greater than inter-country variation. The usefulness of the data is shown by testing one element of Williamson's discriminating-alignment agenda: greater uncertainty in the transactional environment increases the involvement of third-parties.

Keywords: governance, transactions, law, bilateralism, transaction-costs, uncertainty

JEL Classifications: L14, C81, D23, P5, M21

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I. Introduction

To what extent do firms rely on each others' trustworthiness and mutual interests or invoke the assistance of various third parties when ensuring the fulfillment of their agreements to buy and sell goods and services? Which combinations of these approaches do firms use? How do answers to these questions vary across countries? Williamson (1979) refers to such combinations as transactional governance structures. In the 40 years since this concept was introduced, no study has produced economy-wide, cross-country data on a comprehensive set of approaches to supporting transactions, showing which governance structures are most commonly found effective by firms. This is surprising given the consensus that firm performance and levels of development are associated with the effectiveness of arrangements for enforcing agreements (Williamson 1985; North 1990; Moran and Ghoshal 1999, Greif 2001, World Bank 2002, 2017).

The aim of this paper is to fill this gap in the literature. We rely on data that are generated from the responses of individual firms to a survey question that is designed to be interpretable by a respondent from any firm in any sector in any country. The data reflect the experiences of 3,430 firms in six South American economies. This is a small number of countries, but the methodology is sufficiently general that it could be applied in any country, sector, or region in the world. By using representative samples and survey weights, we are able to characterize the aggregate importance of different governance structures in a very large part of economic activity.¹

To our knowledge our paper is the first to present and analyze data that provide such a comprehensive picture of the effectiveness of the different approaches that firms use to support the fulfillment of agreements. While there are many datasets on particular elements of governance, such as the strength of contractual institutions, our data uniquely capture four elements: reflecting

¹ The samples are designed to be nationally representative of non-agricultural, non-extractive, formally registered, private firms with at least five employees. See Section II.3 for more details.

the responses of individual firms about their own experiences of transactional governance; providing a (nearly) whole-economy perspective; facilitating comparisons between different countries; and enabling the examination of a comprehensive set of strategies employed in transactional governance.² To emphasize the potential value of our dataset for further research, we provide an example of its use by examining a core element of transaction-cost theories: the effect of uncertainty on the choice of governance structures.

A (transactional) governance structure is the "institutional framework within which the integrity of a transaction is decided" (Williamson 1979: 240), a coordinated combination of different mechanisms that together constitute a strategy for encouraging the fulfillment of agreements to transact.³ To date, there exists no generally agreed upon, encompassing theoretical framework that predicts which particular mechanisms appear often, and which can be safely ignored. Therefore, the first step in our quest is to specify a comprehensive list of such mechanisms. As described in detail in Section II, in formulating this list, we rely on three very common elements of the economics literature. First, the analysis of inter-firm agreements invariably begins with opportunism and its detrimental effects, thereby leading to a focus on enforcement. Second, the mechanisms of enforcement are often designated by referring to the specific agents involved in enforcement. Third, the pertinent agents can be arranged on a spectrum, from the narrowest to the broadest, as in Greif's (1997) differentiation between first-, second-, and third-party enforcement.

² There are many high-quality studies that examine pieces of the picture. However, to provide background on how difficult it is to pursue all these elements, we examined those studies labelled as key studies Cao and Lumineau (2015). Of the 49 studies, only six covered more than one country. Of these six, three covered three or fewer countries and five used small, fairly narrow samples of firms. One study (Yang et al. 2012) covered 969 firms in 17 countries, but confined its results to industrial sectors, did not use sampling weights to derive an economy-wide picture, and focused on a limited number of transactional strategies.

³ We confine our attention to those aspects of governance relating to transactions in goods and services. Thus, a governance structure in the sense used in this paper, excludes many activities that fall under the umbrella of corporate governance.

Using this agent-based approach and focusing on enforcement, we construct a survey question about the effectiveness of six generic agents involved in enforcement (individuals, organizations, etc.) that cover the spectrum from intimate first-party personal trust to remote third parties, such as the legal system. This set of six agents is exhaustive in the sense that all firms would be able to relate to the survey question no matter which approach they took to the enforcement of agreements. Given the centrality of the quality of data collection to this paper's contribution, Section II contains extensive discussion of our approach to question wording, provides information on the rigor of survey design, and describes elements of survey implementation that are relevant to making judgments on the validity of the resultant dataset.

The six agents specified in the survey question are not necessarily governance structures themselves but rather inputs into governance structures, which combine the six in varying ways. In building an evocative picture, the next challenge then is finding which individual mechanisms are combined by firms to produce coherent governance structures. In meeting this challenge, one cannot rely on a definitive theory of how combinations are chosen because none is available (Mike and Kiss 2019, Greif 1997). Nevertheless, the archetypes of governance structures must be latent within our data, and therefore we can use an exploratory statistical technique to make them manifest. Latent class analysis (LCA) is particularly suitable for this task (Mike and Kiss 2019).⁴ LCA models the governance structures as the categories, or classes, of a categorical latent variable, which is to be estimated. The archetypal governance structures that result are then purely data-driven, not relying on any a priori conception of which governance structures are used in practice.

⁴ LCA would be labeled as an unsupervised machine-learning approach had it not been developed before the age of big data. Collins and Lanza (2010) provide an intuitive introduction to LCA; Masyn (2013) presents a precise description of the decisions to be made in practical implementations; Vermunt and Magidson (2016) provide a comprehensive technical introduction to the statistical theories and methods included in the software used to produce the results for this paper.

Given the identification of a number of distinct governance structures (or classes), LCA produces estimates of the posterior probability that each firm belongs to each class.

Thus, a second contribution of this paper is the discovery and estimation of governance structures in the six-country dataset using LCA and an interpretation of the estimates.⁵ As we describe in Sections III and IV, we find that pure bilateralism (i.e., a strategy combining only first-party personal trust and second-party mutual interest without invoking any third-party agent) is the most common governance structure and that all governance structures embody bilateral enforcement mechanisms. Hence, none of the estimated governance structures correspond to purely arm's length transactions, where firms rely only on impersonal mechanisms and formal institutions to support their transactions. A corollary is that bilateralism and formal institutions are rarely substitutes, and for many firms, they are complements. Additionally, while much attention has been devoted in the literature to various unpaid, third-party, mechanisms of supporting agreements, such as social clubs and culturally defined groups, our results suggest they are not very important in the enforcement of transactions.

A third contribution is to provide illustrative examples of the use of the data derived from LCA. We do so in Sections V and VI. In Section V, we present descriptive statistics on the variation in the importance of different governance structures across countries and regions. These are descriptive in the sense that they do not isolate *ceteris paribus* causal effects of single variables. We do, however, use techniques previously developed for LCA that produce consistent estimates

⁵ No existing studies obtain a cross-country, economy-wide picture on how these mechanisms are combined to form governance structures. To be sure, there are high quality studies that analyze particular combinations. See, for example, Cao and Lumineau (2015) on contractual and relational governance, which is the focus of many studies in the business economics literature. Hendley et al. (2000), Hendley and Murrell (2003), and Mike and Kiss (2019) are the only country-wide studies of which we are aware that use datasets to which the current paper's methods could be applicable. These datasets are all on single countries. The World Bank's Regional Project on Enterprise Development (RPED) collected cross-country comparable data on, *inter alia*, firms' attempts to solve transactional problems in seven African countries beginning in the early 1990's (see Fafchamps 2004). However, the questions used in the RPED surveys are not in a form that would make the responses suitable for estimation of governance structures. Unlike the current paper, none of the studies cited in this footnote use a sampling design and survey weights so that estimates are representative of a whole economy.

of the descriptive parameters. We show, for example, that inter-regional variation in the effectiveness of governance structures that use legal institutions is larger than cross-country variation. In the countries analyzed, this is unexpected for two reasons: because institutional rules relevant to transactions are set at the national level and because there is significant cross-country variation in the strength of legal institutions. This is a puzzle that is surely in need of further investigation, providing just one example of how our approach to data collection can stimulate new avenues for research.

Section VI provides a specific illustration of how that research might proceed by examining a hypothesis that has been a central feature of theories of transactional governance at least since Williamson (1975, 1985) observed that exogenous shocks could enable opportunism. We examine how the presence of uncertainty affects the use of purely bilateral governance. LCA provides the dependent variable, the estimated posterior probability that a firm uses pure bilateralism.⁶ The explanatory variable of chief interest is the degree of uncertainty in the conditions surrounding the exchange between the two parties. In both fixed-effects OLS and IV regressions, we find that transactions that are more affected by uncertainty use pure bilateralism less and therefore have a greater involvement of third parties. Our interpretation of this result is that reference to a third party provides increased adaptability and a gap-filling role when firms face an uncertain environment (Williamson 1975, 1985). A neutral referee is especially useful when shocks require adjustments that create room for opportunism. Hence, the role of third parties increases as uncertainty increases: the incidence of pure bilateralism decreases.

These illustrative examples of the use of our data suggest a fourth contribution of our research. We produce a derived dataset of the estimated posterior probabilities that each firm adopts each

⁶ Section VI focuses solely on firms' relations with their suppliers.

archetypal governance structure. This dataset is available for use by other researchers to advance their own research agendas by combining our methodology and their own data.⁷

II. The Conceptual Framework, the Question, the Surveys and Raw Responses

II.1 The Conceptual Framework

Three elements in the economics literature underpin the conceptual basis of the survey question that lies at the core of this paper. The first is that the analysis of inter-firm agreements almost invariably begins with Williamson's (1975, 1985) emphasis on opportunism and its possible detrimental effects on the attainment of the overall objectives of the firms that are undertaking those agreements. Hence, our approach can be thought of as emphasizing enforcement in its broadest sense.⁸ We thus follow the prevailing approach in the literature, which places enforcement at the center of the analysis of agreements (e.g., MacLeod 2007).⁹ Agreements can also be coordination devices, whereby the details can serve a purely informational role to coordinate the actions of firms (e.g., Hadfield and Bozovic 2016). While we do not focus specifically on this aspect of agreements, coordination and enforcement can be intertwined, as firms must be able to both commit to the agreement and communicate this commitment to each other to achieve coordination (Greif, 2000).

Second, an important strand of the literature ultimately casts analysis in terms of what specific agents (individuals, firms, organizations, or institutions) are involved in enforcement.¹⁰ We call

⁷ The concluding section of the paper provides details on how to access the relevant datasets and tools.

⁸ Greif (1997) illustrates this broad emphasis on enforcement as follows (p. 247): "Since the agent can act opportunistically, the principal would not initiate an exchange (even if it were efficient) in the absence of a contract enforcement institution." See also, Greif (1994, 2005).

⁹ See also Johnson, McMillan and Woodruff (2002), Dixit (2003, 2009), Hart and Moore (1988), Susarla et al. (2020), Zhou et al. (2008), Bernstein (2016).

¹⁰ This approach is present when focusing on the actions of organizations, such as courts or government officials, that implement institutions. Further examples are provided by criminal groups, arbitration courts, social groups practicing ostracism, and business associations cutting off trade.

this an agent-based approach, in which broad strategies emerge as descriptive summaries of the types of agents chosen to aid enforcement. That approach can be seen most clearly in the foundational analytical approach to understanding inter-firm agreements, game theory, which begins with the naming of agents. Our survey question effectively does the same, by asking respondents to consider specific sets of agents (e.g., government officials).

An alternative approach would begin with strategies, not agents. The most popular form of this approach in the literature contrasts contractual and relational transactional strategies, with the origins of the former often interpreted as lying within economics and the latter reflecting sociological theory.¹¹ Measures of the use of these two strategies usually aggregate responses to multiple questions on various behaviors and beliefs that characterize the formation and implementation of inter-firm agreements.¹² Strategy-based approaches have been successfully applied across multiple contexts, especially using smaller, bespoke samples that reflect narrower ranges of cultures, sectors, or activities.¹³ Such a focus facilitates the use of highly nuanced survey questions, which is crucial in understanding strategies and their use. We chose the agent-based approach since the terms designating distinct types of agents will likely have a more consistent meaning than terms that correspond to the nuances of broad strategies when implemented via

¹¹ The definitions of these two strategies vary across different studies, often significantly. For example, contrast the narrow approach on whether the use of social sanctions is implied in relational strategies used by Gil et al. (2019) with the broader approach of Johnson, McMillan, and Woodruff (2002). For definitions, see, e.g., Cao and Lumineau (2015) and Abdi (2017). Contractual and relational transactional strategies can be used together or separately. Argyres et al. (2020) argues that a contractual approach might be embedded in a relational approach to produce more powerful inter-firm cooperation. For the roles of economics and sociology in conceptualizing these strategies, see, e.g., Poppo and Zenger (2002), Greif (2005).

¹² For example, Poppo and Zenger (2002) measure relational governance by combining responses to three questions on the level of collaborative relationship, on the extent of shared goals, and the reliability of the partner to keep promises. Zhou and Xu (2012) measure it by aggregating information on whether the exchange is frequent and whether the parties keep each other informed about changes. Homburg et al. (2009) include multiple questions on trust, along with multiple questions on the extent to which the relationship is governed by written contracts.

¹³ See e.g., Homburg et al. (2009) who collect data on contracts in the US and Germany in the chemical mechanical and electrical industries. To examine the effect of national culture on the comparative use of contractual and relational governance, Handley (2015) collects data from firms that are large, US-based, and engaged in outsourcing of business processes. To analyze the effect of culture on the relationship between governance and of opportunism, Handley and Angst (2015) survey service providers that are located across countries but all having customers that are based in the US.

economy-wide and cross-country surveys. Later, our statistical analysis estimates the broad descriptive strategies that emerge from responses to the question posed on different agents. We regard the agent-based and strategy-based approaches as true alternatives since they could not be combined in a single survey question of the type used in this paper, for reasons we clarify below.

The third element of the economics literature that underpins the conceptual basis of our survey question is the view that the pertinent agents can be identified and arranged on a spectrum, from the narrowest to the broadest. Although the language varies enormously across papers, this view is common, although often implicit and not comprehensive in scope (see, e.g., Dixit 2003, World Bank 2002, Greif 1997). To clarify this point and connect it to the structure of our survey question, we use Greif's (1997, 2005) formulations since the notion of a spectrum of agents is an important feature of his highly influential work.

Greif (1997) differentiates between first-, second-, and third-party enforcement (see also Dixit 2009), any combination of which can be relevant to any specific agreement. First-party enforcement reflects the personal characteristics of agents themselves, characteristics that are often relevant to all of the agent's actions, not only those undertaken in implementing a particular agreement. Problems arise less frequently when that agent is trustworthy, trusting, honest, and has absorbed common social norms. The rest of society can provide background to these purely first-party motives, since many moral values arise as the result of social interactions (Granovetter, 1985).¹⁴ However, these motives are purely first-party because enforcement occurs without any reference to second or third parties: guilt (as opposed to shame) does not imply direct social interaction (Greif 1994, 1997, Argyres et al. 2020). Problem-solving occurs simply because of the

¹⁴ Poppo et al. (2016) describe this as follows: "relational trust arises from social relationships when there are strong beliefs about the goodwill, honesty, and good-faith efforts of others, which mitigate risk by aligning core values" (p. 2). See also Granovetter (1985), Gulati (1995), Zhou et al. (2008), Poppo and Zenger (2002), Susarla et al. (2020).

"... the tendency of individuals to derive utility from acting according to their values (first-party enforcement)" (Greif 1997: 250).¹⁵ When first-party enforcement works because one agent judges the other trustworthy, the frame of reference is not forward-looking based on the agreement itself but rather backward-looking: what the agent has done in the past and where the agent comes from is used to predict trustworthiness. The agent enforcing the agreement is the intrinsic person and the mechanism is personal trust.¹⁶

Second-party enforcement reflects calculative trust, the prime example being the repeated-game-folk-theorem equilibrium, whereby each of the parties has a direct long-term financial interest in fulfilling the agreement (e.g., MacLeod 2007). In contrast to personal trust, the information used for second-party enforcement is mostly forward looking, in which the personal identities of the two parties can be irrelevant, and the focus is upon the continuation of a profitable business arrangement.¹⁷ In second-party enforcement, we do not have social beings, but rather agents as profit-seeking computing machines.¹⁸

Third-party enforcement involves implicit or explicit reliance on additional economic agents to prevent or to resolve problems that might arise in the implementation of the agreement. In this paper, we take 'third parties' to include all agents other than the two that are directly party to the agreement. Such third parties include courts, social or economic groups, arbitrators, and

¹⁵ See also Greif (1994), Argyres et al. (2020) and Guiso et al. (2009). Ellickson (1997) comments on Greif (1997) as follows "[a] first party system involves internalized norms against defection that individuals enforce against themselves." (page 268)

¹⁶ First-party enforcement is referred to as morality in Dixit (2003) and Mike and Kiss (2019). Greif (1997) uses terms such as general morality or personal trust to describe the same concept. Other terminology used to describe this type of enforcement includes individual or "internalized" norms, such as honesty (World Bank, 2002, Bohnet et al. 2001). Also see, e.g., Di Domenico and Ryan (2017) for neuroscientific evidence of such intrinsic enforcement.

¹⁷ The forward-looking calculation in this context refers to calculative assessment of "whether it pays to cooperate" (Poppo and Zhou 2016, p. 3) which is absent in the case of the personal trust. In MacLeod's terms (2007), the existing stock of reputation capital held by the agents might be relevant to the calculations, but no consideration needs to be made concerning how this capital was built. The repeated-game-folk-theorem equilibrium could involve statistical analysis of past data when agents estimate parameters that they can try to deduce from past behavior.

¹⁸ While the distinction between 'personal trust' and 'calculative trust' is important and has been acknowledged in the literature for many years, interest in it has risen recently, with attempts at empirical analysis (Williamson 1993, 1996, Baker et al. 2002, Poppo et al. Zhou 2016, Argyres et al. 2020, Susarla et al. 2020).

government. They might be explicitly mentioned in the agreement (e.g., arbitrators) or be implicit (e.g., criminal groups). Potential sanctions include the loss of valuable future transactions with third parties. Specific actions by third parties might never occur: merely referring to their existence and powers might lead to cooperative adjustments that prevent problems arising or lead to obvious resolutions when problems do arise. But sometimes there are court cases, social ostracisms, or acts of violence.

Our survey question follows these three precepts. This paper aims to use the data produced by this question to undertake a cross-country characterization of transactional governance structures, a form of empirical analysis that is absent from the literature (Greif 1997, 2005, Mike and Kiss 2019). Naturally, several enforcement agents can be combined to form specific governance structures (Cannon et al. 2000). However, there is a lack of a comprehensive theory on how combinations are chosen (Mike and Kiss 2019), apart from general theorizing that different combinations will be optimal under different economic conditions (Greif 1997). Many studies have explored, theoretically or empirically, whether various types of enforcement substitute or complement each other (e.g., McMillan and Woodruff 2001, Poppo and Zenger 2002), with evidence indicating that context is important (e.g., Cao and Lumineau 2015). Hence, there can be a vast array of combinations (Mike and Kiss 2019). Greif (1997: 253) proposes that "[a]n important conclusion, then, is that theory alone cannot predict which system of societal organization—the integrated individualist system based on second-party enforcement, formal organizations, general morality, and legal enforceability, or the segregated collectivist system based on personal trust and third-party enforcement—is more efficient in promoting exchange." The main goal of this paper is to fill this gap.

II.2 The Question

We now turn to the wording of the survey question and the tradeoffs faced in its formulation. These arise from practical matters of survey implementation, making terms clear to a heterogeneous group of respondents, and constraints on question length.

Implementation of the question begins with the interviewer reading the following aloud:

When making agreements with [suppliers][customers], please indicate to what degree each of the following is effective in resolving or preventing problems.¹⁹

Then, the respondent is presented with a 'show card' that contained a list of six 'agents' in the sense discussed above.²⁰ These are: personal relationship and trust; mutual interest in maintaining business relationship without involving others; paid private dispute resolution; assistance of government officials; intervention of other third-parties (excluding paid, private dispute resolution and government officials); and legal system. The interviewer then reads aloud the Likert scale of possible responses, also displayed on the show card, which remains visible the whole time the respondent is being prompted to give individual answers for each of the six agents:

Not at all	Slightly	Moderately	Very much	Extremely
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Respondents rate each of the six agents individually. Because respondents could continually see the content of all six sub-questions when responding on any particular one, they could implicitly understand the underlying logic of the question.²¹

¹⁹ We chose to ask about agreements with suppliers and customers separately because firms might employ very different strategies when managing upstream relations than downstream ones.

²⁰ Interviewers were instructed to read questions as written on the survey instrument and present the 'show card'. Then, on respondent inquiries, interviewers could consult a written manual to explain the meaning of questions. The manual contained the following interpretation of the opening statement of the question: "Resolving or preventing problems in agreements includes negotiations, how agreements are finalized, and how other available means are implemented to resolve problems when they appear. Each one of the following six mechanisms includes not only their use but also the promise or threat of their use when a problem emerges."

²¹ The exact wording of the question in Spanish and English is included in Appendix A.1, together with the show card. Nuances raised in the translation process are discussed in Appendix A.2. The stages of survey implementation that are relevant to the question design are described in Appendix A.3, with the relevant sections of the interviewer manual provided in Appendix A.4.

II.2.1 The Specification of the Six Agents

The six agents in the question are arrayed on the first-party to third-party spectrum.²² The first sub-question, 'personal relationship and trust' aims at evoking unilateral personal trust. It begins with 'personal' to indicate motives that lie deep within the agent. It uses 'relationship' and 'trust' to steer the respondent away from any hint of pecuniary motives.

The next sub-question, 'mutual interest in maintaining business relationship without involving others', refers to calculative trust. It places 'mutual' at the fore, bringing into play the second party to the agreement, but not any other agents, and mentions 'business relationship' in order to move the respondent's attention to more worldly motives. The use of 'business' primes the idea of pecuniary benefits. The term 'maintaining' evokes a repeated game (e.g., McMillan and Woodruff 1999), while the 'without involving others' forces attention only on the interaction with the other party to this agreement. Note that maintaining a business relationship might also implicate aspects of reputation since breach of an agreement may reduce the reputational capital of the breacher (e.g., MacLeod 2007).

The next four sub-questions refer to different kinds of third parties. Each is worded to steer the respondent away from personal trust or mutuality. 'Paid private dispute resolution' refers to arbitration, perhaps by business associations, mediation, and other similar fora. These are not named in the question because specific names would vary between countries, and the use of them might involve country- or language-specific priming. This general term also gives parties a means of indicating the effectiveness of criminal groups while not revealing sensitive information (Hendley, Murrell, and Ryterman 2000).

Appendix A.5 and A.6, respectively, include information on fieldwork dates and the total number of observations available for each country; and summary statistics on rates of "Don't Know" responses, which are negligible.

²² A number of the points made in this subsection were included in the interviewer's manual, which determines interviewer explanations. See Appendix A.4.

We include the 'assistance of government officials' for a variety of reasons. Even in developed countries, government officials play a role: when a market is regulated, when local officials use zoning, inspections, and fines to influence the outcomes of disputes, or when criminal-justice officials suspect fraud.²³ Hendley and Murrell (2003) included government because they were studying a country with a communist past, and the same logic would surely apply when there has been a history of statist policies.²⁴

The 'intervention of other third-parties (excluding paid, private dispute resolution and government officials)' can include unpaid involvement, or threat thereof, by business associations, by officials of third-party firms with which the parties have other relationships, citizens prominent locally, or social groups, such as churches, political parties, and clubs, even family members who are not party to the agreement, etc. This is a broad, catch-all category but that is intentional: respondents can invoke the effect of agents who do not fit easily into the other categories.²⁵ When constructing this sub-question, there was the decision on whether to use the word 'intervention' in the question. Ultimately this decision rested on the phrasing of the question as a whole, because mention of 'third-parties' alone without some type of action would be much too general. Without the words 'dispute resolution', 'assistance' and 'intervention' in the third, fourth, and fifth sub-questions, there was the possibility that respondents might invoke too many aspects of transactions in their responses, such as individual norm formation, partner selection, or informational, or coordination aspects of entering agreements. Certainly this is one example of the trade-offs inherent in the design of short survey questions: we chose to elicit responses that are indicative of

²³ Williamson (1991) and Greif (1997) mention regulations in this context, Greif (1997) and Greif (2005) mention bureaucratic procedures, and World Bank (2002) mentions fines.

²⁴ We are agnostic on whether the effectiveness of government officials in resolving or preventing problems in agreements is positive or negative from the perspective of economic development in general. Our purpose is to solely understand the extent of their role.

²⁵ For the role of these kinds of third parties in governance of agreements see, e.g., Greif (2005), World Bank (2002), Ellickson (1997), Greif (1994, 1997, 2000), Johnson, McMillan and Woodruff (2002).

any concrete effect of the transactional agents, rather than casting a broader brush to mere association with the parties to the agreement.

The 'legal system' is the last agent. Because it is the farthest removed of all six sub-questions from moral, personal, or relationship considerations, it is placed at the end to evoke a spectrum of options from personal to remote. The phrasing steers respondents away from thinking that any role for the law would imply choosing a high rating: most agreements will mention the law in some way even if it never has any effect on behavior; all actions are under the shadow of some law. The use of the term 'system' is aimed at evoking the idea of a real organization in the respondents' minds, without using the word 'courts' to avoid the assumption that lawsuits are a necessary condition for giving this option a high rating.

There are two words that we studiously avoided including in our question even though they describe important concepts widely used in the pertinent literature—'reputation' and 'networks'. These words refer to broad strategies or tools that agents use but are not the entry points of analysis in the agent-based approach that we use. Moreover, these words can be rather ambiguous, describing powerful and versatile strategies that can vary considerably across contexts and agents in the ways that they function. Reputation can, for example, have a societal value, implying third-party involvements (Greif 2000, Williamson 1991). A reputation for a willingness to commit violence is at the heart of the enforcement by criminal groups. Government, social groups, and the legal system all use reputation as their currency. Reputation can also invoke the probability of certain behaviors that one agent assigns to other agents (World Bank 2017, Macchiavello and Morjaria 2015, Bernstein 2016), percolating into second-party enforcement in which reputation sometimes lies at the center of analysis (MacLeod, 2007). People can value their reputation simply because that is the lens through which they view their intrinsic selves and they preserve their

reputation because that is what they value, implying aspects of first-party enforcement. Simply put, reputational considerations can be a tool of all the agents invoked in our question and our use of the term would loosen, rather than tighten the wording of the question.

Similarly, networks can be invoked in many different senses. The most common definition of a network is a set of agents with some characteristics in common, each agent potentially having a connection with some other agents. Under this definition, a network might play many kinds of roles in transactions. Networks can be used to operationalize reputation in enforcing agreements (e.g., World Bank 2002, Bernstein 2016, Argyres et al. 2020). They also transmit information about law, people, markets, goods, and technologies that serve alternative purposes, such as finding suppliers or forming norms. These additional elements are important, but they are too far removed from opportunism and, our focus: the central task of enforcement.

Avoiding the terms 'reputation' and 'networks' shows why we did not attempt to combine the agent-based and strategy-based approaches in a single survey question. Elements of reputation and networks are crucial in relational strategies. But, as we note above, reputation can be used in some way by each of the six agents we focus upon. Networks have a similarly broad scope of application in relational strategies. To use these terms to find which of the six agents are involved in relational, rather than contractual, agreements would lead to a much too complex question.

We now turn to the wording of the body of the question and discuss its elements.

II.2.2 Question Design

In conducting economy-wide, cross-country research using only one composite survey question, it is inevitable that survey administration would piggyback on existing efforts.²⁶ Our

²⁶ For example, the construction of an economy-wide sampling frame for any particular developing country is often a challenging, burdensome and expensive task, which requires considerable resources and expertise.

question was asked within a regular cycle of the World Bank Enterprise Surveys (WBES, described in more detail in the next subsection). The form and phrasing of the question were therefore framed to fit the approach of the WBES, an important element of which is asking busy top managers or owners of firms a large set of questions on a collection of heterogeneous topics. This means that questions must be terse and understood in a natural way by businesspeople, leading to budget constraints on words and concepts embodied in questions.²⁷

Question design begins with the choice to use 'agreements', and not 'contracts', since contracts are only one type of agreement. Then one must decide whether to ask firms about their agreements with transactional partners in general, or to ask about one specific partner, since the transaction-cost and contract-theory literatures suggest that relationships may differ across different partners. Focusing on a specific partner is conceptually and practically complicated. First, the question must suggest to respondents which specific partner they should focus upon.²⁸ A possible solution is asking respondents to choose a partner when answering questions, as when Mike and Kiss (2019) suggested choosing a 'typical' supplier and buyer.²⁹ But this solution invites selection bias: Mike and Kiss (2019) found that respondents equated typical business partners with those having longstanding ties, implying that the resultant dataset characterized relationships in which

²⁷ Terseness in wording has benefits for the whole survey. Longer questions cause problems because they place a greater cognitive burden on respondents (Yan and Tourangeau 2008). This affects respondent comprehension (Holbrook et al. 2006), adding complexity without altering the distribution of responses (Shaeffer et al. 2005), leading to respondent satisficing and decreased measurement reliability (Alwin and Beattie 2016). It also leads to a potential bias as respondents with more cognitive resources will answer complex questions differently than those with fewer (Oberski 2016). Contrast our terse questions with those of Hendley and Murrell (2003), on which they are based, but which faced fewer constraints on question length as their survey covered only one country, did not use a representative sample, and could fully focus on issues of transactional governance and the law.

²⁸ This approach originated in McMillan and Woodruff (1999) who asked respondents to reflect on their firm's first and most recently added customers and suppliers. However, McMillan and Woodruff (1999) were interested in exploring the determinants of trade credit, for which a focus on highly specific transactions is necessary. Note that a case-study approach can be applied as well. For example, Mahapatra et al. (2010), chose the organizations whose interactions they studied in great detail. However, this approach would be impossible to undertake on the scale required for the current investigation, which is economy-wide in multiple countries.

²⁹ Notably, the questions can be made even more granular by asking about a specific transaction, though the strategies that firms employ to ensure fulfillment of agreements in a transaction likely transcends the particular transaction at hand (e.g., Parmigiani and Mitchell 2010), diminishing the value of such granularity.

familiarity between partners was a strong component. Conceivably, such selection bias could be avoided by working with each firm to generate a list of its partners and then choosing one randomly. But this would increase the length and complexity of questions and the survey implementation overall. Asking firms about their agreements with transactional partners in general avoids these types of conceptual and practical complications, reflecting the plausible assumption that the approach taken by a firm will transcend one specific relationship, being based on the firm's overall comparative advantage.

Moreover, the WBES surveys establishments (which we have called 'firms', for convenience). The WBES is meant to broadly capture firms' experiences, and so it includes questions on a variety of topics, which are generally pitched at the level of overall operations. This provides a fitting context in which to embed a question about agreements with transactional partners in general. Importantly, establishments usually produce a narrow range of products with a uniform technology. Hence, our approach is analogous to that taken in many studies where establishments are viewed as a single entity with a single technology, one example being the estimation of establishment-level production functions. We therefore use a level of aggregation that is common in the economics and business literatures by posing questions about the establishments' transactional partners in general. Finally, our question was preceded in the WBES questionnaire by questions that specifically asked respondents to focus on the whole set of transactional partners. Therefore, respondents begin to answer our question on supplier (or customer) relationships having been primed to think about the circumstances under which they engaged with suppliers (or customers) in general.³⁰

³⁰ Our question on customer relations was identical to the one for suppliers, except for the obvious substitution of 'customers' for 'suppliers'.

Next, in framing a question, one must decide which aspect of agent performance to ask respondents to assess.³¹ We chose to focus on 'resolving or preventing problems in agreements' because this was a circumscribed objective that all respondents would quickly understand.³² It directly resonates with the first element of our conceptual framework that emphasizes enforcement in its broadest sense and implicitly invokes notions of good overall transactional performance, including through the deterrence of opportunism.³³ Importantly, we do not constrain ourselves to enforcement in the sense of specific performance of the terms of an agreement, since uncertainty invariably means that efficiency would necessitate adjustments in those terms during implementation. Nor is our focus on actual disputes: the use of 'preventing problems' prompts respondents to include information about cooperative adjustments that are made under the shadow of enforcement without any real dispute explicitly arising. In this sense, our approach might be better summarized by the term 'safeguarding', than the more common 'enforcement'.³⁴

In combining an inquiry about the resolution and prevention of problems, we have introduced unfortunate 'multibarreled' phrasing, where a question inquires about two or more concepts that are not clearly separated.³⁵ The relative focus on either one of these two aspects might vary non-randomly between different types of respondents, introducing bias. This is a shortcoming but one that would be prohibitively costly to avoid. In an ideal theoretical scenario, we would have asked questions about resolution and prevention separately. In practice however, there are at least two

³¹ In the literature reviewed by Cao and Lumineau (2015), respondents were asked a series of questions about different properties tailored to different transactional mechanisms. While this approach is suitable in many areas of research, our overall objective dictated that all transactional mechanisms be treated in exactly the same manner. Thus, for example, we could not model our approach on the methodologies of any of the voluminous number of papers reviewed by Cao and Lumineau (2015).

³² Therefore, we do not inquire about the selection of partners, which occurs before agreements are made. See, for example, Dekker (2008) on how the amount of effort invested in partner selection affects the choice of governance structures.

³³ The deterrence effect of enforcement is difficult to quantify directly for multiple reasons, including due to respondents' potential guesswork as to why problems did not arise. Given our conceptual framework's focus on enforcement in its broadest sense, we consider it crucial to attempt to measure the deterrence aspect of enforcement.

³⁴ See Zhou and Poppo (2010), Carson, Madhok and Wu (2006), Abdi (2017), Devarakonda, McCann, Reuer (2018).

³⁵ Survey methodologists suggest avoiding the use of such combinations of terms, to allow respondents to focus on one aspect of an inquiry without making a choice of which aspect to focus upon (Fowler and Cosenza 2008).

important complications. First, the two properties will be difficult for respondents to disentangle. A mechanism that prevents complications evolving into problems can also be viewed as a way to resolve issues. A mechanism that resolves problems, perhaps with the explicit threat of sanctions, also can prevent them from even arising because of the deterrence effect. Indeed, 'preventing' can be thought of as being produced by the shadow of 'resolving'. Second, respondents might view two very similar questions as repetitive, which reduces the overall quality of a survey.³⁶ Third, piggybacking on the regular cycle of the WBES meant a strict constraint on the total number of questions that we could ask. Given these conceptual and practical considerations, we chose to ask about both resolution and prevention in one question.

A further issue revolved around the phrasing of the term to connote success when resolving and preventing problems. We chose to use a single, simple term 'effective'.³⁷ We did not ask respondents to focus upon whether agreements work in an efficient way because this is too demanding a criterion and probably one that is less familiar for business managers than economists. In using this word, we avoided weighted terms such as importance, usefulness, or frequency of either use or occurrence, even as these elements, and perhaps more, enter in determining effectiveness.³⁸ The terms "important" or "useful" carry the meaning of value and can be prone to more subjective interpretation than the term "effective". Frequency of use or

³⁶ Survey methodologists warn against such repetitive design since it contributes to respondents' survey fatigue and affects their responses through the rest of the questionnaire, and even their overall participation.

³⁷ In the papers reviewed by Cao and Lumineau (2015), equivalent notions are satisfaction with the exchange relationship and performance of the partner in the exchange. These notions are entirely analogous to our 'effective', although measured in a variety of different ways in the papers reviewed. Poppo and Zhou (2016) refer to the notion of "harms" to exchange performance, which too is analogous to our 'effective'.

³⁸ Hendley and Murrell (2003), whose survey question is adapted in this paper, mention all these terms but also provide detailed clarifications to respondents, which was not possible in the context of the WBES.

occurrence does not necessarily indicate effectiveness since, for example, a legal system with high level of effectiveness works through its shadow rather than through explicit use of the courts.³⁹

Final decisions on the form of the question reflected information gained in the field at various stages of survey implementation, during translations and scripting, while training local surveyors, and from a 'cognitive audit' of the question. These stages are described in detail in Appendix A.3, and Appendix A.6 reports the (negligible) rates of "Don't Know" responses.⁴⁰

We have spent longer than is usual in addressing issues of question wording, since the relevance and validity of the data obtained from our question is central in this paper. Nevertheless, the problems we faced, and tradeoffs we encountered are typical of any study that aims to collect data that is not recorded in the accounts of firms. To put the process of question design into context, it is worth remembering that in the seminal paper in the current line of inquiry, Macaulay (1963) was forced to remark that "...to a great extent, existing knowledge has been inadequate to permit more rigorous procedures—as yet one cannot formulate many precise questions to be asked a systematically selected sample...Much time has been spent fishing for relevant questions..." Despite the years since the publication of Macaulay's paper and the subsequent recognition that it had raised fundamental issues, researchers still face a notable challenge in constructing universally applicable questions that address the problems of data collection that he so clearly articulated. In this paper, we have endeavored to implement a question that covers a comprehensive set of agents

³⁹ It is conceivable that respondents could confuse the term 'effective' with other terms we avoided, such as importance, usefulness, or frequency of use or occurrence. However, as noted below, various stages of survey implementation included a 'cognitive audit' of our survey question, which is described in more detail in Appendix A.3. Interviewees did interpret the term 'effective' as referring to a combination of both the extent of reliance and productiveness of the enforcement agent: the lowest ranking on the scale would be chosen if either the enforcement agent was not relied on, including due to lack of knowledge about that possibility for enforcement, or if it had been relied upon and it was ineffective.

⁴⁰ Low rates of "don't know" responses may be suggestive of good comprehension of questions by respondents (Krosnick 1991). The questions used in this paper had frequencies of don't knows that were comparable to those questions that had proven satisfactory by their staying power through many cycles of the WBES surveys. Krosnick and Presser (2010) note that frequent selection of a middle point on a scale (our 'moderately') is evidence of satisficing behavior on the part of respondents. There is no evidence in our data that the mid-point is used frequently. Given the negligible rates of "don't know" responses, we omit from our analysis any observation that has at least one "don't know" as a response to any of the set of six sub-questions.

involved in transactional governance, with the constraint that it must be addressed to economy-wide samples of firms from different countries.

II.3 The Surveys and Raw Responses

Our question was posed to owners and top managers of a total of 3,430 firms in Argentina, Bolivia, Ecuador, Paraguay, Peru, and Uruguay, as part of a regular cycle of WBES in 2017 and 2018.⁴¹ The WBES samples of firms are designed to be nationally representative of non-agricultural, non-extractive, formally registered, private firms with at least five employees.⁴² The survey used a stratified design with simple random sampling.⁴³

Table 1 displays the raw response percentages for the six sub-parts of each of the two identical questions, one on suppliers and one on customers. Patterns emerge even at this level of analysis. Respondents tend to regard first- and second-party enforcement (i.e., trust and mutual interest) as most effective, while regarding others as less effective.⁴⁴

Much analysis could be conducted using the types of information in Table 1. However, the governance of transactional relations likely involves the coordinated use of different agents. As

⁴¹ While these countries are quite similar from a global perspective, there are important differences across them in terms of economic development, quality of institutions, natural resource endowments, etc. Similarities between countries do not impede our main aim of providing a method of empirically characterizing firms' governance structures. See Appendix A.5 for detailed timing of each survey.

⁴² The survey universe comprises the following sectors as per ISIC Rev. 3.1: the entire section D covering manufacturing (two-digit codes 15 through 37), section F covering construction (code 45), section G covering wholesale and retail trade as well as repair of motor vehicles, motorcycles and personal and household goods (codes 50 through 52), section H covering hotels and restaurants (code 55), and section I covering transport, storage and communications (codes 60 through 64). Formal registration usually refers to registration with tax agencies or in general firm registries. The universe includes partially privately owned firms and excludes fully state-owned firms. The sources of the sampling frames for these WBES were: for Argentina – Dun & Bradstreet 2016, for Bolivia – Economic Census, updated by Encuestas y Estudios consulting group 2016, for Ecuador – Superintendencia de Compañías Valores y Seguros del Ecuador 2016, for Paraguay – Directorio General de Empresas y Establecimientos 2015, for Peru – the combination of Top 10mil 2011, Registro Mype Callao 2010, Registro Mype 2012 and SUNAT (Hacienda) 2011, and for Uruguay – Instituto Nacional de Estadística 2015.

⁴³ Full details of the methodology can be found at <http://www.enterprisesurveys.org/methodology>. Stratified random sampling was used, with strata based on firm size, geographical location, and economic sector. The data includes sampling weights. All results are obtained using these weights and thus refer to the entire population of pertinent establishments in the six countries.

⁴⁴ Hadfield and Bozovic (2016) have argued in the context of innovation-oriented interactions that legal contracts are valuable in planning transactions, even if the parties have no intention of using the contract in a formal legal setting. In this case, respondents would not identify the use of such a contract with the effectiveness of the legal system, but rather with first- or second-party mechanisms (i.e., trust and mutual interest).

noted by Cannon et al. (2000: 184) "exchange is best understood as embedded in a complex matrix of economic, social, and political structures and that the governance of exchange relations more often relies on combinations of market, social, authority-based mechanisms than on any one category exclusively." Therefore, a fuller understanding is achieved by analyzing the responses to all six sub-questions in combination. There is a daunting number of possibilities: with our six sub-questions, each with five categories of responses, there are 15,625 possible response patterns (5^6). The actual responses do include far fewer combinations than this. But even so, for relations with suppliers, we observe 711 distinct combinations and for relations with customers 631.⁴⁵ This confirms the theoretical prediction of the coexistence of many different combinations of transactional governance approaches rather than a single one that works across all contexts (Greif 1997, Mike and Kiss 2019). Given that responses are spread over hundreds of distinct patterns, statistical methods are necessary to gain the types of insights that arise from parsimonious summaries of the data. These insights and more are provided using LCA.

III. Latent Class Analysis: Data-Generating Process and Diagnostics

The use of LCA to study firm behavior is not very common.⁴⁶ Therefore, we introduce our statistical methodology in more detail than usual. This allows us to emphasize the distinctive aspects of our approach, which employs assumptions that are less restrictive than those usually used in practical applications of LCA. LCA is particularly useful when analyzing the responses to a multi-part survey question like ours. In the most basic data-generating process (DGP) envisioned by LCA, the response of a single firm to any particular sub-part of a composite question is viewed

⁴⁵ Appendix A.7 includes tables listing the most common reported response patterns.

⁴⁶ LCA has been applied in a number of areas of business and economics, but its use is not common in any area, with the arguable exception of marketing. (See, e.g., Kamakura and Russell (1989) for an early empirical application and Jedidi et al. (1997) for a methodological discussion). The few existing examples of the application of LCA to data on producers tend to focus on niche activities. Grewal et al. (2006) focus on individual software developers, Samuelsson and Davidsson (2009) study nascent entrepreneurs, Ebers and Oerlemans (2016) use a small sample of firms in the German construction industry, and Mike and Kiss (2019) study a sample of privately owned small and medium sized enterprises in Hungary.

as independent of the response on another sub-part. This is the local independence assumption in LCA, which is invoked in the overwhelming majority of LCA applications. The set of responses of firms of a similar type (that is, within a particular class) therefore forms a multi-dimensional contingency table, where answers along separate dimensions are independent. But there are different types, or classes, of firms. Which class a firm lies in is unknown. A complete dataset therefore comprises mixtures of contingency tables, with unobserved mixing proportions. LCA separates the mixture into its constituent parts, treating the class of a firm as a latent variable that must be estimated.

In general terms, LCA is similar to other latent variable approaches. For example, there are immediate parallels with factor analysis. While both techniques can be applied (perhaps with technical modifications) to the same types of observable data, the key difference is that LCA estimates a nominal latent variable while factor analysis estimates one or more continuous (i.e., cardinal) latent variables. The categories of LCA's estimated latent variable correspond to the separate elements, or classes, of the mixture: hence the name—Latent Class Analysis. When the classes thus uncovered are meaningful and recognizable in the context of the existing literature, the analysis is especially illuminating.

In the next subsection, we introduce LCA's DGP in its most basic form, that is, assuming local independence of all responses. Then, in Subsection III.2 we relax this assumption to adjust the DGP to fit the properties of the data that we collected.⁴⁷

⁴⁷ Readers wanting a more intuitive introduction to LCA are directed to Appendix B, which provides a simple example framed in this paper's context.

III.1 The Simplest LCA Data-Generating Process

Each firm, i , reports on the effectiveness of K enforcement agents by choosing, for each K , one of R points on a Likert scale.⁴⁸ The response vector, $Y_i = (y_{i1}, \dots, y_{iK})$, is observed. In our data, $K = 6$ and $R = 5$. We observe separate Y_i 's for relations with customers and relations with suppliers, but since we keep the analysis of each type of relation entirely separate, we use only one Y_i in specifying the DGP.

In its operations, firm i chooses one of several governance structures (i.e., combinations of agents). The choice of governance structure places the firm in one category of a nominal and latent variable, c , with C values. c_i denotes the value of c for firm i : $c_i = j$ if firm i chooses governance class j . c_i is to be estimated for each firm.

The strongest version of local independence—between the responses for all sub-questions—leads to a particularly simple, intuitive form for the DGP. Practical Applications of LCA most commonly use this strong version: a firm's response for enforcement agent k is conditionally independent of the response for agent m ($m \neq k$).

Denote by $\theta_{kr|c}$ the probability that a firm in latent class c chooses answer r concerning agent k . Denote by π_c the probability that a firm is in latent class c . Then the probability of observing a specific vector of responses, Y_i , for firm i is:

$$P(Y_i) = \sum_{c=1}^C \pi_c \prod_{k=1}^K \prod_{r=1}^R [\theta_{kr|c}]^{I(y_{ik}=r)} \quad (1)$$

⁴⁸ To emphasize our specific approach to conceptualizing transactional governance, as detailed in Section II, we refer to enforcement agents, or simply agents, rather than mechanisms or strategies, terms that fit better with the strategy-based approach. Of course, the terms 'agent' and 'enforcement' are to be understood in the broad sense in which we have defined them in Section II.

where $I(y_{ik} = r)$ is an indicator function equal to 1 if $y_{ik} = r$, and 0 otherwise. The $\theta_{kr|c}$ and π_c are to be estimated. This DGP satisfies the local independence assumption across all six sub-questions because, conditional on c , y_{ik} is independent of y_{im} for all $k \neq m$ and all i .

III.2 Relaxing Full Local Independence

Exceptions to assuming local independence between all K sub-questions (i.e., agents) can be built into LCA, and this might be natural given our data. For example, in the piloting of the survey, we found that respondents had some difficulty in separating the notions of mutual interest and personal trust.⁴⁹ Therefore, the errors in the responses for these two enforcement agents are possibly correlated. Moreover, when somewhat similar enforcement agents are probed in succession, respondents might not exert the cognitive effort to distinguish their responses: the errors in consecutive sub-questions are possibly correlated.⁵⁰ If the tendency for pairs of responses to partially contain the same information is not considered, then LCA will give correlated responses too much weight (Vermunt and Magidson, 2002: 95). The analogy to weighted least-squares is immediate.

To formulate the relaxation of full local independence, split the K agents into H subsets. The error terms in responses about two agents within the same subset are correlated and therefore do not satisfy local independence, even conditional on the latent class of the firm (c_i). Let Y_{ih} be the vector of firm i 's responses on the agents in the h^{th} subset, with each Y_{ih} being a sub-vector of Y_i . Y_{ih} , $h=1, \dots, H$, is observed.

Denote by $f(Y_{ih}|c)$ the pdf of Y_{ih} given c . Then the probability of observing a specific response vector, Y_i , for firm i is:

⁴⁹ This is not surprising. One of the takeaways from Popo et al. (2016) is that there have been few efforts in the past to distinguish empirically between these two different types of trust.

⁵⁰ This phenomenon is often referred to as "nondifferentiation of responses" (e.g. Krosnick and Alwin, 1988).

$$P(Y_i) = \sum_{c=1}^C \pi_c \prod_{h=1}^H f(Y_{ih}|c) \quad (2)$$

Estimates of $f(\cdot | \cdot)$ and the π_c are obtained by maximizing the following likelihood:⁵¹

$$\sum_i w_i P(Y_i) = \sum_i w_i \sum_{c=1}^C \pi_c \prod_{h=1}^H f(Y_{ih}|c) \quad (3)$$

where the w_i denote sampling weights. Use of the sampling weights implies that our estimates are representative of the entire universe of firms covered by the WBES in the six countries.

III.3 Incorporating Correlates of Class Membership

LCA also facilitates studying which factors are associated with the class to which a firm belongs. This is Williamson's (1991) discriminating-alignment research agenda. While a central goal of this paper is discovering governance structures and exploring their characteristics, in Sections V and VI we conduct some exploratory exercises in relating class membership to firm characteristics. The following paragraphs outline the statistical methodology used in those exercises.

Equation (2) is easily modified for this change. $\pi_c(Z_i)$ is the probability of membership in latent class c given that the firm has characteristics Z_i . These Z_i may include features of the firm (e.g. size) as well as the environment or context in which it operates (e.g. culture). Then the probability of observing a specific response vector, Y_i , for firm i with characteristics Z_i is:

$$P(Y_i | Z_i) = \sum_{c=1}^C \pi_c(Z_i) \prod_{h=1}^H f(Y_{ih}|c) \quad (4)$$

With this model, one estimates the functions $f(\cdot | \cdot)$ and $\pi_c(\cdot)$.

⁵¹ We use the Latent GOLD software (Vermunt and Magidson 2016).

If (4) is the preferred model, there are two routes to estimation. One obvious choice is to form a likelihood from (4) and estimate the $f(\cdot | \cdot)$ and the $\pi_c(\cdot)$ directly. Alternatively, one could proceed in three steps. First, maximize the likelihood (3) and estimate $f(\cdot | \cdot)$ and the π_c . Then, use Bayes theorem to estimate firm-specific class membership probabilities for each firm, $\hat{\pi}_{ci}$. Finally, use regression techniques to estimate the functions $\pi_c(\cdot)$, $c = 1, \dots, C$, using as data the $\hat{\pi}_{ci}$ and Z_i .

There is a large literature, both theoretical and applied, reflecting on the choice between the two routes to estimation. From theory, there are procedures to obtain consistent estimates of $f(\cdot | \cdot)$ and $\pi_c(\cdot)$ using the 3-step process (Vermunt 2010, Bakk et al. 2013, Bakk et al. 2014). The applied literature suggests that using the 3-step process is advisable unless one has great confidence in the specification of (4), especially understanding which Z_i to include and exclude (Nylund-Gibson and Masyn 2016).⁵² For that reason, we use the 3-step process because many of the relevant Z_i 's remain unmeasured or unknown when using cross-country data. This is the case because of the inherent difficulty of collecting cross-country data on transaction-related activities and because the discriminating-alignment research program—identifying the Z_i 's—is still a work in progress.

Our decision to use the 3-step procedure also rests on our objective of understanding the nature of the classes. A prime contribution of this paper is the characterization of the most common governance structures (step 1). By estimating the classes in general—independently of the correlates of class membership—we can focus on this goal and provide readers with results unencumbered by any more ambitious objectives. Moreover, by providing the Bayesian posterior probabilities produced at step 2 of the 3-step procedure (the $\hat{\pi}_{ci}$), we make it possible to pursue the exploratory exercises of Sections V and VI, which suggest an approach that can be taken by

⁵² Jedidi et al. (1997) make a similar comment in a more general modeling context than LCA.

others, using our data on posterior probabilities and selecting their own Z_i 's from the copious data available from the WBES or other sources.

III.4 Selecting a Specific LCA Model and Evaluating its Properties

The implementation of step 1 of the 3-step process entails estimation of $f(\cdot | \cdot)$ and the π_c by maximizing the likelihood at (3). LCA is typical of latent-variable models in that implementation requires making many detailed specification decisions. In most practical applications of LCA, the choice of how many classes (C) to estimate is primary, with a relatively small number of options considered. However, relaxing local independence enormously increases the number of possible options when specifying the DGP. In this subsection, we provide an overview of the procedures we used to choose our favored model, relegating most details to Appendix C.⁵³

Settling on the details of model specification moves through three stages. First, statistical measures of model-fit are used as criteria to choose a very small set of satisfactory models. Second, the results from those models are evaluated using more subjective criteria. For example, parsimony is important to avoid over-fitting and to facilitate meaningful interpretation, which usually means the use of a simpler model (with fewer parameters). Third, the researcher examines class homogeneity and separability. Homogeneity is the notion that the members of a specific class exhibit similar characteristics or, equivalently, that there are certain configurations of responses typifying each class. Separability captures whether each class looks quite different from all other classes, or, equivalently, that there are certain configurations of responses that distinguish each class from the others. In all three stages, statistical measures are used as model-selection criteria.

To begin the model selection process, three preliminary decisions were necessary. First, we chose to analyze the responses for suppliers and customers separately. We presume that firms

⁵³ Detailed background information can be found in Collins and Lanza (2010), Masyn (2013), and Vermunt and Magidson (2016).

might employ very different approaches in conducting upstream relations than downstream ones: after all, a firm's objective in dealing with suppliers primarily concerns securing timely delivery at an appropriate level of product quality; while downstream relations are primarily about getting paid by a satisfied customer. The large samples meant that sufficient statistical power could be generated in two separate analyses.⁵⁴

The second decision was to choose the numbers of classes (C) to be considered. Invoking parsimony, we focused on 3-, 4-, 5-, and 6-class specifications. Models with a greater number of classes were not considered as the number of parameters would increase greatly, entailing the risk of over-fitting. Robustness results outlined in Appendix C show that considering even more options would not have affected our analysis.

The third decision was whether to consider models embodying a relaxation of local independence, or to keep local independence between all combinations of the six agents. Relaxing local independence results in a proliferation of design possibilities. The six agents can form 15 unique pairs, with 32,766 distinct combinations of these pairs possible.⁵⁵ Considering this number of possible models is untenable. We thus chose to look initially where theory and the observations from survey implementation pointed us. As mentioned previously, respondents might not clearly distinguish between trust (sub-question 1) and mutual interest (sub-question 2). In the piloting of the survey, we learned that sometimes individuals did not clearly distinguish assistance of government officials (4) from intervention of other third parties (5). As a result, it was natural to consider specifications that relaxed independence between the responses on sub-questions 1 and 2 and those on 4 and 5.

⁵⁴ Compare Mike and Kiss (2019), which merges data from the two types of questions, and Hendley and Murrell (2003), which does not differentiate between upstream and downstream.

⁵⁵ $32,766 = \sum_{k=1}^{14} \binom{15}{k}$. For identification, LCA needs at least one pair of sub-question responses to be locally independent; hence the 14.

Considering these possibilities for the relaxation of local independence and the four possibilities for the number of classes, there were already 16 models to consider. With this starting point, we conducted an empirical exploration of whether there was a need to relax the local independence assumption on other pairs of answers to the sub-questions. To accomplish this, we estimated the 16 models and examined the size of bivariate residual correlations, a measure of the marginal increase in the log-likelihood function that could be obtained by removing the local independence assumption for any specific pair (Vermunt and Magidson, 2016: 83-5). The pairs that had particularly large bivariate residual correlations were then added to the set of pairs that were candidates for non-imposition of local independence.⁵⁶ Based on these residual correlations, we chose to consider a total of 20 models for each of supplier relations and consumer relations, where, for each of the four possibilities of class size, we allowed for the combination of correlations of 1-2, 2-3, 3-4, 3-5, 4-5 for supplier relations, and 1-2, 4-5, 4-6, 5-6 for customer relations, in addition to the four mentioned above. The selection of the best model was based on several information criteria, particularly the Bayesian information criterion, the consistent Akaike information criterion, and the approximate weight of evidence criterion.

Providing further details of the model selection process is necessary for completeness, but understanding these details adds little to understanding the paper's central substantive findings. Interested readers can consult the relevant appendixes, which describe the choice of the set of models considered (Appendix C.1), the statistical criteria used to compare the performance of the different models (Appendix C.2), and the final choice of the preferred models (Appendix C.3).⁵⁷

⁵⁶ The exploratory results suggested that answers to adjacent sub-questions were related. As already noted, this may be due to non-differentiation of responses. This effect is known to be smaller in face-to-face surveys (Holbrook et al, 2003), which may be a reason that only adjacent responses were correlated in our data. These correlations might also reflect an "anchoring effect" (e.g. Furnham and Boo, 2011), where a subsequent response is biased towards a previously selected response.

⁵⁷ Four-class models were preferred, with the correlation structures obtained through the analysis of the bivariate residual correlations as described above.

Appendix C.4 provides an analysis of the robustness of our substantive conclusions, by comparing the characteristics of the classes produced by our preferred models with the characteristics of the next-best models.⁵⁸

IV. The Estimated Model: Class Characteristics

For each of supplier and customer relations separately, the process of model selection led us to estimate four latent classes. That is, we conclude that four governance structures adequately describe the choices that firms make when combining the six enforcement agents.

Assigning names to the classes is a crucial, substantive element of the analysis because important insights are generated only if LCA uncovers readily recognizable types of governance structures. Finding resonance between our estimates and existing ideas and concepts provides additional validation of the analysis.

IV.1 Characteristics of Chosen Models

The naming of classes builds primarily on an examination of how the estimated response probabilities vary across classes. These are the $\hat{\theta}_{kr|c}$, the estimated probability of choosing response r for agent k if the firm is in class c .⁵⁹ Tables 2a and 2b list these estimated probabilities, with accompanying graphical depictions of the estimated governance classes. In the tables, classes are labeled in two ways, by a number and a name. The numbers are artefacts of the estimation process; the class names are evocative labels provided by us and justified below.

The probabilities are precisely estimated (the tables report standard errors). Most non-zero estimated probabilities do not lie in the 95% confidence intervals of either their vertical or

⁵⁸ Notably, both the first- and second-best models involve fewer classes than the maximum considered, suggesting no need to consider less parsimonious models (i.e., 7 or more classes).

⁵⁹ The $\hat{\theta}_{kr|c}$ do not appear explicitly in the DGP in equation (2), which relaxes full local independence and which is the one we use. Therefore, $\hat{\theta}_{kr|c}$ should be interpreted here as the marginal probability that a firm in class c chooses answer r on agent k .

horizontal neighbors. Thus, easily discerned differences in the figures are almost certainly statistically significant.

IV.2 Class Names: Characterizing the Classes

We believe the following names capture the characteristics of the estimated governance structures:

	<u>Relations with Suppliers</u>	<u>Relations with Customers</u>
class 1	Pure bilateralism	Pure bilateralism
class 2	Bilateralism with private support	Bilateralism with private support
class 3	Bilateralism with legal support	Bilateralism with weak support
class 4	Strong comprehensive governance	Weak comprehensive governance

The nature of class 1 for both upstream and downstream relations is transparent and is the same for both types of relations. Only trust and mutual interest (first- and second-party enforcement) are endorsed as effective. For firms that rely solely on trust and mutual interest and hardly use any third party, enforcement involves only the actions of the two parties to the agreement themselves. We thus call both class 1's *pure bilateralism*. The use of 'pure' is emphasized as a contrast to the remaining classes, which differ primarily in what they add to first- and second-party enforcement. Given this, it is tempting to conclude that the classes are ordered from the narrowest to the broadest, implying that each subsequent class adds a component to the previous one. However, LCA does not impose the assumption of ordered categories: the classes do not necessarily lie along any single dimension.

In contrast to pure bilateralism where only two agents are found effective, all agents contribute significantly to both class 4's. For upstream relations, firms in this class find the legal system as effective as any other agent, with government officials and other third parties at least as important as each of the two bilateral agents. Because every single agent is rated as effective as in every other class, we use the label *strong comprehensive governance*. However, for downstream relations

weak comprehensive governance is more appropriate for class 4, given that within this class all agents are less effective for customer relations than for supplier relations.⁶⁰

In class 2, first- and second-party enforcement are as important as in class 1, but all third-party agents also have a notable presence. Among the third parties, paid, private dispute resolution is the most important, followed by the legal system.⁶¹ This is consistent with the common practices of private third parties: arbitration is backed by the legal system; debt-collection firms harass with legal threats. We thus use the name *bilateralism with private support* for class 2, but only brevity precludes mentioning the additional role of the legal system.

There is a marked difference between upstream and downstream governance structures only for the class 3's, albeit with some similarities. For both supplier and customer relations, there is a contribution from first- and second-party enforcement, but this contribution is weaker than for all the other three classes within either upstream or downstream relations. Third-party agents have a significant presence for supplier relations, with the legal system being the most important among the third parties, followed by paid private dispute resolution. That is, for supplier relations, class 3 differs from class 2 primarily in the relative emphasis on law and paid private dispute resolution. We thus use the name *bilateralism with legal support* for class 3 on the upstream side, but only brevity precludes mentioning the role of paid private dispute resolution.

While first- and second-party enforcement are weakly present in class 3 of customer relations, the contribution of the third parties is even weaker. Thus, we name this class *bilateralism with weak support*, recognizing that among all eight estimated latent classes, this is the governance

⁶⁰ More precisely, the responses "very much" and "extremely" have lower estimated probabilities in *weak comprehensive governance* compared with those in *strong comprehensive governance*.

⁶¹ More precisely, looking at the effectiveness responses in descending order (reading Tables 2a and 2b from right to left, from "extremely" to "not at all"), paid, private dispute resolution has generally higher estimated probabilities for higher effectiveness responses than the rest, followed by the legal system.

structure where the aggregate effect of all 6 agents is rated lowest by respondents. Compared to other classes, the label 'ineffective governance' might also be appropriate.

IV.3 What Has Been Learned About Transactional Governance?

Table 3 presents estimates of the proportion of firms placed within each class (the $\hat{\pi}_c$ from LCA). Before discussing the prevalence of each estimated class, it is worth revisiting our conceptual framework and emphasizing that we have successfully accomplished our goal of using an exploratory statistical approach to uncover the archetypal governance structures that firms use for their transactions, while estimating the proportions of firms that use each of the governance archetypes. We know of no other study that has undertaken such empirical analysis in an economy-wide, cross-country framework, while considering a full spectrum of enforcement agents.⁶² In setting and pursuing this goal, our methodology has reflected Greif's (1997: 253) concern that theory alone cannot predict which systems of the enforcement of agreements to exchange would be used in any particular society.

Looking at the prevalence of each estimated class, pure bilateralism dominates, accounting for nearly two-thirds of governance structures on the supplier side and more than half on the customer side. This result alone has significance. Any cursory reading of the literature would convince the reader that economists' priors on the importance of pure bilateralism are extremely diffuse.⁶³ For

⁶² As noted in sections I and II, we are aware of only four studies that are somewhat similar, Hendley et al. (2000), Hendley and Murrell (2003), Mike and Kiss (2019), and Fafchamps (2004). However, each of the first three cover only a single country, and the fourth uses data collected in a way that makes analysis of combinations of agents very difficult. The closest to our analysis is Mike and Kiss (2019), but it is on a single country and does not use a nationally representative sample of firms. They also collect responses on six mechanisms of enforcement, but use a strategy-based rather than an agent-based approach. Three of their sub-questions can be directly mapped to three of ours, namely first- and second-party enforcement, and the legal system. The remaining three are 'community norms', 'personal reputation', and 'impersonal market reputation' that do not have direct agent-based equivalents in our survey question. Nevertheless, their estimated three governance structures (using LCA) are somewhat similar to ours, with similar names: (i) their 'bilateral' is equivalent to our 'pure bilateral'; (ii) 'comprehensive' is equivalent to our 'strong' and 'weak' comprehensive; and (iii) 'third-party' involves the three strategies that do not have a clear agent-based equivalents but the estimated class seems closest to our 'bilateralism with legal support'.

⁶³ One indication of the diffuseness of priors on this result is recent work on global value chains (GVCs). World Bank (2020) provides a "novel, relational conceptualization of GVCs" where "the identity of the agents participating in a GVC is crucial". Our identification of pure bilateralism as being the most important governance structure is completely consistent with that novel conceptualization.

example, much attention in the literature is devoted to analysis of enforcement by third parties, such as social or merchant groups, or communities at large. While the inner workings of third-party enforcement are often investigated in detail, they are not usually analyzed as one of several enforcement options that firms may choose from. Moreover, first- and second-party enforcement often appear in separate branches of the literature (e.g., in sociology and economics, respectively), not directly presented in the specific contexts of enforcement of business agreements between firms.

In general, firms rate their governance structures as less effective for customer relations than for supplier relations. (This follows from a quick visual comparison of the figures accompanying Tables 2a and 2b.) This characteristic is epitomized in the two class-4 names—*strong comprehensive governance* and *weak comprehensive governance*.

The estimation and naming of the classes not only reveal which governance structures are important, but also which are absent. All governance structures rely, at least in part, on bilateralism: no firm relies solely on a combination of third parties and formal institutions. This is also a finding of Mike and Kiss (2019) in the data from Hungary, leading the authors to state that "Law never stands alone", but it is inconsistent with many claims in the literature that characterize development as a process of escaping personalized interaction and moving to a rule-based, impersonalized set of interactions.⁶⁴ A very widely cited version of this view can be found in Peng (2003: 276), which claims that the most important transition for emerging economies is the process of moving "from a relationship-based, personalized transaction structure calling for a network-centered strategy to a rule-based, impersonal exchange regime". While our data do not capture the

⁶⁴ Mike and Kiss (2019) characterize this as the classical view, and give many references to its use.

process of development, they do reflect countries at different levels of development, and no estimated governance structure involves only rule-based, impersonal transactions.

A corollary of this pattern is that bilateralism and the legal system should not be viewed as purely substitutes. In several of the classes they play complementary roles, and there is no obvious case where a move from one class to another will involve a significant decrease in bilateralism simultaneously with a large increase in the perceived effectiveness of the legal system.⁶⁵ This pattern goes against a view that long held a dominant position in the literature, which considered the use of formal legal arrangements for transactions as inconsistent with the use of personalized relationships based on trust: formality eroded trust. This view became less dominant after Poppo and Zenger's (2002) seminal contribution and is perhaps now a minority view (Cao and Lumineau 2015, and Poppo and Cheng 2017). By providing economy-wide and cross-country evidence, our results add to the literature that has argued that trust and formal contracts are most often complements.

Paid private dispute resolution and the legal system are sometimes substitutes and sometimes complements. For example, for supplier relations, when moving from the pure bilateral class to any of the three other classes there is an increase in the importance of both paid private dispute resolution and the law. But, as indicated by their very names, a move from bilateralism with private support to bilateralism with legal support indicates substitutability.

Two further facets of the results contrast with extant emphases in the literature. First, the literature almost entirely neglects the role of government officials in supporting transactional governance. This role may entail the use of regulations, inspections, fines, or even aspects of

⁶⁵ A move from pure bilateralism to the class 3's (bilateralism with legal or with weak support for suppliers and customers, respectively) does involve a decrease in bilateralism coupled with an increase in the use of the legal system, but these changes are rather weak (especially the change in bilateralism), suggesting partial substitution at best.

criminal justice. The work by Hendley and Murrell (2003) is a rare exception to the lack of emphasis on the role of government in this context, though this paper's attention to this role is linked to the focus on the transition of Romania from socialism. Our data suggests that government officials do sometimes support the enforcement of agreements, even if that role is minor. In the *strong comprehensive governance* class of supplier relations, government officials are prominent.

Second, given the amount of attention paid in the literature to non-paid private third parties, especially networks, one would expect them to be more important. Network approaches have been very popular in recent decades, following Granovetter's (1985) emphasis that transactions are embedded in a broader social structure, the historical-theoretical analysis of Greif (1989), and case studies on the importance of trading networks in varied settings (Bernstein 1992; Landa 1981). However, as we point out in Section II, the term 'network' is used in diverse ways in the literature, some of which would imply that a network is present even when the reference is only to a large grouping of similar agents who are not necessarily invoked in any type of enforcement process. In fact, our results suggest that, in aggregate, non-paid private third parties are arguably the least important of the six agents in enforcement activities (Tables 1, 2a, and 2b).

V. Variations in the Importance of Governance Structures

In this section, we examine how the importance of governance structures varies with the environment of firms, focusing on the countries and regions in which they are located. This exercise and that in Section VI are exploratory, providing examples of how our LCA-generated data can be used to understand the links between governance structures and their determinants. Here, we simply explore patterns in the data and do not attempt to isolate *ceteris paribus*, causal effects of single variables. Nevertheless, this exercise adds evidence on the validity of the data we have produced: if there were no significant association between chosen governance structures and

firm characteristics, the meaningfulness of our estimates could be questioned. Section VI takes an additional step, producing evidence suggesting a causal effect of one determinant of governance structures, providing further validation of the data and exemplifying its use.

To illustrate the type of thought experiment explored in this section, consider the prevalence of governance structures across the different countries where firms are located. We show the change in the importance of governance structures that would result if firms migrated from one place to another, simultaneously going through all other changes associated with the differences between firms in the two places. Using the notation of Section III, we estimate $\pi_c(Z_i)$ for only one Z_i without considering why the Z_i vary with i . We do so by implementing step-3 of the method outlined in Section III. Steps 1 and 2 give each firm's estimated posterior probability of being in each class. The most natural way of estimating the $\pi_c(Z_i)$ would be to simply regress these probabilities on the Z_i of interest. Bolck et al. (2004) showed that this naïve approach leads to systematic underestimation of the strength of associations and developed a correction procedure. Vermunt (2010), Bakk et al. (2013), and Bakk et al. (2014) extended their work, developing a maximum-likelihood method that produced consistent estimates of the parameters defining the $\pi_c(.)$. We apply their method in implementing our step-3 analysis.⁶⁶

V.1 Cross-Country Variations in Governance Structures

We find a notable and statistically significant variation in the prevalence of governance structures across countries. For both upstream and downstream relations, Wald tests indicate rejection at the 0.1% level of the null hypothesis that there is no association between governance-structure and country. Figures 1a and 1b illustrate the cross-country variation. In these figures, darker colors denote governance structures that are more complex, that is, those in which more

⁶⁶ Mike and Kiss (2019) also conduct an exploratory analysis of the determinants of class membership, but employ the one-step process discussed in Section III.

third-party agents have a higher measure of effectiveness (reflecting the $\hat{\theta}_{kr|c}$ in Tables 2a and 2b).⁶⁷

To illustrate the usefulness of our methodology in generating new findings, consider Bolivia in these figures. Governance structures including more than just bilateralism are relatively more prevalent in Bolivia than in all others. This is surprising. Bolivia is the least developed of the six countries and scores lowest on standard measures of the quality of the legal system (e.g., the World Governance Indicator's rule of law index). Given the low levels of personal trust in Bolivia (Latin American Public Opinion Project, 2016/7), it is tempting to think that this might reflect comparative, rather than absolute, advantage in the legal realm. However, this cannot be a complete explanation, since LCA's estimation of a firm's governance class does not use data on a firm's country. Therefore, the greater effectiveness indicated for legal institutions in Bolivia than in, say, Uruguay, is inconsistent with the latter country's much higher ratings on indexes of legal institutions.⁶⁸ This is a puzzle, and one that is most clearly raised in an exercise like the current one.

V.2 Cross-Regional Variations in Governance Structures

We next look at within-country, regional variation in governance structures. We apply the third step of the 3-step method to each country separately, using regional dummy variables as covariates. Table 4 reports the p -values of within-country Wald tests of the null hypothesis that there is no variation across a country's regions in the patterns of governance structures. On the

⁶⁷ Thus the ordering of classes is different from that in Tables 2a and 2b, which followed LCA's somewhat arbitrary ordering.

⁶⁸ Bolivia has the highest estimated shadow-economy presence among the six countries studied in this paper (Medina and Schneider, 2019). Since the WBES use representative samples of formally registered firms, the population of firms from which the sample is drawn in Bolivia may have a higher share of large firms than the populations in other countries, among other potential differences across the populations of firms that may be relevant for firms' governance structures. These differences due to variation in the prevalence of shadow economy, and thus variation in the share of the economy that the WBES represents, cannot be a complete explanation either however, since Peru, where the prevalence of governance structures differs markedly from Bolivia, follows Bolivia closely in the estimated rate of the shadow economy.

customer side, only Argentina and Ecuador exhibit significant variation. On the supplier side, all countries but Bolivia exhibit significant cross-regional variation. This is another observation suggesting that Bolivia is rather anomalous, in this case by indicating that national institutions produce more regional homogeneity than in other countries.

Figures 2a and 2b show inter-regional variation in governance structures for those countries where we find statistically significant variation. The importance of bilateralism varies enormously. For example, an average firm in Rosario (Argentina) is 22 percentage points more likely to rate pure bilateralism as effective in its relations with suppliers than an average firm in its neighboring region of Cordoba. The difference on the customer side is even starker—44 percentage points. Regions even appear very different from their countries: Piura (in Peru) has the lowest level of pure bilateralism amongst any of the 17 regions in Figure 2a, even though Peru has the highest level of pure bilateralism of the six countries in Figure 1a.

The conclusion is inescapable that inter-regional variation is even more important than cross-country variation. For example, the within-country, cross-regional standard deviation of the percentage of bilateralism in supplier relations is greater for each of Argentina, Ecuador, Peru, and Uruguay than the corresponding cross-country standard deviation. Even though legal systems are country-level institutions in the six nations we study, regions, rather than countries, might be the best unit of analysis for understanding patterns of governance structures.⁶⁹

V.3 Other Associations with Governance Structures

The exercises laid out in subsections V.1 and V.2 can be undertaken for as many firm characteristics as data are available: Appendix D reports many more results on the associations between governance structures and firm characteristics. There, we show a significant association

⁶⁹ Inter-regional variations in both GDP and GDP per capita are less than cross-country variation in these six countries using the regional data in Gennaioli et al. (2013) and the corresponding country-level data from the World Development Indicators.

between governance structures and the following: attitudes toward courts, foreign ownership, export status, sector, management practices, and membership in business associations. The message of Appendix D is broader than its individual results: the patterns in the data suggest that our estimates of governance structures are substantively valid given the significant and intuitive associations between the use of governance structures and firm characteristics.

VI. Determinants of Governance Structures: Uncertainty in Supplier Relations

This section presents an introductory example of how our new data can be used to explore a specific hypothesis on the determinants of governance structure. In this empirical example, we use as our dependent variable the estimated posterior probability that a firm uses pure bilateralism for its supplier transactional governance. The explanatory variable of chief interest is the degree of uncertainty in the conditions surrounding the exchange between the two parties. Given the empirical exercise in the paper—providing a specific example of the use of our data—we do not aim for definitive conclusions, but rather to offer some suggestive insights.

We start with the briefest summary of the existing literature that has explored the link between the uncertainty that firms face in their relations with suppliers and the choice of transactional governance structures. Williamson (1985) saw uncertainty as a prime factor that was conducive to opportunism in business exchanges. We focus on 'environmental uncertainty', which is exogenous to firms and their relationships with their suppliers. Noordewier et al. (1990) define such uncertainty as "unanticipated changes in circumstances surrounding an exchange". Environmental uncertainty is generally regarded as costly—often leading to the necessity of renegotiation of the terms of an agreement.⁷⁰

⁷⁰ We occasionally also refer to 'environmental uncertainty' as 'exogenous uncertainty' to reflect that it arises from unanticipated events. This is distinguished from 'behavioral' or endogenous uncertainty, which is due to the actions of a partner within an exchange.

In investigating the effect of such unforeseen shocks on the choices of governance structures, researchers often follow Macneil's (1980) general perspective: 'discrete' (or contractual) exchanges involve clearly delineated and formalized arrangements, while 'relational' governance structures consist of more informal arrangements that can afford flexibility, through trust and intentions to cooperatively solve problems that might arise.⁷¹ For example, in a significant early contribution, Noordewier et al. (1990) found that relational governance structures mitigate the costs incurred under greater environmental uncertainty. While Noordewier et al. (1990) viewed contractual and relational as lying on opposite ends of a spectrum, with their use varying inversely, another body of work has considered whether greater uncertainty can increase the use of both contractual and relational governance. Zhou et al. (2008), for example, find that managers increasingly use both relational norms and more-detailed contractual terms under greater environmental uncertainty.

An important implication of this literature is that when firms face an uncertain environment, they increasingly favor adaptable governance structures (Poppo and Zenger 2002). When uncertainty implies that the complete decision-tree for the transaction cannot be mapped out, a third-party provides increased adaptability and a gap-filling role (Williamson 1975,1985). More complex governance structures, by invoking third parties, can mitigate the costs of unforeseen events for the continuation of the relationship by, for example, providing dispute resolution through a neutral referee. Such neutral interpretations from third-party referees would be especially useful in situations where the occurrence of a specific exogenous shock might be unclear to one of the parties, and thus create room for opportunism. This refereeing can also safeguard against the failure of bilateral norms by instilling a credible belief that opportunism will

⁷¹ The prototypical, purely discrete transaction occurs on the spot market while the prototypical relational exchange occurs between family members.

be punished when it is undertaken under the guise of a necessary reaction to a shock. Nevertheless, nothing in this theory rules out the possibility that first- and second- party governance can be employed alongside the use of third parties. Thus, the empirical implication is simply that the role of third parties increases as uncertainty increases: the incidence of pure bilateralism will decrease.

VI.1 The Empirical Framework

We explore this prediction for supplier relations by regressing the probability that firms use pure bilateralism on environmental uncertainty. The generic form of the equation to be estimated is:

$$B_{isr} = \alpha + \beta U_{isr} + \beta_X X_{isr} + \delta_s + \eta_r + \varepsilon_{isr} + \gamma \theta_{isr} \quad (5)$$

where B_{isr} is the measure of pure bilateralism for firm i in sector s and region r , U_{isr} is a measure of uncertainty, X_{isr} is a vector of observable characteristics, δ_s is a set of sector dummies, η_r is a set of region dummies, ε_{isr} is an i.i.d. disturbance term, and θ_{isr} is a vector of unobservable factors. The variables used in estimation are defined in detail in Appendix E. Here, we provide a general description. As the dependent variable, we use the posterior probability that the firm employs pure bilateralism with its suppliers; this variable is estimated using LCA as described in Section III (Class 1 in Table 2a).

The main explanatory variable is a measure of the environmental uncertainty that firms face in their relations with suppliers. Uncertainty is measured using the survey responses to the question: "[p]lease indicate to what degree this establishment's suppliers are prevented from fulfilling agreements because of circumstances beyond their control." Note that the question's phrasing encourages respondents to focus on the elements of uncertainty that are exogenous to their relationship. The response categories were: not at all, slightly, moderately, very much, and

extremely. We create a dummy variable that equals 1 if firms choose anything other than "not at all" and 0 otherwise.

Our measure of uncertainty aims to capture Williamson's (1985) 'primary' uncertainty, which arises from exogenous sources, such as natural events, changes in regulations or prices, or other aspects of the business environment beyond the firms' control. This is a non-strategic form of uncertainty that is distinct from behavioral uncertainty related to the suppliers' opportunism. The more recent literature views environmental uncertainty as encompassing technological uncertainty (e.g., Handley and Angst, 2015), or external uncertainty (e.g., Katsikeas et al. 2009), or unanticipated shifts in demand (Gaur et al., 2011). This kind of uncertainty is often measured through survey questions relating to the firms' sector of operation in general or by direct measures of the volatility of prices or other aspects of the business environment (e.g., Abdi and Aulakh, 2017, Crocker and Masten, 1991). Our measure aims to capture this kind of uncertainty as it relates to the firms' relations with their own suppliers.

The vector of control variables, X_{iSr} in equation (5), contains seven elements that are natural candidates to reduce omitted variable bias. Firm size is measured by the logarithm of the number of employees. It is plausible that larger firms have more capacity to employ lawyers and use more sophisticated governance structures, or that a larger scale of operations changes a firm's exposure to uncertainty. We also include a dummy variable on whether the establishment is part of a larger firm, as more complex firm structures may cushion against uncertainty, while changing the types of governance arrangements that are optimal for the firm. Firm age is included because older firms are probably more likely to have built relationships with peers, suppliers, or customers that affect their decisions on governance structures. At the same time, older firms may also be distinctly perceptive or knowledgeable about the uncertainties faced by their suppliers. Firms that are

foreign-owned or export across borders are likely to have a sophisticated internal structure that might change the types of governance structures they choose. A foreign orientation can also change exposure to uncertainty, perhaps through additional steps or processes required to comply with cross-border regulations. It has been widely noted that operating across distinct environments (with differing cultures, governments, and contexts) raises uncertainty (see, e.g., Handley and Angst 2015). For sector fixed effects, δ_s , we use two-digit ISIC codes, and for region fixed effects, η_r , we use the ES stratification regions. Summary statistics for all the variables used in the regressions are provided in Table E.1.

VI.2 Estimation

We begin with an OLS estimation, reported in the first column of Table 5. However, since θ_{isr} is unobservable, the composite error term is $\varepsilon_{isr} + \gamma\theta_{isr}$ and OLS estimates of β will be biased and inconsistent if γ is nonzero and θ_{isr} is correlated with U_{isr} . This type of endogeneity can arise, for example, if some firms are more forgiving than others in ascribing problems to sources outside their suppliers' control, while the same trait contributes to the development of bilateral relations with suppliers.⁷²

We view U_{isr} as comprising two elements (Fisman, and Svensson 2007):

$$U_{isr} = u_{isr} + u_{sr} \tag{6}$$

where u_{sr} is the uncertainty common to firms in sector s and region r , while u_{isr} is the uncertainty that is idiosyncratic to the firm.⁷³ We use u_{sr} as an instrumental variable. Its validity as an instrument rests on the assumption that the sector-region specific part of the uncertainty (u_{sr}) is

⁷² Or for that matter their rating responses to the individual enforcement agents.

⁷³ In constructing these variables, we use a more granular classification of sectors than Fisman and Svensson (2007), and exclude sector-region averages that are based on fewer than 5 observations.

determined by underlying factors at the level of sector and region (in combination), and exogenous to a firm-specific source of endogeneity: $\text{corr}(u_{sr}, \theta_{isr}) = 0$.

We create u_{sr} as follows. We first group observations at the level of the two-digit ISIC sector and region. We then calculate the weighted average of the uncertainty variable for each such sector-region group. We drop observations for firms where the weighted average reflects the responses of fewer than 5 firms located in the same sector-region cell.

The exclusion restriction on u_{sr} will be violated if there are unobserved factors at the sector-region level that are determinants of bilateralism. Importantly, neither sector-specific nor region-specific elements pertaining to bilateralism or uncertainty are present in θ_{isr} , because δ_s and η_r are included in (5). Thus, the processes that would violate the exclusion restriction would need to work systematically at the sector-region level.

Given the potential shortcomings of the first IV strategy developed above, we explore the use of an alternative set of instruments. This alternative set is based on the survey responses on whether each of the following is a major obstacle to the firms' operations: (i) crime, theft, and disorder; (ii) customs and trade regulations; and (iii) transportation. The environment of crime, theft and general disorder is likely an important determinant of uncertainty that firms face when making or receiving deliveries. Similarly, if customs and trade regulations are complex or arbitrary, they might create considerable uncertainty in the ability of suppliers to deliver as per agreement. Finally, the quality of roads or transportation likely affects firms' ability to deliver on time and without damage. The response categories on the survey question were no obstacle, minor obstacle, moderate obstacle, major obstacle, and very severe obstacle. Again, we use dummy variables, equaling 1 if the respondent selects major or very severe, and 0 otherwise.

The validity of each of these three obstacle variables as instruments rests on the usual exclusion restriction. Obviously, each of these aspects of business operations is an important determinant of the overall business environment, which influences firms' governance strategies. However, governments and criminal groups are most responsible for the variation in these three variables, which will usually operate at the regional or sector level and therefore enter the fixed effects. Violations of the exclusion restriction would occur if firm-level perceptions of the importance of these obstacles and their choices of governance structure covaried within sector-region cells. Violations would also occur if omitted firm-level factors affect both the reported perception of these obstacles and the choice of governance structures. Ultimately, any exclusion restriction cannot be justified in purely theoretical terms. It is easy to conjure up a counter-example, a location-specific criminal group that specializes in the electronics sector, say, simultaneously reducing uncertainty and making third-party enforcement virtually a necessity for firms in that region-sector combination.

In exploring the implications of our empirical results, our instruments do not have to fully satisfy the exclusion restriction. This is because we have no interest in pinning down the size of the uncertainty effect, but rather simply focus on what can be learned about its sign. The thrust of our argument below is that u_{sr} and the obstacle variables will have fewer problems of endogeneity, in a sense to be defined below, than U_{isr} . This will allow us to interpret the OLS and IV results, and in particular differences between them, in a way that will allow us to make tentative conclusions about the sign of the effect of exogenous uncertainty on the use of pure bilateralism.

VI.3 Results

Table 5 reports both OLS and IV estimates for three different sets of instrumental variables. In all specifications, sampling weights are used, and the standard errors assume clustering at the level of strata, which reflects sector, region, and firm size.

Column (1) contains the OLS estimates. The estimate of the coefficient on uncertainty is negative and highly significant, lying over four standard errors below zero. The coefficient's negative sign indicates that when exogenous uncertainty is high, governance structures are more likely to involve third-party agents. Column (2) reports IV regressions using the sector-region average of uncertainty as an instrument. The estimate of the coefficient on uncertainty increases in absolute value and is still significant, now two and one-half standard errors below zero.

For reasons stated above, readers will reasonably harbor doubts about the exclusion restriction on this instrument, and so we do not claim that the estimated coefficient on uncertainty in column (2) pins down the absolute value of the effect of uncertainty. Rather we focus on the sign of that effect, taking clues from how the estimated coefficient in (2) differs from the OLS estimate. Consider the following assumption that is weaker than the exclusion restriction and is plausible: there are fewer endogeneity problems when using the sector-region averages as instruments than with the variable itself used as its own instrument.⁷⁴ As we address problems of endogeneity, albeit imperfectly, by moving from (1) to (2) in Table 5, and the critical estimated coefficient increases in absolute value, we reach firmer evidence supporting the hypothesis that increasing uncertainty reduces pure bilateralism. With this logic, an estimate produced by a method that solved all endogeneity problems would be expected to be negative.⁷⁵

⁷⁴ OLS is IV using the variable itself as its own instrument.

⁷⁵ The rough intuition is clear. These ideas can be backed up with more formal reasoning, which would require more space than is justified given the role of that reasoning in this paper. A more formal statement is available from the authors on request.

Column (3) uses the 'obstacle' variables as instruments. The estimate of the coefficient on uncertainty is again significant, lying over two standard errors below zero. It is very large in absolute value, indeed implausibly so. Nevertheless, a comparison with the OLS estimates provides further evidence that the effect of uncertainty is to reduce the likelihood that the governance structure is pure bilateralism. The Hansen *J*-statistic provides no evidence that would lead one to question the exclusion restrictions for these three instruments, although it is well-known that this statistic can have very low power. These are also weak instruments. However, if instruments satisfy the exclusion restriction but are weak, the estimated value of the coefficient can be expected to lie between the OLS estimate of the coefficient and its true value (Chao and Swanson 2005). Again, the comparison between the IV and OLS estimates (in columns (3) and (1)) suggests that the true coefficient is negative.

Column (4) uses all 4 instruments. Not surprisingly, given the use of the sector-region uncertainty averages, these are no longer weak instruments. For the same reason, the Hansen *J*-statistic raises doubts about the exclusion restriction for this set of variables. The evidence in column (4), again, must be regarded as suggestive rather than definitive. The estimate of the coefficient on uncertainty is highly significant and nearly four standard errors below zero. It is twice as large in absolute value as the estimated OLS coefficient. The differences between the estimates in columns (4) and (1) is further evidence of a negative effect of uncertainty on the use of pure bilateralism.

It would strain credibility if we claimed that the results in Table 5 pin down the exact size of any coefficients. We are more confident that these results provide evidence for a negative sign of the uncertainty coefficient. As we have stated before, problems of endogeneity in estimating the determinants of inter-firm governance structures are legion and have hardly been definitively dealt

with in the literature. Therefore, our attempts to address the problem of endogeneity should be regarded as an approach to learning from imperfect estimates rather than solving the problems of endogeneity. Cast in that light, Table 5 provides evidence that uncertainty increases the propensity to use third parties beyond those two parties directly involved in the agreement.

VII. Lessons Learned and Avenues for Future Research

This paper uses an exploratory statistical approach to uncover archetypal governance structures that firms employ to support the implementation of their agreements. Those estimated governance structures capture the patterns in economy-wide, cross-country data that reflect responses to a survey question that considers a full range of enforcement agents. To our knowledge, it is the first paper whose results reflect such a comprehensive context. This past lacuna in the literature has partly been due to difficulties of data collection, a problem that we solve by designing and applying a new survey question to elicit consistent information on the conduct of transactions from firms of all types, functioning in very different environments. This survey question is based upon a conceptual framework that focuses on enforcement in its broadest sense and uses an agent-based approach, with the enforcement agents viewed as arrayed on a comprehensive spectrum.

Yet, obtaining such data provides only part of the solution to understanding how firms govern their transactions. There is also a need to summarize the patterns implicit in the data in a way that produces evocative measures. For this an exploratory method is necessary, given that there is no encompassing theory on how firms combine enforcement agents to form governance structures. LCA eminently suits this task: it is unsupervised in discovering patterns in the data, but relies on an underlying probabilistic, generative model. Thus, it combines the advantages of both classical statistical methodology and machine learning. The use of a generative model permits reliance on

standard statistical techniques for model selection and evaluation of estimates. The unsupervised learning offers the possibility of finding governance structures that are not even contemplated before the analysis. Nevertheless, the governance structures we uncover through this exploratory technique resonate comfortably with concepts that are standard in the existing analysis of transactions, lending credence to our analysis.

We find that pure bilateralism is the most prevalent governance structure that we observe, and that all governance structures involve bilateralism (necessitating the use of the term 'pure' to describe the governance structure that relies solely on the parties directly involved in the agreement). That no governance structure we find comprises purely arm's length transactions, where firms rely only on impersonal enforcement and formal institutions, is important because arm's length transactions have often been viewed as something of an ideal, the aspirational endpoint in the process of economic development.⁷⁶ This view implicitly casts bilateralism and formal institutions as substitutes, a relationship that does not appear in our estimates, which instead suggest that for many firms, bilateralism and formal institutions are complements. Some of our findings contrast to emphases in the literature. In particular, while the literature devotes much attention to various unpaid, third-party, mechanisms of supporting agreements, such as networks, social clubs, and culturally defined groups, our data suggests their role to be very limited.⁷⁷ We find that government officials, an enforcement agent that has been nearly completely ignored in the literature, are important in supporting agreements.

⁷⁶ To be sure, this is an aspiration not shared by all, or perhaps even a majority, of scholars contributing to the economics literature. It is even less popular among diverse groups of scholars studying the detailed workings of the legal system, for example, both the law and economics and the law and society schools.

⁷⁷ Our results are broadly consistent with those of Mike and Kiss (2019). Given that these authors use different survey questions, study a different context (Hungary), and implement LCA in a different way, such consistencies point to robust general conclusions about the landscapes of transactions. One difference is that Mike and Kiss (2019) find a latent class in which third-party reputational mechanisms are quite important. Whether this is a reflection of the different context, Hungary, or of different survey questions is an open issue, to be answered only by implementing a consistent cross-country methodology.

In Sections V and VI, we provide examples of further analyses that can be conducted once our estimates of governance structures are obtained. The observations are at the firm level and the variables of interest are the probabilities that the firm has chosen each of the four governance structures. Notably, in Section V, we find that regional variation in the effectiveness of different governance structures is more important than cross-country variation. This is somewhat puzzling given that institutional rules relevant to transactions are set at the national level in all the countries we analyze. It suggests that institutional implementation is at least as important as the quality of formal rules. In Section VI, we venture into analysis of determinants of governance structures and provide evidence that the uncertainty that firms face through their suppliers influences the firms' choices around reliance on third-party enforcement. This finding shows that our data can provide a wholly new way of testing existing hypotheses that have been the subject of much theoretical discussion but without any consensus arising in the empirical literature, as is the case with the effect of uncertainty on governance.

While explorations of the variations in and determinants of governance structures, as in Sections V and VI, have not been this paper's prime objective, these exercises show the validity of the methodology we have developed and demonstrate the potential of the datasets that we have generated.⁷⁸ Specifically, our methodology allows readers to test other hypotheses, using firms' governance structures as dependent variables as we have done, or as independent variables helping to explain variations in firms' behavior and performance. Moreover, given the information we provide, readers could add different countries, or cities, or sectors to those we have studied here. If the question that we lay out in Section II were to be implemented in a survey of any size, even

⁷⁸ The data is posted at www.enterprisesurveys.org/portal. Users need an account (available free of charge) to gain access to the data. After signing in, go to the "Combined Data" tab. There, download the zip file "Landscape of Transactions Data and Estimates".

a single firm, then the tools that we have made publicly available can be used to characterize the governance structure of the firms in the survey. Through such new surveys, readers could produce results that are comparable with ours without repeating the laborious steps involving LCA that we undertook in this paper, thereby facilitating diagnosis of a firm's, or a sector's, or a country's strengths and weaknesses.

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Tables and Figures

Table 1: Summary of Responses to the Questions

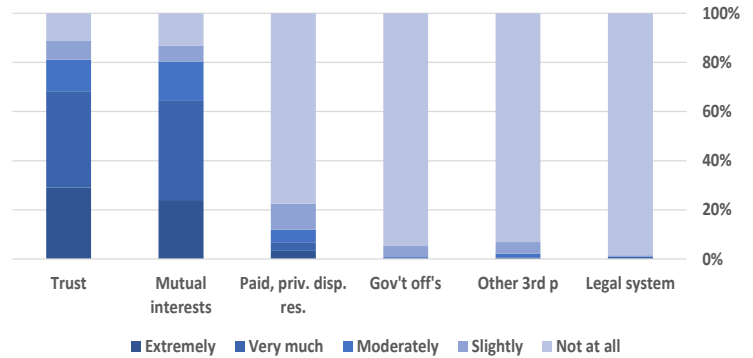
Relations with suppliers (n=3,350)						
	Not at all	Slightly	Moderately	Very much	Extremely	Total
Trust	8.3	8.0	14.4	41.8	27.6	100.0
Mutual interests	10.9	6.7	14.4	42.4	25.5	100.0
Paid private third-parties	61.9	15.4	13.9	5.6	3.1	100.0
Gov't officials	86.2	8.0	2.5	1.9	1.4	100.0
Other third-parties	81.5	12.5	3.8	1.7	0.4	100.0
Legal system	70.1	17.6	8.2	2.7	1.4	100.0
Relations with customers (n=3,339)						
	Not at all	Slightly	Moderately	Very much	Extremely	Total
Trust	6.5	7.8	12.2	39.3	34.2	100.0
Mutual interests	9.0	7.1	11.5	42.3	30.0	100.0
Paid private third-parties	62.0	19.9	10.9	5.2	2.1	100.0
Gov't officials	89.5	6.2	2.3	1.2	0.8	100.0
Other third-parties	82.0	12.3	3.7	1.6	0.3	100.0
Legal system	72.5	16.1	7.6	2.4	1.5	100.0

Table 2a: Predicted Response Probabilities, Relations with Suppliers

Class 1 – Pure Bilateralism

Method	Not at all	Slightly	Moderately	Very much	Extremely
Trust	0.11 (0.01)	0.08 (0.01)	0.13 (0.01)	0.39 (0.02)	0.29 (0.02)
Mutual interests	0.13 (0.01)	0.06 (0.01)	0.16 (0.02)	0.41 (0.02)	0.24 (0.02)
Paid, priv. disp. res.	0.77 (0.02)	0.11 (0.01)	0.05 (0.01)	0.03 (0.01)	0.03 (0.01)
Gov't off's	0.95 (0.01)	0.05 (0.01)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)
Other 3rd p	0.93 (0.01)	0.05 (0.01)	0.02 (0.01)	0.00 (0.00)	0.00 (0.00)
Legal system	0.98 (0.02)	0.00 (0.01)	0.00 (0.01)	0.01 (0.01)	0.00 (0.00)

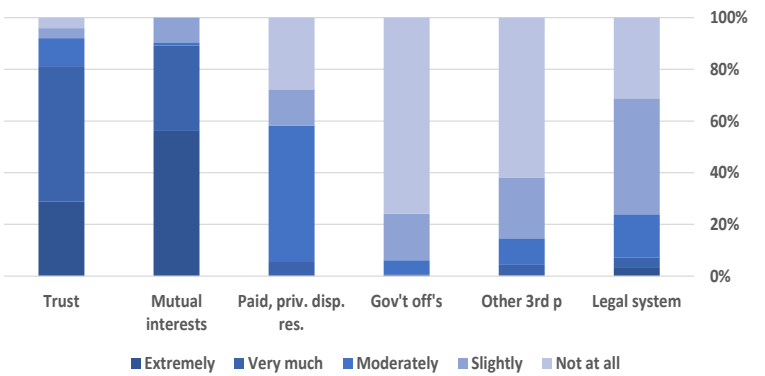
Standard errors in parenthesis.



Class 2 – Bilateralism with private support

Method	Not at all	Slightly	Moderately	Very much	Extremely
Trust	0.04 (0.01)	0.04 (0.02)	0.11 (0.04)	0.52 (0.06)	0.29 (0.05)
Mutual interests	0.00 (0.00)	0.10 (0.03)	0.01 (0.01)	0.33 (0.07)	0.56 (0.07)
Paid, priv. disp. res.	0.28 (0.06)	0.14 (0.04)	0.52 (0.07)	0.06 (0.02)	0.00 (0.00)
Gov't off's	0.76 (0.04)	0.18 (0.04)	0.05 (0.02)	0.01 (0.00)	0.00 (0.00)
Other 3rd p	0.62 (0.05)	0.23 (0.05)	0.10 (0.03)	0.04 (0.02)	0.00 (0.00)
Legal system	0.31 (0.06)	0.45 (0.06)	0.17 (0.04)	0.04 (0.02)	0.03 (0.02)

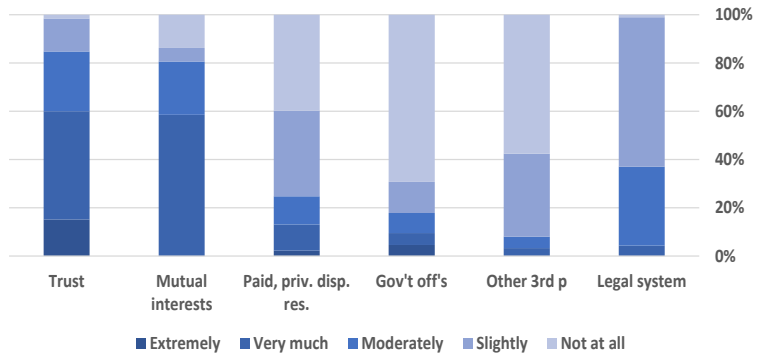
Standard errors in parenthesis.



Class 3 – Bilateralism with legal support

Method	Not at all	Slightly	Moderately	Very much	Extremely
Trust	0.02 (0.01)	0.14 (0.04)	0.25 (0.04)	0.45 (0.05)	0.15 (0.03)
Mutual interests	0.14 (0.03)	0.06 (0.03)	0.22 (0.04)	0.59 (0.05)	0.00 (0.00)
Paid, priv. disp. res.	0.40 (0.06)	0.35 (0.05)	0.12 (0.05)	0.11 (0.03)	0.02 (0.02)
Gov't off's	0.69 (0.05)	0.13 (0.03)	0.08 (0.03)	0.05 (0.02)	0.05 (0.02)
Other 3rd p	0.58 (0.05)	0.34 (0.05)	0.05 (0.01)	0.03 (0.02)	0.00 (0.00)
Legal system	0.01 (0.02)	0.62 (0.05)	0.33 (0.05)	0.04 (0.02)	0.00 (0.00)

Standard errors in parenthesis.



Class 4 – Strong comprehensive governance

Method	Not at all	Slightly	Moderately	Very much	Extremely
Trust	0.03 (0.03)	0.00 (0.00)	0.12 (0.07)	0.08 (0.05)	0.77 (0.10)
Mutual interests	0.04 (0.04)	0.00 (0.00)	0.19 (0.10)	0.52 (0.13)	0.25 (0.12)
Paid, priv. disp. res.	0.01 (0.03)	0.25 (0.11)	0.00 (0.00)	0.38 (0.15)	0.36 (0.14)
Gov't off's	0.13 (0.10)	0.00 (0.00)	0.00 (0.00)	0.57 (0.13)	0.30 (0.14)
Other 3rd p	0.50 (0.15)	0.00 (0.00)	0.16 (0.10)	0.31 (0.13)	0.03 (0.03)
Legal system	0.03 (0.02)	0.00 (0.00)	0.00 (0.00)	0.47 (0.15)	0.50 (0.15)

Standard errors in parenthesis.

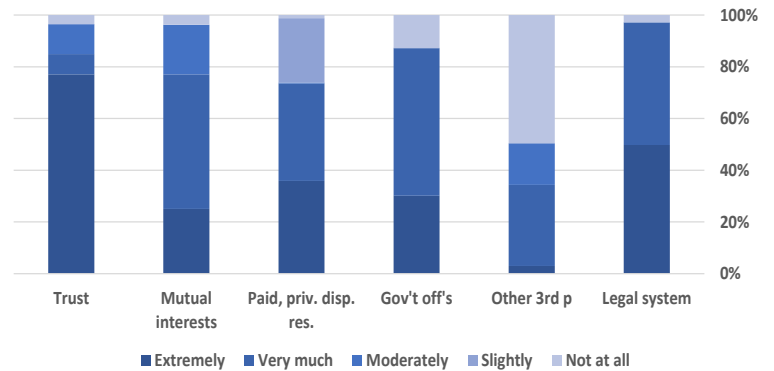
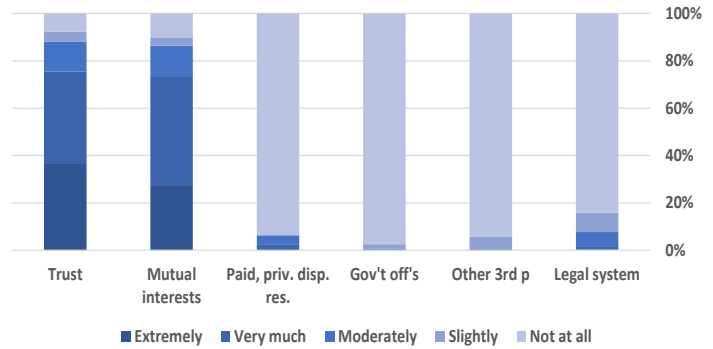


Table 2b: Predicted Response Probabilities, Relations with Customers

Class 1 – Pure Bilateralism

Method	Not at all	Slightly	Moderately	Very much	Extremely
Trust	0.08 (0.02)	0.04 (0.01)	0.13 (0.02)	0.39 (0.03)	0.37 (0.03)
Mutual interests	0.10 (0.02)	0.03 (0.01)	0.13 (0.02)	0.46 (0.03)	0.27 (0.03)
Paid, priv. disp. res.	0.94 (0.04)	0.00 (0.00)	0.04 (0.03)	0.02 (0.02)	0.00 (0.00)
Gov't off's	0.98 (0.01)	0.02 (0.01)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)
Other 3rd p	0.94 (0.02)	0.05 (0.02)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)
Legal system	0.84 (0.02)	0.08 (0.02)	0.06 (0.01)	0.01 (0.01)	0.00 (0.00)

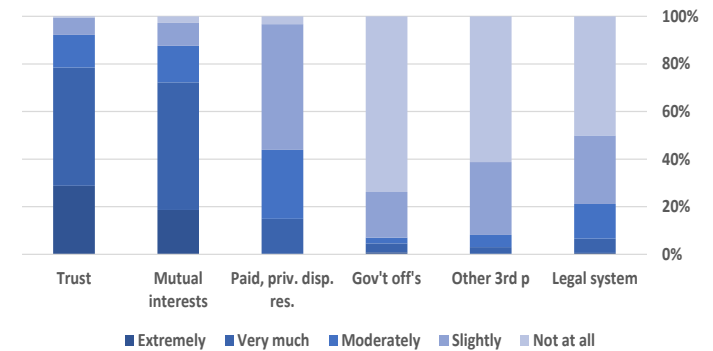
Standard errors in parenthesis.



Class 2 – Bilateralism with private support

Method	Not at all	Slightly	Moderately	Very much	Extremely
Trust	0.00 (0.01)	0.07 (0.02)	0.14 (0.02)	0.50 (0.04)	0.29 (0.04)
Mutual interests	0.03 (0.01)	0.10 (0.03)	0.15 (0.03)	0.54 (0.04)	0.19 (0.04)
Paid, priv. disp. res.	0.03 (0.07)	0.53 (0.07)	0.29 (0.06)	0.15 (0.05)	0.00 (0.00)
Gov't off's	0.74 (0.04)	0.19 (0.04)	0.02 (0.02)	0.04 (0.01)	0.01 (0.01)
Other 3rd p	0.61 (0.05)	0.31 (0.05)	0.05 (0.01)	0.03 (0.01)	0.00 (0.00)
Legal system	0.50 (0.05)	0.29 (0.05)	0.15 (0.03)	0.06 (0.02)	0.01 (0.01)

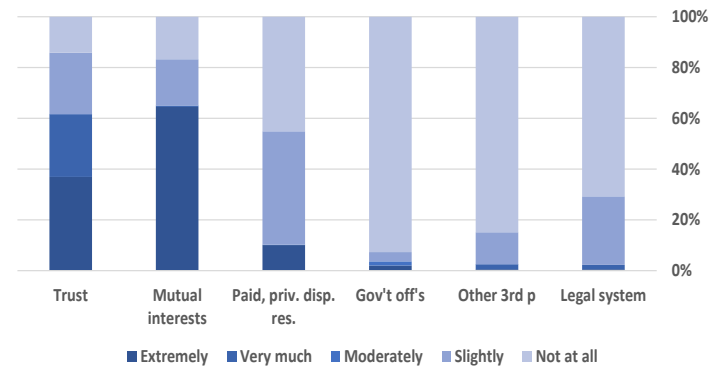
Standard errors in parenthesis.



Class 3 – Bilateralism with weak support

Method	Not at all	Slightly	Moderately	Very much	Extremely
Trust	0.14 (0.05)	0.24 (0.06)	0.00 (0.00)	0.25 (0.06)	0.37 (0.07)
Mutual interests	0.17 (0.05)	0.18 (0.05)	0.00 (0.00)	0.00 (0.01)	0.64 (0.07)
Paid, priv. disp. res.	0.45 (0.09)	0.45 (0.08)	0.00 (0.00)	0.00 (0.00)	0.10 (0.04)
Gov't off's	0.93 (0.03)	0.04 (0.02)	0.02 (0.01)	0.00 (0.00)	0.02 (0.01)
Other 3rd p	0.85 (0.05)	0.13 (0.05)	0.00 (0.00)	0.02 (0.01)	0.01 (0.00)
Legal system	0.71 (0.06)	0.27 (0.06)	0.00 (0.00)	0.02 (0.01)	0.01 (0.00)

Standard errors in parenthesis.



Class 4 – Weak comprehensive governance

Method	Not at all	Slightly	Moderately	Very much	Extremely
Trust	0.01 (0.01)	0.03 (0.02)	0.36 (0.09)	0.37 (0.09)	0.22 (0.07)
Mutual interests	0.02 (0.01)	0.07 (0.03)	0.07 (0.03)	0.66 (0.08)	0.19 (0.07)
Paid, priv. disp. res.	0.36 (0.09)	0.13 (0.05)	0.32 (0.09)	0.07 (0.03)	0.12 (0.07)
Gov't off's	0.64 (0.07)	0.00 (0.00)	0.30 (0.06)	0.02 (0.01)	0.04 (0.03)
Other 3rd p	0.37 (0.10)	0.02 (0.01)	0.49 (0.10)	0.12 (0.05)	0.01 (0.01)
Legal system	0.54 (0.09)	0.12 (0.05)	0.10 (0.04)	0.01 (0.01)	0.23 (0.09)

Standard errors in parenthesis.

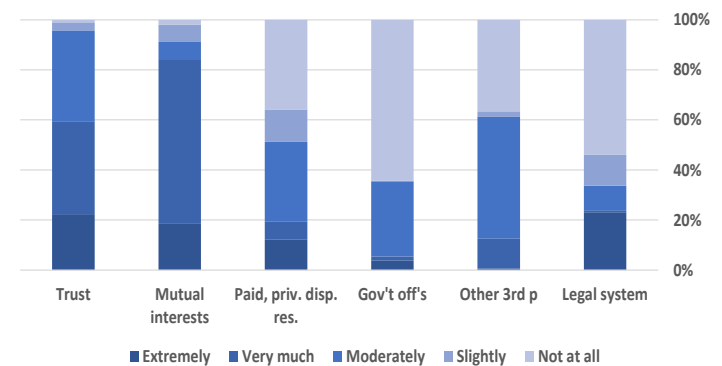


Table 3: Estimated Class Membership Probabilities

	$\hat{\pi}_c$	s.e.
Relations with Suppliers		
Pure bilateralism	0.657	0.024
Bilateralism with private support	0.166	0.022
Bilateralism with legal support	0.160	0.017
Strong comprehensive governance	0.017	0.004
Relations with Customers		
Pure bilateralism	0.565	0.032
Bilateralism with private support	0.242	0.000
Bilateralism with weak support	0.145	0.025
Weak comprehensive governance	0.050	0.008

Table 4: Tests of the Association of Regions with the Use of Governance Structures

	Association between region and supplier governance structures	Association between region and customer governance structures
Sub-regions of:	<u>p-values for Wald tests</u>	
Argentina	0.000***	0.040**
Bolivia	0.390	0.140
Ecuador	0.000***	0.000***
Paraguay	0.000***	0.780
Peru	0.000***	0.270
Uruguay	0.019**	0.520

Table 5: Effect of Uncertainty on Bilateralism

	(1)	(2)	(3)	(4)
Panel A: First-Stage for IV Regressions				
Uncertainty at sector-region level		0.966*** (0.079)		0.941*** (0.080)
Crime, theft and disorder			0.123* (0.070)	0.106 (0.069)
Customs and trade regulations			0.051 (0.051)	0.029 (0.051)
Transportation			0.014 (0.033)	0.016 (0.028)
Panel B: OLS and IV Regressions				
	OLS	IV	IV	IV
Uncertainty	-0.202*** (0.048)	-0.253** (0.104)	-1.294** (0.571)	-0.392*** (0.103)
Log of size	-0.020 (0.016)	-0.018 (0.017)	0.034 (0.034)	-0.011 (0.017)
Firm is part of a larger firm	-0.039 (0.063)	-0.039 (0.060)	-0.047 (0.079)	-0.040 (0.055)
Firm age (years)	-0.001 (0.001)	-0.001 (0.001)	-0.001 (0.002)	-0.001 (0.001)
Exporting directly at least 10% of sales	-0.029 (0.057)	-0.017 (0.059)	0.216 (0.176)	0.014 (0.062)
At least 10% foreign-owned	-0.088 (0.070)	-0.091 (0.068)	-0.159 (0.109)	-0.100 (0.066)
2-digit sector fixed effects	YES	YES	YES	YES
Region fixed effects	YES	YES	YES	YES
Number of observations	2,255	2,255	2,255	2,255
R^2	0.125			
Cragg-Donald Wald F statistic		176.40	9.91	49.86
Kleibergen-Paap Wald F statistic		148.83 {0.00}	1.72 {0.25}	36.71 {0.00}
Hansen J -statistic p-values			{0.72}	{0.02}

Notes: Panel A of this table shows first-stage regression estimates. These first-stage regressions also include all exogenous variables included in the second-stage. Panel B shows OLS (column 1) and IV regression (columns 2-4) estimates. Column (2) uses sector-region averages of uncertainty as the instrument, (3) uses the three variables on obstacles as instrument, (4) uses all four variables. Standard errors are in parentheses. calculated assuming clustering at the level of strata. All regressions use sampling weights. Braces are used for p -values. Significance levels: .01 - ***; .05 - **; .1 - *.

Figure 1a: Cross-country variation of the mix of governance structures used in relations with suppliers

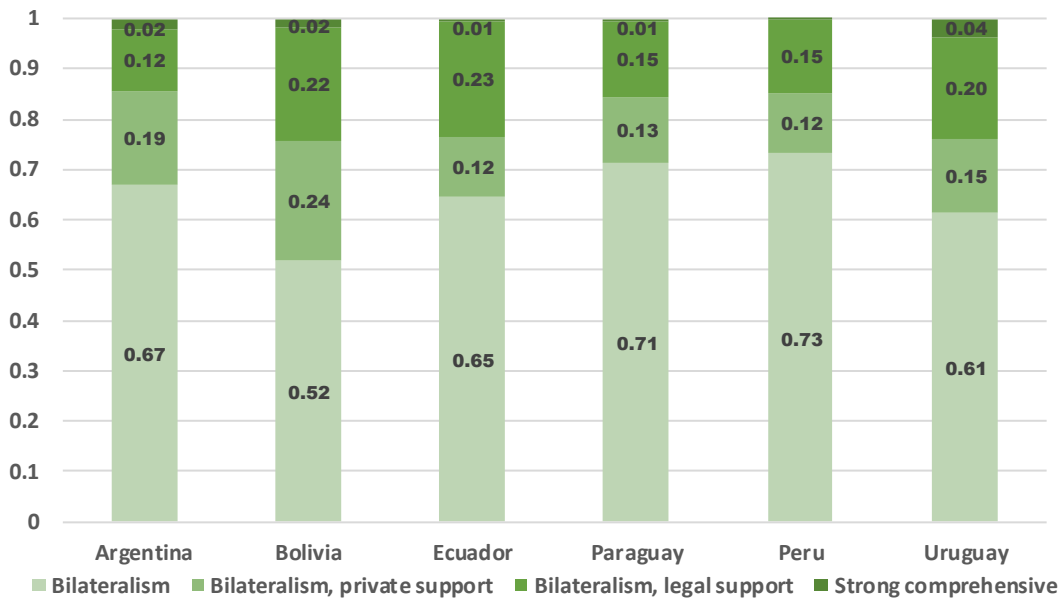


Figure 1b: Cross-country variation of the mix of governance structures used in relations with customers

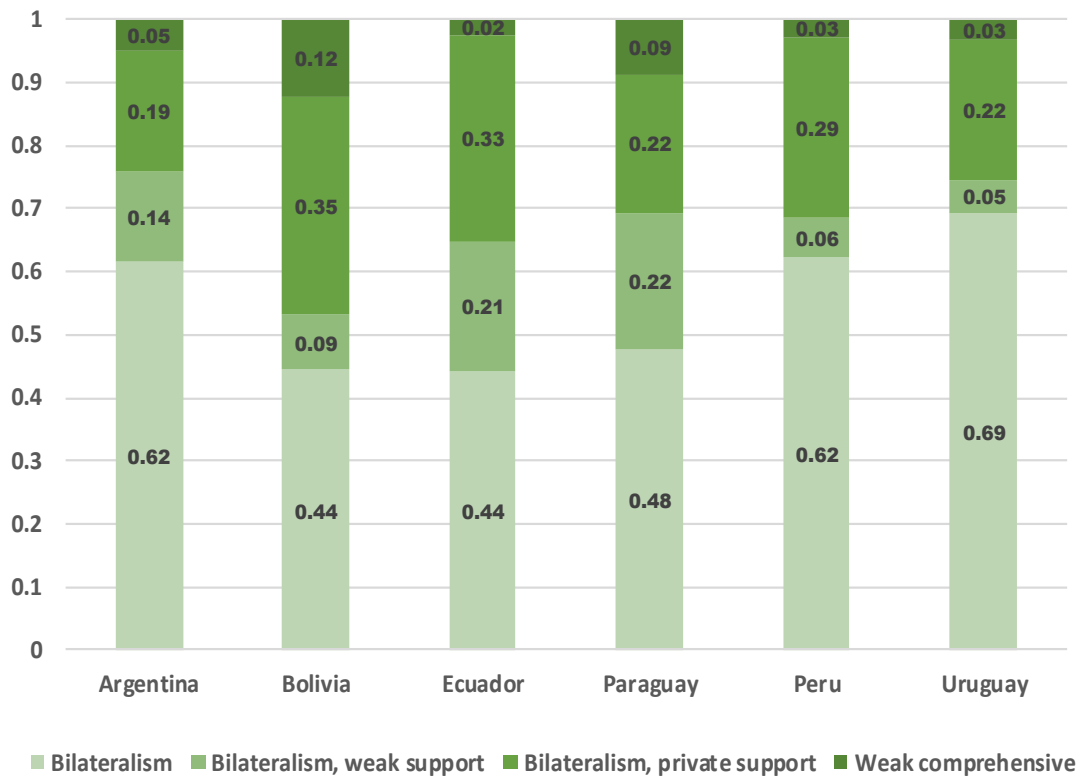


Figure 2a: Within-country variation of governance structures for supplier-relations

