Mapping the Landscape of Transactions: The Governance of Business Relations in Latin America*

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Abstract: To what extent are trust, law, and third-parties important in ensuring the fulfillment of firms' agreements to trade? How do firms combine these to form transactional governance structures? This paper is the first to answer these questions for a comprehensive set of transactional governance mechanisms for whole economies in a cross-country setting. Generation of the pertinent data requires formulating a new survey question answerable by any firm in any context. The question is administered in six South American countries. Latent class analysis (LCA) estimates the governance structures that firms employ to support the implementation of agreements. Without imposing an a priori model, LCA discovers meaningful governance structures. Bilateralism is always used. Law is never used alone. Bilateralism and formal institutions are not substitutes. Data are generated that facilitate testing hypotheses consequent on Williamson's discriminating-alignment agenda.

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

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I. Introduction

To what extent are mechanisms such as trust, law, or third-parties effective in supporting the fulfillment of firms' agreements to buy and sell goods and services? How do they combine such mechanisms? How do answers to these questions vary across countries? Williamson (1979) refers to such combinations of mechanisms 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 transactional mechanisms, 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 absence of cross-country evidence on a comprehensive set of transactional governance structures is also troubling, because any diagnosis of the causes of firms' or countries' ailments will depend on assessing their behavior in critical areas of activity. Given the absence of any absolute standard to guide such an assessment, comparative, cross-country data are necessary. While there are many datasets on particular elements of governance, such as the strength of contractual institutions, to our knowledge no paper to date has presented data that provides an overall picture, within and across countries, of the effectiveness of the different mechanisms by which firms enforce agreements.[1]

[1] We emphasize that our objective contains three elements: a whole-economy perspective, comparable data collected from different countries, and examination of a comprehensive set of mechanisms used in contractual governance. To be sure, there are many high-quality studies that examine pieces of the picture. However, to provide background on how difficult it is to pursue all three goals, we examined those studies labelled as key studies in the survey by Cao and Lumineau (2015). Of these 49 studies, only six covered more than one country. Of these six, three studies covered three or fewer countries and five used small, fairly narrow samples of firms. One study (Yang et al. 2011) 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 two transactional mechanisms.

The aim of this paper is to fill this gap in the literature. The paper presents and analyzes the responses of 3,430 firms to a newly designed survey question that is posed to representative samples of firms in six South American countries. Given the use of survey weights, our estimates characterize the aggregate importance of different governance structures in a very large part of economic activity. The application here is to 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.

A (transactional) governance structure is the "institutional framework within which the integrity of a transaction is decided" (Williamson 1979: 240). In this paper we confine our attention to those aspects of governance relating to transactions in goods and services.[2] A governance structure is a coordinated combination of different mechanisms that together encourage the fulfillment of agreements to transact. Such mechanisms might be trust, hit-men, legally enforceable contracts, etc. No existing studies obtain a cross-country, economy-wide picture on how these mechanisms are combined to form governance structures.[3] One reason for this lacuna is that there exists no generally agreed upon encompassing theoretical framework that predicts which particular combinations of mechanisms appear often, and which can be safely ignored.[4]

There are important consequences for how the research must proceed given the absence of a generally accepted, encompassing theory that would provide guidance on which combinations of mechanisms to focus upon during data collection. A pertinent survey question must ask about an

[2] Thus, a governance structure in the sense used in this paper, excludes many activities that fall under the umbrella of corporate governance. We do not consider, for example, transactions with banks or shareholders, but rather focus on transactions with suppliers of production inputs and customers for the firm's goods and services.

[3] 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 7 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 analysis of issues addressed in this paper. 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.

[4] 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. But to our knowledge there is no study that considers a full gamut of mechanisms.

exhaustive variety of individual mechanisms. It must have a very general structure, resonate with the concerns of all types of firms, and make responding feasible for all firms. Therefore, a first contribution of this paper is the construction of a new survey question, together with a demonstration that it elicits reliable data from representative samples of firms in several countries. Given the centrality of data collection in this paper, we emphasize our approach to question wording and survey implementation, which are extremely important when collecting data on a crucial set of firm activities that are inherently difficult to measure.

Additionally, the absence of an encompassing theoretical framework predicting which governance structures exist means that data cannot be collected on composite governance structures, per se, because they are unknown *a priori*. Instead, a survey question must focus on the individual mechanisms that are inputs into governance structures, about which there is much more existing theory. In building a comprehensive picture, the challenge then is finding which individual mechanisms are combined by firms to produce coherent governance structures. That is, one must apply an exploratory statistical technique that isolates archetypes of governance structures. This type of statistical investigation is usually approached using latent variables. Here, the governance structures are viewed as the categories, or classes, of a categorical latent variable. Exploring the characteristics of the classes thus discovered is a key part of the investigation. Latent class analysis (LCA) is particularly suitable for this task (Mike and Kiss 2019).[5]

Thus, a second contribution of this paper is to develop the application of LCA for the discovery and estimation of governance structures, and apply it to the six-country dataset. We characterize the governance structures and show how the importance of each varies across

[5] 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.

countries and between regions within countries. Our characterization of governance structures is data-driven: it does not rely on an a priori conception of which governance structures are used in practice.

A third contribution is to provide illustrative examples of the use of the information generated by our method. 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 of the descriptive parameters. The example points the way to potential areas of further research and possible policy conclusions.

A fourth contribution is to develop a dataset that can be used by other researchers to advance their own research agendas by combining our methodology and their own data. We provide a dataset of the predicted posterior probabilities that each firm in our sample is associated with each estimated archetypal governance structure.[6] These predicted probabilities could then be used in combination with existing survey data produced by the World Bank Enterprise Surveys to investigate the determinants of firm choice of governance structures. Or, more broadly, researchers could employ a Rajan-Zingales (1998) style methodology and our predicted probabilities in combination with their own datasets to address a broad range of research issues.

Going even further, readers could survey countries, or regions, or sectors different from those studied here. With any set of firm responses to the questions laid out in Section II, a researcher could use the information we provide to obtain the predicted probabilities that the respondent firms employ each particular governance structure. These results could then be directly compared to those for the six South American countries. This could be particularly useful for researchers who

[6] The very last paragraph of the paper provides details on how to access the relevant datasets and tools.

have limited resources and can only sample a small number of firms, yet have an interest in obtaining reliable and comparative statistical results.

These four contributions show the feasibility of constructing and implementing a methodology that produces cross-country data characterizing the aggregate mix of governance structures that are typically used. Such data provide a means of examining existing hypotheses in an economy-wide, cross-country context. For example, we find that pure bilateralism (i.e., reliance on personal trust and mutual interest to enforce agreements) is the most common governance structure and that all governance structures embody bilateral enforcement mechanisms.[7] None of the estimated governance structures correspond to purely arm's-length transactions, where firms rely on impersonal mechanisms and formal institutions to support their transactions. A corollary is that bilateralism and formal institutions are never 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 networks, social clubs, and culturally defined groups, our results suggest they are not very important in transactional governance.[8]

The purpose of collecting new data is not only to examine existing hypotheses but also to generate new facts thereby stimulating further research. Here we mention two. First, the data suggest that inter-regional variation in the effectiveness of legal institutions is larger than cross-country variation. In the countries analyzed, this is unexpected because institutional rules relevant to transactions are set at the national level, and also because there is significant cross-country

[7] Many papers in the literature use the concept of relational governance and include social relationships within that concept. We separate the effects of bilateralism, which excludes third-party social relationships, from any governance structure that envisages the intervention of any third-party.

[8] Networks are no more important than is the help of government officials, a group whose role in supporting inter-firm transactions has invariably been ignored in the literature. Hendley et al. (2000) and Hendley and Murrell (2003) are exceptions, but these papers are focused on ex-socialist countries.

variation in the strength of legal institutions. Secondly, but in the same vein, we find that legal mechanisms are more important in Bolivia than would be predicted using standard country-level indicators of the strength of legal institutions. The fact that the respondents in the poorest country in our six, Bolivia, rate the effectiveness of legal institutions as greater than that in the richest country, Uruguay, is surely a puzzle in need of further investigation.

Section II details the process of data collection, especially focusing on the logic of our new survey questions. Section III describes the data-generating process underlying LCA and introduces the criteria that we use to choose a particular model specification. Section IV considers the characteristics of each of the estimated governance structures, showing how their features resonate with ideas in the transaction-cost and contract-theory literatures. Section V presents illustrative examples on how to use the information generated by our method, providing descriptive statistics on the variations in the prevalence of different governance structures across countries and regions. Section VI concludes by considering direct extensions of this research. We pose questions that our findings directly kindle and detail how others can use the data that we have generated.

II. The Questions, the Surveys, and Raw Responses

We use responses to questions posed by the World Bank Enterprise Surveys (WBES) in 2017 and 2018 to representatives of a total of 3,430 firms in Argentina, Bolivia, Ecuador, Paraguay, Peru, and Uruguay. The respondents were owners and top managers in a random sample of officially registered firms in the manufacturing and services sectors with at least five employees.[9] The samples are designed to be nationally representative, using a stratified survey design with simple random sampling.[10] In this section, we focus mainly on our approach to question wording

[9] Note that for simplicity we use firms interchangeably with establishments, which is the survey's unit of analysis.
[10] 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.

and survey implementation, devoting more space to these issues than is perhaps usual: the context of this paper is a crucial set of firm activities that are very difficult to measure and therefore the methodology of data collection is central.

Newly designed questions were fielded on the effectiveness of methods of preventing or resolving problems when implementing agreements, i.e. methods of enforcing agreements.[11] Two composite questions were posed, one about agreements with suppliers and the other about agreements with customers, each question having six sub-parts.[12] The composite questions only differ from each other in whether they inquire about suppliers or customers. We chose to ask about supplier- and customer-relations separately because firms might employ very different strategies when managing upstream relations than downstream ones.

In the survey, the following was read aloud:

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

Then, answers were elicited for each one of the following six mechanisms, posing each separately (without numbering): 1) personal relationship and trust; 2) mutual interest in maintaining business relationship, without involving others; 3) paid, private dispute resolution; 4) assistance of government officials; 5) intervention of other third-parties (excluding paid, private dispute resolution and government officials); and, 6) legal system. Respondents were presented with a Likert scale of responses:

Not at all	Slightly	Moderately	Very much	Extremely

[11] We separate prevention and/or resolution of problems from the stage of selecting 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.

[12] We focus on relations with suppliers and customers and do not consider the make or buy decision. There is a vast literature on this aspect of governance structure. See Chatterji et al. (2019) for a recent empirical examination of the relationship between governance structures and firm boundary decisions and Argyres and Zenger (2012) for a discussion of theoretical approaches to the analysis of firm boundary decisions.

During the time that the interviewer asked for responses on each of the six mechanisms, the respondent was presented with a 'show card' that contained a list of the six mechanisms with the Likert scale. Thus respondents could continually see all the content of all six sub-questions and could implicitly consider all six mechanisms when responding on one particular mechanism.

The exact wording of the questions 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. Interviews were conducted face-to-face by local contractors in Spanish using tablet devices.[13] Information on fieldwork dates and the total number of observations available for each country is given in Appendix A.3. Summary statistics on rates of "Don't Know" responses are provided in Appendix A.4. These rates are negligible.[14] We now provide comments on the trade-offs involved in formulating the survey questions, and our reasoning that led to the final wording of the question.

For an exercise such as the one conducted here, with only two composite questions to be addressed to representative samples of many hundreds of firms in several countries, it is inevitable that administration would piggyback on existing efforts.[15] Our questions were asked within a regular cycle of the WBES. The form and phrasing of the questions were therefore framed to fit the approach of the WBES. One element of this approach is to ask busy top officials of firms a large set of questions on a collection of heterogenous topics. This means that questions must be terse.[16] There is inevitably a budget constraint on words and concepts embodied in questions.

[13] Show cards were presented on paper.
[14] Given the high item-response rates, we are able to 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.
[15] 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.
[16] Terseness in wording has consequences for the whole survey. Longer questions cause problems because they take longer to interpret and place a greater cognitive burden on respondents (Yan and Tourangeau 2008). Taking more time and using up more cognitive resources means that respondents will satisfice more as they proceed through a survey, decreasing measurement reliability (Alwin and Beattie 2016).

Not surprisingly, survey methodologists have examined whether measurement reliability changes with question length and complexity. Paradoxically, a wording that captures all the nuances occurring to a researcher might cause difficulties for a respondent. Longer questions require more working memory, leading to difficulties in comprehension and together with problems in retaining the full meaning of the overall question while considering a battery of sub-questions. For example, Holbrook et al. (2006) found that comprehension difficulties were positively associated with question length. Shaeffer et al. (2005) found that the addition of words to make a question logically complete did not affect the distribution of responses, while adding to the complexity of the question. Based on a meta-analysis, Oberski (2016) concludes that more complicated phrasings are bad for reliability. Moreover, the issue is not simply greater random error, but also of bias: respondents with more cognitive resources will answer complex questions differently than those with fewer. Factors such as these provided background to confronting the thorny issues of question design.[17]

Additionally, the goal of the WBES is to administer surveys that can be addressed to samples of firms that are extremely heterogenous in character. This too was an important goal for this paper. Hence, the questions had to be general in their phrasing, avoiding referring to facets of activities that might not apply to some firms. Generality in wording is therefore inherent in any effort to collect cross-country-comparable, economy-wide data on a comprehensive set of mechanisms.

A first decision in question design was whether to ask firms about their relations with transactional partners in general, as in Hendley and Murrell (2003), or to ask respondents to choose one specific transaction when answering questions, as when Mike and Kiss (2019) asked

[17] Our specific questions were based on those in Hendley and Murrell (2003), but with many changes primarily motivated by the need to fit into the WBES framework.

respondents to choose a specific, typical, interaction.[18] Asking respondents to focus only on a transaction of their own choice invites selection bias. For example, 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 familiarity between partners was a strong component. Moreover, asking about one particular trading partner in a way that would diminish selection bias would increase the length and complexity of questions, with the resultant depreciation in measurement reliability that has been noted above.

Note also that our question on supplier relationships was preceded in the questionnaire by questions that specifically asked respondents to focus on their whole set of their suppliers. Therefore, respondents begin to answer our question on supplier relationships having been primed to think about the circumstances under which they engaged with suppliers in general.[19] This would have prepared respondents to focus on the aggregate picture of their interactions with suppliers. Our question on customer relations was identical to the one for suppliers, except for the obvious substitution of "customers" for "suppliers". Analogously, the customer question was preceded in the questionnaire by questions that specifically asked respondents to focus on their whole set of customers.

We therefore chose to ask about transactions in general. The assumption is that respondents will convey information that summarizes governance structures across the range of their firm's

[18] This latter 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 details. However, this approach would be impossible to undertake on the scale required for the current investigation, which is economy-wide in multiple countries.

[19] Importantly, Parmigiani and Mitchell (2010) make the point that managers might not make decisions at the transaction level because there are hundreds of different partners and governance decisions are made at a more aggregated level and individual transactions represent the implementation of these decisions.

transactions. Hendley and Murrell (2003) found this approach worked smoothly in Romania. The surveyors did not report any problems with posing the question in this way.

In WBES surveys, inquiries are made about the operations of single establishments (what we have called 'firms', for convenience). This makes asking about transactions in general more acceptable. Establishments are more likely to produce a narrow range of products with a uniform technology than are multi-unit firms. 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 very common in the economics and business literatures.

A second difficulty in framing a question was deciding which property of transactional mechanisms respondents would be asked to assess.[20] We chose to focus on preventing and resolving problems in agreements because this was a circumscribed objective that all respondents would quickly understand. It also resonates with fundamental concerns that appear in both the transaction-cost and contract-theory literatures. This objective is narrower than asking respondents to focus upon whether agreements work in an efficient way, although certainly part of that broader perspective.

A third issue revolved around the phrasing of the term to connote success when preventing and resolving problems. Reducing question complexity entailed using a single, simple term. We chose to use the term "effective".[21] In interpreting this word, the respondent is being invited to view effectiveness as a combination of both usefulness and frequency of use. The alternative would

[20] In the literature reviewed by Cao and Lumineau (2015), respondents were asked questions about different properties of 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).

[21] In the papers reviewed by Cao and Lumineau (2015), the 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.

have been to ask about both how useful each mechanism is and about how often firms use each mechanism. This would create its own problems, however. If the two properties were referred to in one question, respondents might choose to focus answers on only one of the two properties. Importantly, this choice might vary between different types of respondents, introducing bias. For this reason, survey methodologists typically warn against the use of such 'multibarreled' questions that allow the respondent to focus only on only one aspect of the inquiry (Fowler and Cosenza 2008). Moreover, question complexity would also be increased, with the attendant problems described above. Instead, our wording encourages a focus on overall productivity, since a mechanism cannot be effective if it is neither useful nor much used.

Final decisions on the form of questions were not made solely on an priori basis by researchers but also reflected information gained in the field. Surveyors reviewed the questionnaire when translating it into Spanish, commenting on any problematic terms, which would be changed before implementation. Standard back-translation procedures were applied, which could identify conceptual issues.

After a draft questionnaire was completed, WBES implementers (including one of the paper's authors) met with the local surveyors for in-country training on the survey methodology and a question-by-question review of the questionnaire. The survey was piloted with firms that were not in the sample, allowing for the possibility of changes in wording even at this stage. Following these pilot interviews, a report of potential issues (such as question wording) was provided: no important problems were reported on these questions, in any of the separate reports provided for each of the six countries.

One product of this preparation was an interviewer manual, an important part of which is instructions about the interviewer should react to respondent inquiries about how to interpret

specific questions. Help in interpreting questions has been shown to increase measurement reliability (Conrad and Schober 2000). WBES procedure confines interviewer comments to those that appear in the manual. The relevant section of the manual is included in Appendix A.5. It explains, for example, that resolving or preventing problems in agreements incudes not only directly using the mechanisms but also employing promises or threats of their use when a problem emerges.

A 'cognitive audit' of the questions was also undertaken, using open-ended interviews with managers of a heterogenous collection of firms. One inquiry made in these audits was on how managers understood the use of the word "effective". Interviewees did interpret that term as referring to a combination of both the amount of use and productiveness of the mechanism: the lowest ranking on the scale would be chosen if either the mechanism was not used or if it had been used and it did not work for the firm. The interviews also revealed that the question was not interpreted in a conjectural way but rather was taken to refer to the firm's actual experience. Thus, if a respondent had no knowledge of how effective a mechanism could be because the respondent's firm had not used the mechanism, it was given the lowest rating on the scale.

Feedback during and after survey implementation could have potentially provided indications of whether problems had arisen with any question. Interviewers and their supervisors could ask the researchers for clarification of issues that surfaced during fieldwork. No important issues arose that were related to the questions used in this paper. After fieldwork concluded, the local survey administrators provided a report with comments on implementation. There were no specific comments on the questions used in this paper.

Krosnick (1991) suggests that frequencies of "don't know" responses are indicators of comprehension difficulties that lead to satisficing behavior by respondents. The questions used in

this paper had frequencies of don't knows that were comparable to those of similar types of questions that had proven satisfactory by their staying power through many cycles of the WBES surveys.[22] 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. Appendix A.6 lists the most common reported response patterns in our data. There is no evidence that the mid-point ('moderately') is used frequently. Indeed, among those most common responses 'moderately' is very unusual, indicating that respondents had no difficulty in reporting which transaction mechanisms their firms found effective.

We have spent longer than is usual in addressing issues of question wording and survey implementation, to clarify why our questions took the form that they did and to report that the questions worked well in implementation: The reliability and validity of the data obtained from our questions is obviously central in this paper. Nevertheless, the problems we faced 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, it is still a notable challenge to construct universally applicable questions that address the problems of data collection that he so clearly articulated. We are not aware of any other paper that has successfully accomplished the

[22] In particular, our question performed better on the "don't know" criterion than the much-used questions that ask "To what degree is X an obstacle to the current operations of this establishment? ", where X is some part of the institutional environment. For an example of such questions, see Appendix D.1.

task of implementing a question that covers a comprehensive set of transactional governance mechanisms, addressing it to any type of firm in economy-wide samples from different countries.

Table 1 displays the raw response percentages for the six sub-parts of each of the two questions, one to suppliers and one to customers. Patterns emerge even at this level of analysis. Respondents tend to regard bilateral mechanisms (i.e., trust and mutual interest) as most effective, while regarding third-parties, government officials, and legal mechanisms as less effective.[23]

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 mechanisms. Therefore, a fuller understanding requires analysis using the vector containing responses to all six sub-questions rather than examining the individual elements of the vector separately. This task involves analyzing 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.[24] Given that responses are spread over hundreds of distinct patterns, systematic 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.[25] Therefore, we introduce our statistical methodology in more detail than usual. This allows us to emphasize the distinctive

[23] 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 bilateral mechanisms.
[24] Appendix Tables A.3 and A.4 list the most common reported response patterns.
[25] 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.

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 the one introduced above. 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 as independent of the response on another sub-part. This is the local independence assumption that is used in a large majority of applications of LCA. 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 exactly 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. 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* transactional mechanisms by choosing, for each *K*, one of *R* points on a Likert scale. The response vector, $Y_i = (y_{i1}, \ldots, y_{iK})$, 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. The choice of governance structure places the firm in one category of a nominal 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*. The variable *c* is latent and c_i is to be estimated for each firm *i*.

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 mechanism *k* is conditionally independent of the response for mechanism *m*, when $m \neq k$.

Denote by $\theta_{kr|c}$ the probability that a firm in latent class *c* chooses answer *r* concerning mechanism *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:

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

where $I(y_{ik} = r)$ is an indicator function equaling 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., mechanisms) 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.[26] Therefore, the errors in the responses for these two mechanisms are probably correlated. Moreover, when somewhat similar mechanisms are probed in succession, respondents might not exert the cognitive effort to distinguish their responses: the errors in consecutive sub-questions are possibly correlated.[27] If the tendency for pairs of responses to partially contain the same information is not taken into account, 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* mechanisms into *H* subsets. The error terms in responses about two mechanisms 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 mechanisms in the h^{th} subset, with each Y_{ih} being a sub-vector of Y_i. Y_{ih}, *h=1,…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:

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

[26] This is not surprising. One of the takeaways from Poppo et al. (2016) is that there have been few efforts in the past to distinguish empirically between these two different types of trust.
[27] This phenomenon is often referred to as "nondifferentiation of responses" (e.g. Krosnick and Alwin, 1988).

Estimates of $f(\cdot \mid \cdot)$ and the π_c are obtained by maximizing the following likelihood:[28]

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

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 Determinants of Class Membership

LCA also facilitates studying which factors determine the class to which a firm belongs. This is Williamson's (1991) discriminating-alignment research agenda. While this paper's main focus is on discovering governance structures and exploring their characteristics, we also aim to provide readers with tools that can be used to explore the links between governance structures and their potential determinants. Therefore, in Section V we conduct some preliminary exercises 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:

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

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

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 $f(\cdot \mid \cdot)$ and the $\pi_c(.)$ directly. Alternatively, one could

[28] We use the Latent GOLD software (Vermunt and Magidson 2016).

proceed in three steps. First, maximize the likelihood (3) and estimate $f(\cdot \mid \cdot)$ 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 $\pi_c(.), c = 1, \ldots C$, 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 $f(\cdot \mid \cdot)$ and $\pi_c(.)$ 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 confidence in the specification of (4), especially understanding which Z_i to include and exclude (Nylund-Gibson and Masyn 2016).[29] For that reason, we use the 3-step process because many of the relevant Z_i 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 this paper's primary objective—understanding the nature of the classes. We are primarily interested in characterizing the most common governance structures (step 1). By estimating the classes in general—independently of the determinants 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 for others to conduct their own step-3 analyses, selecting their own Z_i's from the copious data available from the WBES, or using data from other sources.

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

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

Implementation of step 1 of the 3-step process entails estimation of $f(\cdot \mid \cdot)$ 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 existing practical applications of LCA, the choice of how many classes (*C*) to estimate is the primary decision, 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 many details to Appendix C. Detailed background information can be found in Collins and Lanza (2010), Masyn (2013), and Vermunt and Magidson (2016).

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. This decision was based on the judgment that firms might employ very different types of strategies in conducting upstream

relations than downstream ones. After all, a firm's objectives in the two activities are very different: for the former, it is primarily about securing timely delivery at an appropriate level of product quality; for the latter it is primarily about getting paid by a satisfied customer. The large samples meant that sufficient statistical power could be generated in two separate analyses.[30]

The second decision was to choose the options for the numbers of classes (*C*) to be considered. Invoking parsimony, we focused on 3-, 4-, 5-, and 6-class specifications. Models with greater numbers 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 as described in Section III.2, or to keep local independence between all combinations of the six mechanisms. Relaxing local independence results in a proliferation of design possibilities. The separate responses on the six mechanisms can form 15 unique pairs, with 32,766 distinct combinations of these pairs possible.[31] Considering this number of possible models is obviously untenable. We thus chose to look initially where theory and the observations from survey implementation pointed us. As mentioned previously, the responses on mechanisms 1 (trust) and 2 (mutual interest) might be related. In the piloting of the survey, we learned that sometimes individuals did not clearly distinguish assistance of government officials (mechanism 4) from intervention of other third-parties (mechanism 5). As a result, it was natural to consider specifications that relaxed independence between the responses on mechanisms 1 and 2 and those on 4 and 5.

[30] 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.

[31] $32{,}766 = \sum_{k=1}^{14} \binom{15}{k}$. For identification, LCA needs at least one pair of mechanisms to be locally independent; hence the 14.

Considering these possibilities for the relaxation of local independence and the four possibilities for class size, 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 mechanisms. 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 of mechanisms (Vermunt and Magidson, 2016: 83-5). The pairs that had particularly large bivariate residual correlations were then added to the set of mechanism-pairs that were candidates for non-imposition of local independence.[32] Based on these residual correlations, we chose to consider a total of 20 models for each of consumer relations and supplier relations. 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 when aiming to absorb 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). Appendix C.4 provides an analysis of the robustness of our substantive conclusions, by

[32] 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.

comparing the characteristics of the classes produced by our preferred models with the characteristics of the next-best models.[33]

IV. The Estimated Model: Class Characteristics

The process of model selection led us to estimate four latent classes for each of customer and supplier relations. That is, we conclude that four governance structures adequately describe the choices that firms make when combining mechanisms to enforce agreements.

The next stage in the analysis is to assign names to the classes. This 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 probabilities are the $\hat{\theta}_{kr|c}$, the estimated probability of choosing response *r* for mechanism *k* if the firm is in class *c*.[34] 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 order in which the estimation extracts the classes. The class names are evocative labels for the classes 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

[33] 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).

[34] 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 question *k*.

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

IV.2 Class Names: Characterizing the Classes

This subsection argues that the following names capture the characteristics of the governance structures that firms in the six countries use to support their transactions.

	Relations with Suppliers	Relations with Customers
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.[35] Only trust and mutual interest are endorsed as effective mechanisms: both class 1's are *pure bilateralism*. The use of 'pure' is emphasized as a contrast to the remaining classes, which differ primarily in what they add to bilateralism. Hence, it is tempting to conclude that the classes are ordered, 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 mechanisms are found effective, all mechanisms contribute significantly to both class 4's. For upstream relations, firms in this class find the legal system as effective as any other mechanism, with government officials and third-parties at least as important as each of the two bilateral mechanisms. Every single mechanism is rated as effective as in every other class, so we use the label *strong comprehensive governance*. However, for downstream relationships *weak comprehensive governance* is more appropriate for

[35] Many, but not all, characteristics of the four classes look remarkably similar for suppliers and customers, even though the estimation for suppliers and customers is entirely separate.

class 4, given that within this class all mechanisms are less effective for customer relations than for supplier relations.

In class 2, bilateral mechanisms are as important as in class 1, but all other mechanisms also have a notable presence. Among the non-bilateral mechanisms, paid, private dispute resolution is the most important, followed by the legal system. This is consistent with 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 legal mechanisms.

It is only for class 3 that there is a marked difference between upstream and downstream governance structures, albeit with some similarities still present. For both supplier and customer relations, there is a contribution from the two bilateral mechanisms, but this contribution is weaker than for all the other three classes within either upstream or downstream relations. For supplier relations, other mechanisms have a significant presence, with the legal system being the most important non-bilateral mechanism, 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 bilateral mechanisms are weakly present in class 3 of customer relations, the contribution of the non-bilateral mechanisms is even weaker. Thus, we name this class *bilateralism with weak support*, recognizing that among all eight estimated latent classes, this is the governance structure where the aggregate effect of all 6 mechanisms 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 that are produced by LCA (the $\hat{\pi}_c$). All class membership sizes are significantly different from 0. Already one notable conclusion follows: our methodology is successful in accomplishing its main goal. These were to use an empirically driven 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 types. We know of no other study that has accomplished this goal in an economy-wide, cross-country framework, while considering a full spectrum of mechanisms for transactional governance.

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.[36] Bilateralism with private support is the second most-prevalent governance structure for both upstream and downstream relations. Private dispute resolution is more effective in interactions with customers than with suppliers. The legal system is more effective for supplier relations than for customer relations.

In general, firms on average 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*.

[36] 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.

The estimation and naming of the classes not only reveals which governance structures are important, but also which are absent. All governance structures rely, at least in part, on bilateral mechanisms: no firm relies solely on a combination of third-parties and formal institutions.[37] This is inconsistent with claims in the economics and business literatures that characterize development as a process of escaping personalized interaction and moving to a rule-based, impersonalized set of interactions.[38] While our data do not capture the process of development, they do reflect countries at different levels of development, and no estimated governance structure involves only rule-based, impersonalized transactions.

A corollary of this is that bilateralism and the legal system should not be viewed as 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 use of the legal system.[39]

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 are worth noting because of their contrast to emphases in the literature. First, the literature almost entirely neglects the role of government officials in supporting

[37] This is also a finding of Mike and Kiss (2019) for Hungary: "Law never stands alone."
[38] Mike and Kiss (2019) characterize this as the classical view, and give many references to its use. For a very widely cited version of this view, see 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".
[39] For a long time, the dominant view in the economics and business literatures was that the use of formal legal arrangements for transactions was inconsistent with the use of personalized relationships based on trust: formality eroded the 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 contract are complements.

transactional governance.[40] Yet, government officials do play a supporting role, even if 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.[41] However, in aggregate, non-paid private third-parties are arguably the least important of the six mechanisms (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 is an exploratory exercise, showing how the data we have generated can be used to understand the links between governance structures and the broader environment of the firm. We simply explore patterns in the data and do not attempt to isolate ceteris paribus, causal effects of single variables. This exercise bears on the validity of the data that we have produced: if there were no significant association between chosen governance structures and firm characteristics, the meaningfulness of our estimates could be questioned.

To illustrate the type of thought experiment explored here, consider a firm's country. We compare the pattern of governance structures for firms in located in different countries. 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

[40] For an exception to the lack of emphasis on the role of government, see Hendley and Murrell (2003). However, that paper focused on the role of transition from socialism as an ingredient that led to the role of government in Romania.
[41] Network approaches have been very popular in the past few 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).

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 3-step method outlined in Section III. Steps 1 and 2 give estimated posterior probabilities of the membership of each firm in each governance structure. 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.[42]

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 firm-country. Figures 1a and 1b illustrate the cross-country variation. In these figures, we use darker colors to denote governance structures that are more complex, that is, involve more mechanisms more effectively (reflecting the $\hat{\theta}_{kr|c}$ in Tables 2a and 2b).[43]

To give an example of the power of our methodology to generate new findings, examine Bolivia in the context of these figures. Governance structures including more than just bilateralism are more effective 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.,

[42] Mike and Kiss (2017) also conduct an exploratory analysis of the determinants of class membership, but employ the one-step process discussed in Section III.
[43] Thus the ordering of classes is different from that in Tables 2a and 2b, which followed LCA's somewhat arbitrary ordering.

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 be a reflection of 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. This is a puzzle, and one that is most clearly raised in an exercise like the current one, which systematically collected economy-wide, cross-country data on a broad spectrum of mechanisms of transactional governance.

V.2 Cross-Regional Variations in Governance Structures

We next look at within-country, regional variation in governance structures. We do so by applying 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 supplier side, all but Bolivia exhibit significant cross-regional variation. On the customer side, only Argentina and Ecuador exhibit significant variation.

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 (in Argentina) is 22 percentage points more likely to rate pure bilateralism as effective in its relations with suppliers than an average firm in the 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 standard deviation of the percentage of bilateralism in Figure 2a is greater within the regions of each of Argentina, Ecuador, Peru, and Uruguay than it is for countries in Figure 1a. 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 governance.

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. Space considerations prevent our presenting further examples here, but Appendix D reports on many results on the associations between governance structures and firm characteristics. Among the characteristics considered, the following show a significant association with governance: attitudes to courts, ownership, foreign orientation, sector, management practices, and membership in business associations. The message of Appendix D is broader than its individual results: that Appendix presents evidence that argues for the substantive validity of our estimates of governance structures. This follows from the many significant and intuitive associations between use of governance structures and detailed firm characteristics.

VI. Lessons Learned and Avenues for Future Research

This paper is the first to estimate economy-wide, cross-country variation in the governance structures that firms employ to support the successful implementation of transactions within a context that considers a full range of transactional mechanisms. In part, the past lacuna has been due to lack of data. What has been missing is a method to elicit consistent information on the conduct of transactions from firms of all types, functioning in very different environments. We fill

this gap by designing new survey questions, and obtaining data from six South-American countries.

Yet, obtaining the data provides only part of the solution to mapping the landscape of transactions. There is also the 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 of governance mechanisms that can provide a tight structure for the empirical approach. 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. Validity can be assessed by examining whether the estimated governance structures resonate comfortably with concepts that are standard in the existing analysis of transactions.

Some of our substantive results would be entirely expected by most readers, but even in those cases we are able to add quantitative perspective. For example, pure bilateralism is the most important governance structure that we observe. Adding to the literature, we estimate which firms rely on this approach and how the importance of bilateralism varies across countries, and regions. In dealing with suppliers, a sizeable number of firms supplement their bilateralism with either paid private dispute resolution or formal legal mechanisms. In dealing with customers, a significant number of firms supplement their bilateralism with paid private dispute resolution. Formal legal mechanisms are more important for supplier relations than for customer relations. For both

upstream and downstream transactions, relatively small proportions of firms find that comprehensive sets of mechanisms are effective in solving their transactional problems.

Notably, all governance structures involve bilateralism. Thus, no governance structure comprises purely arm's length transactions, where firms rely only on impersonal mechanisms and formal institutions to support their transactions. This is important because sometimes arm's length transactions are viewed as something of an ideal, the aspirational endpoint in the process of economic development.[44] This view implicitly casts bilateralism and formal institutions as substitutes, a relationship that does not appear in our estimates. For many firms, they are complements.

In the existing literature, there are naturally many different implicit assumptions that exist on the relative importance of different governance structures. For example, much attention has been paid in the literature to various unpaid, third-party, mechanisms of supporting agreements, such as networks, social clubs, and culturally defined groups. Our results do not support this emphasis.[45] Indeed, our data suggest that the importance of these types of third-parties in supporting private transactions is matched by that of government officials.

In Section V, we provided 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 dependent variables are the probabilities that the firm has chosen each of the four governance structures. Notably, we find that regional variation in the effectiveness of different governance

[44] To be sure, this is an aspiration not shared by all, or perhaps even a majority, of scholars contributing to the economics and business economics literatures. 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.

[45] 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.

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.

Nevertheless, generating the conclusions reached in Section V has not been the paper's prime objective. These exercises are examples showing the validity of the methodology we have developed and the potential in the datasets that we generate. Our methodology allows readers to go further than we have done, to test other hypotheses by linking their own data to the data we have posted.[46] Moreover, given the information we provide, readers could add different countries, or cities, or sectors to those we have studied here. If, in a survey of any size, even a single firm, readers were to implement the questions that we lay out in Section II, then they could use our posted tools to characterize the governance structure of the firms in their survey. Readers could produce results that are comparable with ours without repeating the laborious steps described above, thereby facilitating diagnosis of a firm's, or a sector's, or a country's strengths and weaknesses.

[46] 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, go to the "Landscape of Transactions" section in the listing of datasets. Then in that section download the zip file at "2018 Enterprise Survey Data".

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Table 1: Summary of Responses to the Questions

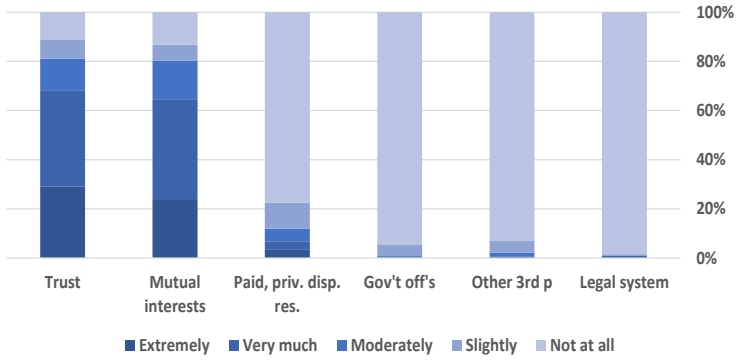
Relations with suppliers (n=3,350)						
	Not at all	Slightly	Moderately	Very much	Extremely	Total
Trust	8.3	8.0	14.4	41.8	27.6	100.0
Mutual interests	10.9	6.7	14.4	42.4	25.5	100.0
Paid private third-parties	61.9	15.4	13.9	5.6	3.1	100.0
Gov't officials	86.2	8.0	2.5	1.9	1.4	100.0
Other third-parties	81.5	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	0.08	0.13	0.39	0.29
	(0.01)	(0.01)	(0.01)	(0.02)	(0.02)
Mutual interests	0.13	0.06	0.16	0.41	0.24
	(0.01)	(0.01)	(0.02)	(0.02)	(0.02)
Paid, priv. disp. res.	0.77	0.11	0.05	0.03	0.03
	(0.02)	(0.01)	(0.01)	(0.01)	(0.01)
Gov't off's	0.95	0.05	0.00	0.00	0.00
	(0.01)	(0.01)	(0.00)	(0.00)	(0.00)
Other 3rd p	0.93	0.05	0.02	0.00	0.00
	(0.01)	(0.01)	(0.01)	(0.00)	(0.00)
Legal system	0.98	0.00	0.00	0.01	0.00
	(0.02)	(0.01)	(0.01)	(0.01)	(0.00)

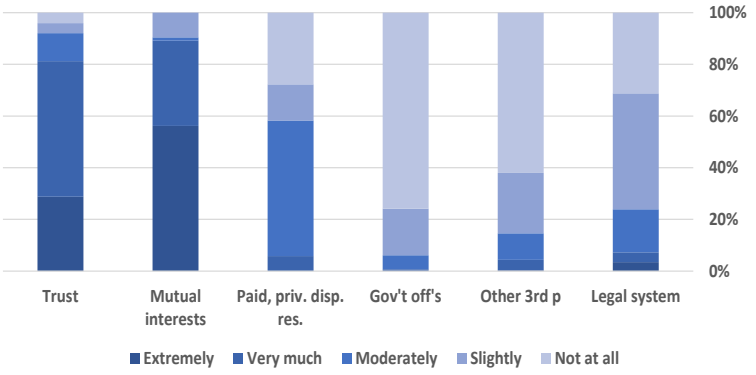
Standard errors in parenthesis.



Class 2 – Bilateralism with private support

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

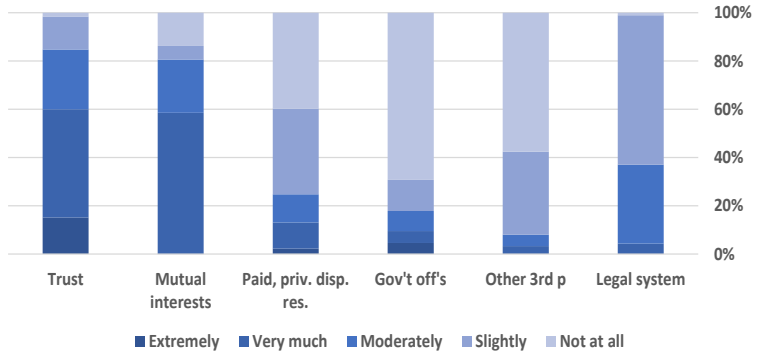
Standard errors in parenthesis.



Class 3 – Bilateralism with legal support

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

Standard errors in parenthesis.



Class 4 – Strong comprehensive governance

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

Standard errors in parenthesis.

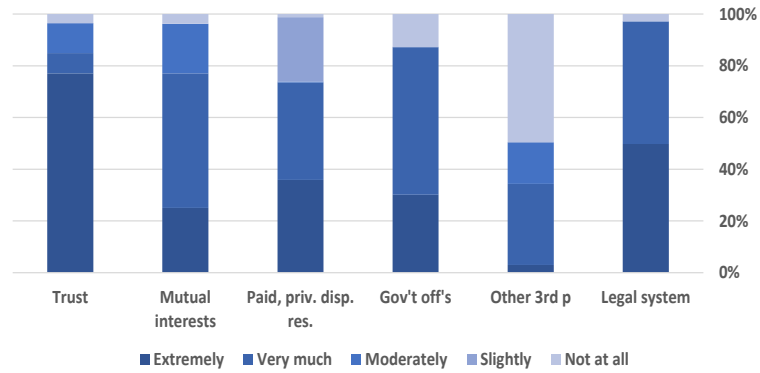
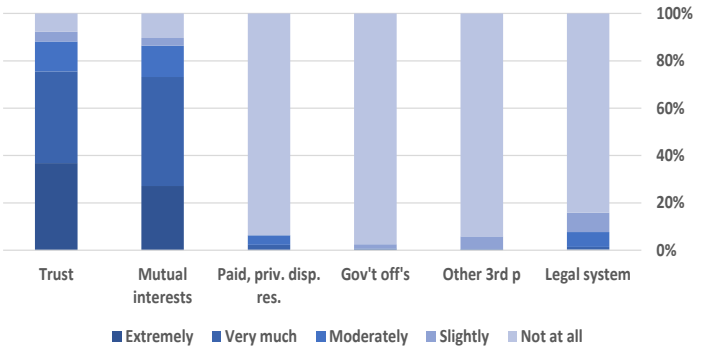


Table 2b: Predicted Response Probabilities, Relations with Customers

Class 1 – Pure Bilateralism

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

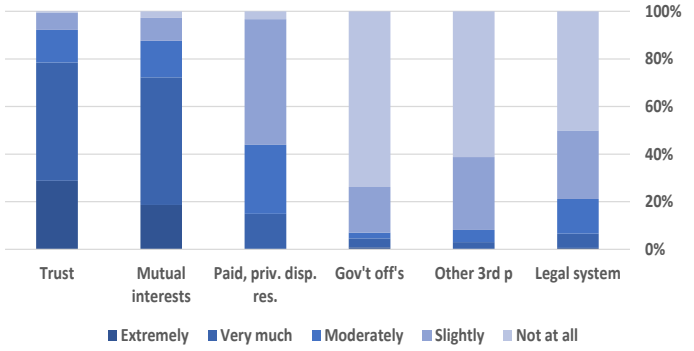
Standard errors in parenthesis.



Class 2 – Bilateralism with private support

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

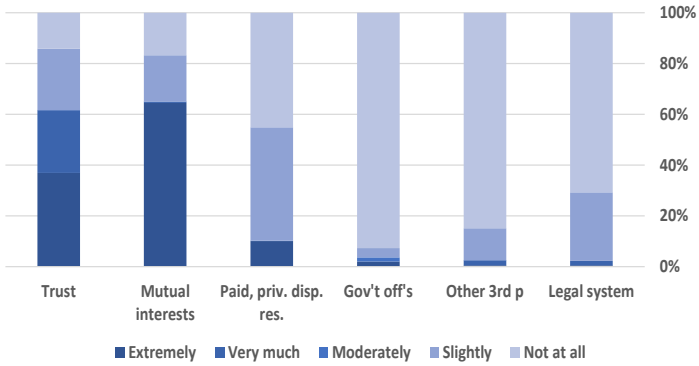
Standard errors in parenthesis.



Class 3 – Bilateralism with weak support

Method	Not at all	Slightly	Moderately	Very much	Extremely
Trust	0.14	0.24	0.00	0.25	0.37
	(0.05)	(0.06)	(0.00)	(0.06)	(0.07)
Mutual interests	0.17	0.18	0.00	0.00	0.64
	(0.05)	(0.05)	(0.00)	(0.01)	(0.07)
Paid, priv. disp. res.	0.45	0.45	0.00	0.00	0.10
	(0.09)	(0.08)	(0.00)	(0.00)	(0.04)
Gov't off's	0.93	0.04	0.02	0.00	0.02
	(0.03)	(0.02)	(0.01)	(0.00)	(0.01)
Other 3rd p	0.85	0.13	0.00	0.02	0.01
	(0.05)	(0.05)	(0.00)	(0.01)	(0.00)
Legal system	0.71	0.27	0.00	0.02	0.01
	(0.06)	(0.06)	(0.00)	(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	0.03	0.36	0.37	0.22
	(0.01)	(0.02)	(0.09)	(0.09)	(0.07)
Mutual interests	0.02	0.07	0.07	0.66	0.19
	(0.01)	(0.03)	(0.03)	(0.08)	(0.07)
Paid, priv. disp. res.	0.36	0.13	0.32	0.07	0.12
	(0.09)	(0.05)	(0.09)	(0.03)	(0.07)
Gov't off's	0.64	0.00	0.30	0.02	0.04
	(0.07)	(0.00)	(0.06)	(0.01)	(0.03)
Other 3rd p	0.37	0.02	0.49	0.12	0.01
	(0.10)	(0.01)	(0.10)	(0.05)	(0.01)
Legal system	0.54	0.12	0.10	0.01	0.23
	(0.09)	(0.05)	(0.04)	(0.01)	(0.09)

Standard errors in parenthesis.

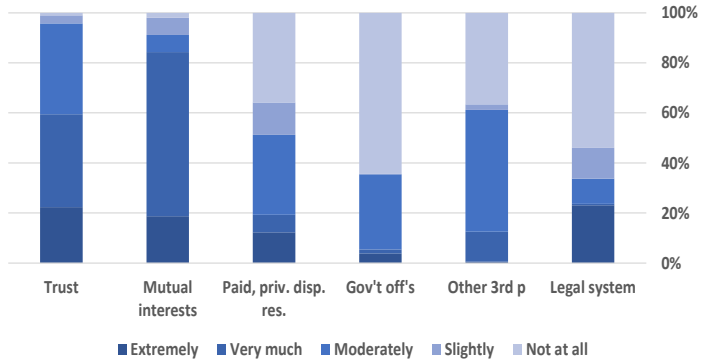


Table 3: Estimated Class Membership Probabilities

	$\hat{\pi}_c$	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:	p-values for Wald tests	
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

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

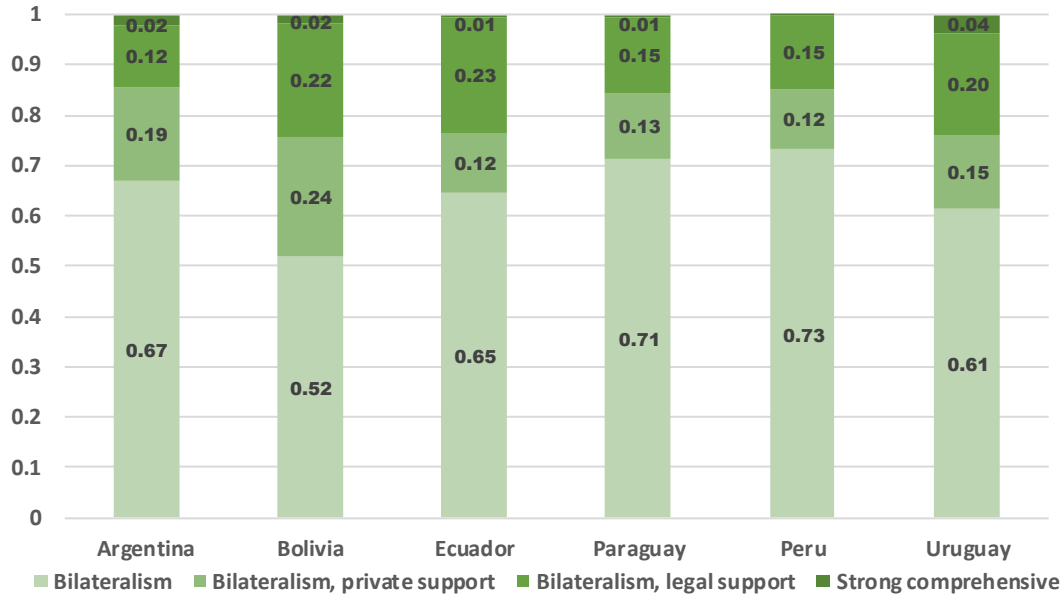


Figure 1b: Cross-country variation of the mix of governance structures used in relations with customers

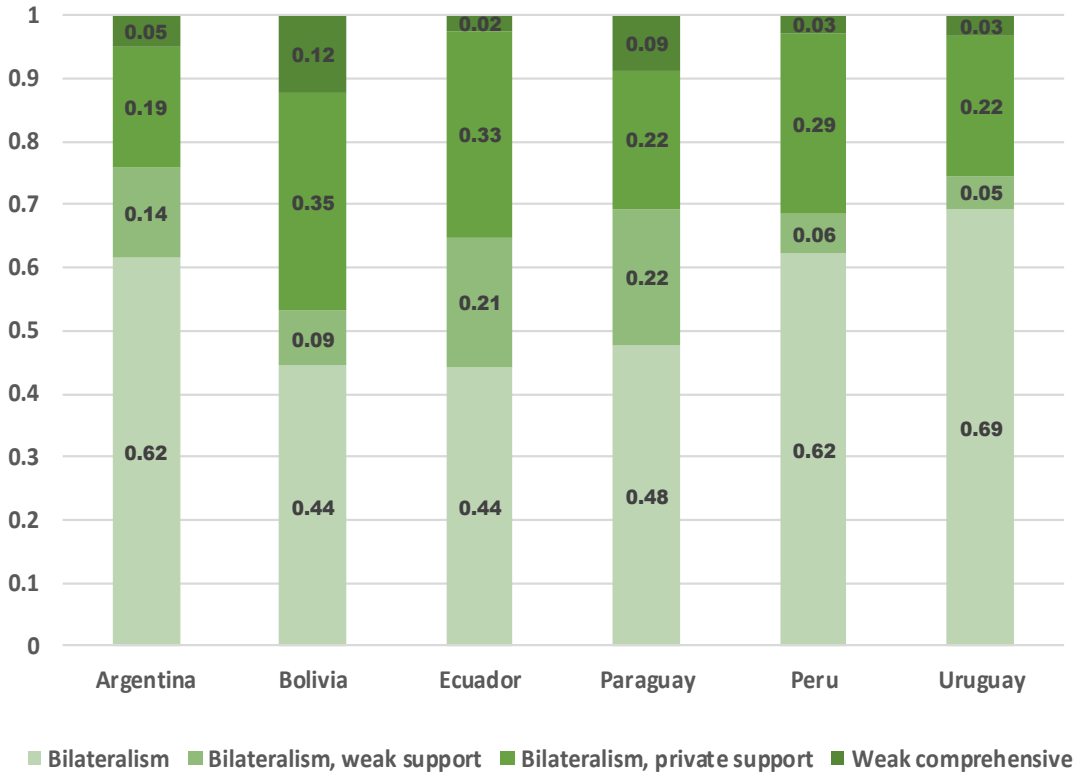


Figure 2a: Within-country variation of governance structures for supplier-relations

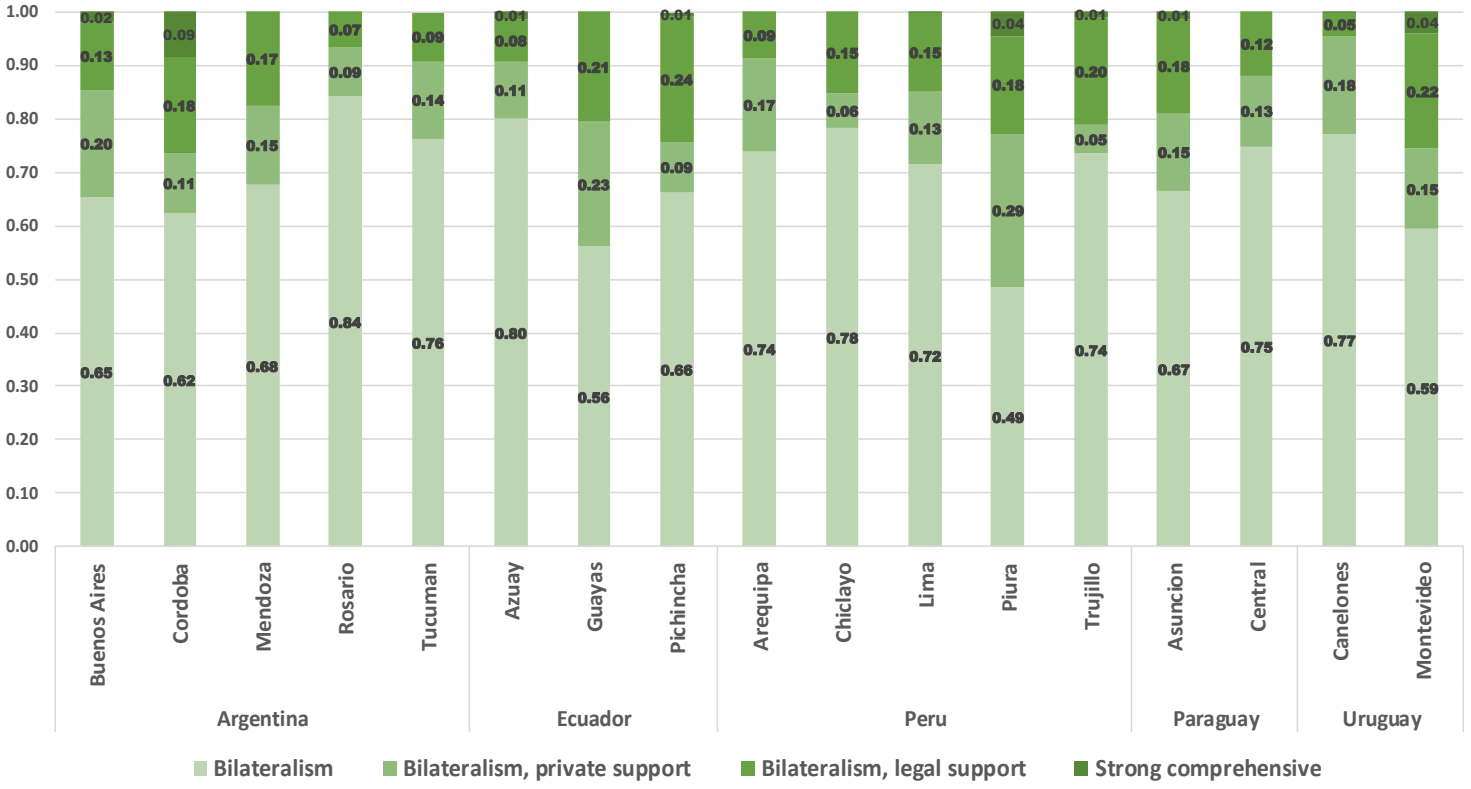


Figure 2b: Within-country variation of governance structures for customer-relations