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LEGAL ENFORCEMENT AND GLOBAL VALUE CHAINS: MICRO-EVIDENCE FROM ITALIAN MANUFACTURING FIRMS

by Antonio Accetturo*, Andrea Linarello♣ and Andrea Petrella♣

Abstract

In this paper we study the relationship between the quality of contract enforcement and firms' participation in Global Value Chains. Using new data on Italian manufacturing firms' supply of customized inputs to other firms and variations in law enforcement in courts across Italy, we find that firms located in courts with longer trial lengths are less likely to supply customized intermediate inputs to foreign firms. The effects are stronger for firms operating in contract-intensive industries. Our results are confirmed when we use a spatial regression discontinuity design that compares the probability of supplying customized inputs for firms that are located on different sides of a court border, and are therefore characterized by different trial lengths.

JEL Classification: F10, F14, L14.
Keywords: Global Value Chains, judiciary efficiency.

Contents

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1 Introduction

Over the past twenty-five years, the ICT revolution, the steady lowering of trade barriers and transport costs, and the access to global markets by several low-wage countries have led to a remarkable structural change in the global economy (Antràs, 2015). The outcome is a new international division of labor, in which the production of final products is fragmented in Global Value Chains (GVC henceforth). The policy relevance for this structural change cannot be understated. UNCTAD (2013) shows a strong correlation between GDP growth and participation to GVCs, especially for developing countries; GVCs, in particular, are seen as an opportunity to access to global trade by small firms, considering the presence of relevant fixed costs associated with the search of new buyers in large and unknown markets.

GVC are characterized by contractual relationships between intermediate producers and assemblers for the delivery of customized inputs that often require relationship–specific investments. When a country's ability to enforce contracts is weak, however, hold–up problems may arise. This, in turn, leads to suboptimal levels of investments and aggregate surplus (Antras, 2003; Antràs and Helpman, 2004), it affects the pattern of comparative advantage (Nunn, 2007; Levchenko, 2007), and it depresses international trade (Anderson and Marcouiller, 2002; Berkowitz et al., 2006). Despite in recent years the availability of micro data have substantially contributed to the improvement of our understanding of international trade, there is little or no empirical evidence on the relationship between the quality of institutions and participation to GVC using firm-level data. The lack of evidence is mostly driven by the fact that production fragmentation is difficult to measure at firm level; this is a major weakness of many empirical works, given the fact that most of the cross-country heterogeneity in the performance on international markets generally depend on firm-level characteristics.

In this paper we provide direct evidence that weak contract enforcement influences firm participation to GVC. We first present a theoretical model in which we show that the ability of a firm to supply an intermediate good to an international buyer crucially depends on the quality of domestic judiciary institutions; we also show that the negative effects of a bad contractual environment are amplified when the intermediate good needs complex contractual arrangements between the buyer and the seller. In the empirical part we focus on the case of Italy, which provides a good empirical setting. We build on a unique dataset from the 2011 Italian Census of Industry and Services, where we are able to identify manufacturing firms that supply customized inputs (within its group or to other companies) domestically or abroad. The Italian law codifies a specific contract type for the supply of customized inputs ("*contratto di subfornitura*, L. 192/1998"), in which the buyer provides design and production criteria to the supplier that performs the physical transformation activities. This contract is widely used in the Italian context (Lazerson, 1999). Because firms directly report whether they supply customized inputs under this particular contract arrangement, we are able to directly measure firms participation in GVC, improving over many existing measures of offshoring.

We exploit the variation in contract enforcement across courts within Italy and a specific feature of the Italian legal system to estimate the impact on firms' participation to GVCs. In case of litigation, the Italian law automatically determines the court in charge that corresponds to the one where the majority of the assets of the Italian firm are located. That court is also

responsible for the direct enforcement of any decision for international disputes, made by either a foreign court or an international arbitration. In other words, there is no room for the *choice-of-law* clause of the final enforcer. In 2011, Italy had 165 tribunal jurisdiction areas that display large differences in contract enforcement. According to the World Bank's *Doing business* figures, based on direct interviews with legal professionals, law enforcement in Italy is on average quite poor: Italy ranks 155th out of 185 countries. However, Italy also features a substantial variation in the quality of law enforcement between courts: as shown in Figure 1, in Bari it might take more than twice as long as in Turin to have a contract enforced. This dispersion in court efficiency is also confirmed by the data used in this paper, based on caseflow data provided by the Ministry of Justice: the difference in the average duration of a trial between the best- and the worst-performing tribunal is equal to 4.5 years.

Regression results show a strong negative correlation between judicial trial length in civil disputes and firm's supply of customized inputs abroad. Firms located in courts with weaker institutions are less likely to participate in GVCs. The estimates suggest that a one-year increase in trial length is associated with a 1.9 percentage point reduction of this probability (about 1/10 of the unconditional probability, equal to 17.8%). This relationship should be stronger in those industries that produce goods that are characterized by relationship–specific investments. For each narrowly defined industry we measure relation specificity as the share of products that are not sold on organized markets according to the Rauch (1999) classification (following Nunn (2007)). We interact trial length with our measure of contract intensity in a Rajan-Zingales specification that includes court fixed effects. We show that the average effect is driven by firms that operate in industries that make a more intensive use of relation–specific investments. We find that a one-year increase in trial length decreases the probability to supply customized inputs by 0.4 to 2.1 percentage points in industries at the 25th and 75th percentile of contract intensity, respectively. These effects have an aggregate relevance: for an average level of contract intensity, the hypothetical scenario in which all the courts were as efficient as the best performing one (Vercelli, with an average trial length of 1.03 years) would imply an increase in the aggregate share of subcontracting firms by 2.2 percentage points, from 17.8 to 20%.

In order to improve the causal interpretation of the results, we also exploit a spatial regression discontinuity design (Dell, 2010) that compares the probability to participate to a GVC for firms that are close to the border between two courts that are characterized by different trial lengths. This approach allows us to control for unobservable confounding factors that smoothly vary across space and that might influence the possibility of a firm to participate in GVCs (for example: the different degree of accessibility to transportation facilities or logistical hubs, technological infrastructures installed on the territory, etc.). Results for this exercise are remarkably similar (even quantitatively) to the ones presented in the Rajan-Zingales specification.

Compared with previous studies on the effects of judiciary institutions on international trade (see Nunn and Trefler (2014) for a detailed review of the empirical literature), the advantage of our analysis lies in the fact that we focus on a single country and we exploit the heterogeneity in the quality of institutions within it; this removes all possible concerns related to (nation–wide) omitted variables that correlate with both judiciary efficiency and the participation to GVC (e.g. the availability of certain contractual arrangements or the organization of public

administration). In other words, we exploit the heterogeneity of *de facto* local institutions, that are an important determinant for the (often very wide) within–country productivity differentials (Acemoglu and Dell, 2010).

Italy can be considered as a textbook case of heterogeneous *de facto* local institutions (Cannari, 2009; Cannari and Franco, 2010). When we look at local institutions, North-South Italian divide includes political accountability (Nannicini et al., 2013) and schooling quality (Angrist et al., 2014; Montanaro and Sestito, 2014). Judiciary efficiency is no exception (Giacomelli et al., 2017), despite the fact that local administrations have no role in the organization of local courts and all decisions regarding the allocation of resources are centrally made by an independent body located in Rome. It is important to notice, however, that our empirical analysis will not solely exploit the Italian North-South divide but also the heterogeneity in the law enforcement within more homogeneous macroareas.

The bulk of the empirical literature on contract incompleteness and international trade uses cross country data. Anderson and Marcouiller (2002) and Berkowitz et al. (2006) show that contract incompleteness can be an important determinate of international trade. Nunn (2007) and Levchenko (2007), further develop this idea and show that countries with better institutional quality have a comparative advantage in the production of goods that are contract intensive. Helpman et al. (2008) estimate a gravity equation to show that countries that share the same legal institutions have a higher probability of establish trade relationships. The use of cross-country data can be problematic because there are two possible sources of institutional quality heterogeneity: countries have different legal system and they differ in institutional enforcement. Our focus on a single country has the advantage of keeping the legal system fixed, while allowing us to focus on the impact of *de facto* institutions within country in the level of law enforcement.

Few other works explore the relationship between the quality of institution and international trade using firm-level data. Using data from 28 developing countries, Ma et al. (2010) show that firms located in areas with better institutional quality export goods that are more contract intensive. Their results replicate the findings of Nunn (2007) using firm level data. Araujo et al. (2012) show that the importer country's institutional quality affects the export of Belgian firms. With a similar approach, Aeberhardt et al. (2014) use French firm-level data to show that better institutional quality improves the persistence of trade relationships for firms operating in industries with severe contracting problems. Our paper differs from all these studies along two important dimensions: first, they focus on firms' exports and imports rather than firms' purchase or supply of customized goods; second, although from a different perspective, these works assume that institutional quality is country-specific. A notable exception is Feenstra et al. (2013), that exploit cross-provincial variations in contract enforcement effectiveness in China and aggregate trade flows at province level to show that *local* institutions matter for "processing" exports. Our findings complement the rather scarce existing firm-level evidence about the triggers of production fragmentation. In a recent paper, Fort (2017) shows that firms' adoption of ICT technology is an important determinant of the firms' global sourcing strategy.

The reminder of the paper is organized as follows. In section 2, we sketch a simple model to provide a theoretical background for our empirical analysis, and in section 3 we introduce the Italian legal system. In section 4 and 5, we describe the data and the empirical strategy. Section

6 discusses the results. In section 7 we present an alternative strategy that exploits spatial discontinuities to achieve an identification, and we discuss the results. Section 8 concludes.

2 Theoretical background

In order to analyze the relationship between participation to GVCs and legal enforcement, we consider a simple cash in advance contract (Antràs, 2015) between two firms (a buyer and a seller) over an intermediate input. The economics of the model is quite simple; when the buyer is not able to immediately verify the quality of the good and the contract is not perfectly enforceable, the seller has the incentive to misbehave. This risk implies that the buyer is less willing to sign the contract when law enforcement is weak; this effect is particularly strong if the intermediate input is particularly valuable for the buyer's production.

Model setup

Consider two firms: F (seller) and firm M (buyer).

At time t_0, M and F sign the contract; F agrees to sell an intermediate good at price s to be paid at t_0. M has also the opportunity to buy the same good from another supplier F' (in principle, F' can also be a subsidiary of M); however, we assume that if M decides to buy from F', it has to pay a higher price $s' > s$. The fact that the good is paid before the buyer is able to observe the real quality of the supplied good may leave room for seller's misbehavior. We assume, for simplicity, that while F can misbehave, F' cannot.

In period t_1, the production and delivery of the intermediate good take place. If F delivers the exact type of good described in the contract, it pays a production cost $c_1 < s$; however, F may decide to misbehave by delivering a lower quality output, by delaying the delivery, or, in an extreme case, by not delivering the good at all. Faced with this opportunity F will consider the monetary incentives and the legal implications of such a deviation from the contract. In case of misbehavior, production cost is $c_2 < c_1$ ($c_2 = 0$ if the good is not produced at all). Once the intermediate good is delivered, M immediately incorporates it in the final good. If F behaved according to the contract, M registers a revenue P_1; if misbehavior took place, M's sales are lower (due to either lower quality of the final good or lower total production) $P_2 = P_1 - d$.

d is a crucial parameter in this model; it basically approximates the importance of the intermediate good in the production of the final good. We can assume that the higher d, the more the intermediate good is designed for the buyer's need (in other words, the intermediate good is relationship-specific). From a legal point of view, this generally implies that the larger is d the more complex is the contract signed between M and F. By receiving and incorporating the intermediate good into the final one, at t_1 M understands whether F misbehaved or not.

In the last period (t_2), M may decide to start a lawsuit against F. We assume that M is always able to win and that it will be fully compensated by its loss by receiving $d = P_1 - P_2$. While these hypotheses imply that there is no uncertainty about the final decision of the court, we assume, however, that the cost associated with this lawsuit is *ex-ante* unknown and uniformly distributed between zero and K: $k \sim U[0, K]$. The cost of the lawsuit could be either very low (the court immediately decides in favor of M) or very high (the court takes a long time to make

a decision). This cost can be directly linked with trial length. If the court is inefficient and it takes a long time to make a decision, foregone profits could not be immediately reinvested with possible financial losses; moreover, firm M could be forced to divert funds from profitable investments to pay lawyers for a longer time.[1] We normalize the litigation cost of F to zero; this basically implies that, on average, litigation cost is higher for M, due to the fact that M is a foreign firm that has to adapt to the legal system of F.

Stage t_2 is extremely streamlined; in fact, we assume that the judicial system is flawless except for trial length. The main reason for this choice of modelling is its simplicity; however, this assumption is not particularly far from truth. As many CEPEJ reports have noted, Italian courts are considered reasonably impartial and independent, but extremely slow.[2]

We assume that firms are risk neutral and all parameters are known by agents; the only uncertain parameter is the cost of the lawsuit k.

Solving the model

The model is solved by backward induction. First note that, if firm F behaves according to the contract, firms' profits are as follows:

$$\pi_M^G = P_1 - s \tag{1}$$
$$\pi_F^G = s - c_1 \tag{2}$$

where G stands for "good" behavior.

If F deviates, M has to decide on the possible start of a lawsuit. M's profits are:

$$\pi_M^{B,S} = P_1 - s - k \tag{3}$$
$$\pi_M^{B,NS} = P_2 - s \tag{4}$$

where B stands for a "bad" behavior by F and S (NS) means "sue" ("no sue").

At t_2, M decides to start a lawsuit only if $\pi_M^{B,S} > \pi_M^{B,NS}$, that if only if $P_1 - P_2 = d > k$. Given the uniform distribution of k between zero and K, this occurs with probability $min\{\frac{d}{K}, 1\}$. From now on, we assume that $K > d$ in order to exclude trivial results in which contracts are always enforced.

We now analyze the F's choice to misbehave at t_1. Equation (2) shows the payoff when F respects the contract. If it does not, its profits depend on the probability of M's reaction:

$$\pi_F^B = (s - c_2)(1 - \frac{d}{K}) + (s - c_2 - d)\frac{d}{K} = s - c_2 - \frac{d^2}{K} \tag{5}$$

The difference between equation (5) and (2) gives the monetary incentive for F to deviate from the written contract: $c_1 - c_2 - \frac{d^2}{K}$. The incentive is larger when deviation entails a very

[1] In the Italian system, lawyers are generally paid for the time they spend on the case. This implies that, if they have to show up more frequently in court for each case, they get higher payment. It should be noted that it is not possible to fix the cost of the lawyers *ex-ante*, thus arising the uncertainty on the final cost of the lawsuit.

[2] See, on this, reports and data available on `http://www.coe.int/T/dghl/cooperation/cepej/default_en.asp`.

large saving in terms of production cost $(c_1 - c_2)$; it is also high when the expected cost of the lawsuit for M is high (K). A large compensation to be paid if F is sued (d^2) reduces instead the incentives to deviate for F.[3]

We now abstract from the simple case in which $c_1 - c_2 - \frac{d^2}{K} < 0$ (i.e. there are no incentives for F to deviate) and we assume that a "bad" behavior is always incentive compatible. At t_0, M has to decide whether to sign the contract with the supplier F or the supplier F'. M will sign the contract with F, that is F will access a GVC only if:

$$[P_1 - s - E(k)]\frac{d}{K} + (P_2 - s)(1 - \frac{d}{K}) > P_1 - s' \tag{6}$$

where the term at the left of the inequality is the profit for M if the contract with F is signed and the term at the right is the profit if the contract is made with F'. $E(k) = \frac{K}{2}$ is the expected value of the cost of the lawsuit, given its uniform distribution and risk neutrality by firms.

Rearranging (6), we obtain the following equation, that describe under which conditions M will access the GVC:

$$s' - s > d(\frac{3}{2} - \frac{d}{K}) = A(K, d) \tag{7}$$

The term on the left of the inequality is the cost incentive for M to sign a contract with F. The term on the right is the expected cost due to the risk of deviation, that depends on two parameters: the quality of contract enforcement institutions (K) and the importance of the intermediate input in the production of the final good d. Notice that, for a given difference in the prices of the intermediates $(s' - s)$, the higher $A(K, d)$, the lower the probability for F to access a GVC.[4]

Comparative statics

We are now able to derive two testable predictions of our simple model. The first is the relationship between participation to a GVC and law enforcement. This is done by deriving $A(K, d)$ with respect to K:

$$\frac{\partial A}{\partial K} = \frac{d^2}{K^2} > 0 \tag{8}$$

Equation (8) is always positive; it basically states that the lower the quality of law enforcement, the more likely it will be that a deviation by F will not be punished by the legal system. As a consequence, the less likely it will be that F participates to a GVC.

The second testable prediction states that when the degree of contract complexity d is higher, it will be less likely for M to sign a contract with a risky supplier in a low quality environment.

[3] As we said, if $d \leq K$ the contract is always enforceable.

[4] In principle, M may decide to buy F to avoid the risk of misbehavior. In this case, the term $s' - s$ may also approximate the costs for internalizing production with an acquisition.

In formula:

$$\frac{\partial^2 A}{\partial K \partial d} = \frac{2d}{K^2} > 0 \tag{9}$$

Equation (9) is equivalent to a Rajan-Zingales specification, in which we show that the negative consequences of bad contract enforcement institutions are amplified when d is particularly large.

Discussion on the model

This simple model is able to determine a relationship between law enforcement and participation to GVCs. The model rests on two main assumptions. First, there are no possibilities to repeat the game and acquire reputation, since the model is static. Second, the contract between F and M requires a payment in advance.

As for the first hypothesis, it is true that the possibility to acquire reputation is able to reduce the negative effects of poor formal institutions to participation to GVCs; this would be consistent with the empirical evidence that formal and informal institutions are substitute for economic development (Ahlerup et al., 2009). However, if the population of buyers and sellers is large enough (which is reasonable for tradable goods) and information on agents' behaviors imperfect, this models is basically equivalent to the first stage of a repeated game.[5] However, it should be noted that reputation would just attenuate the estimated effects of the empirical counterparts of equation (8) and (9); in other words estimated coefficients would represent a lower bound of the actual effect of law enforcement on participation to GVCs.

Regarding the second hypothesis (cash–in–advance contract), if payments may take place after the delivery of the good, the buyer may decide not to pay s if it is not satisfied; in principle, this would make the contract perfectly enforceable. Two things should be noted on this issue. The first is that, as Antràs and Foley (2015) show, most of international transactions generally involve little use of finance and are paid in advance by the buyer. The second is that the economics of the model does not crucially depend on the fact that payment is made in advance but just on the circumstance that the buyer is able to assess the real quality of the intermediate input after assembling the final good and observing its profits. This is not far from real-life transactions, as Antràs (2015) and Midler (2009) point out on a more anecdotal ground.

3 The Italian legal framework

We test the two theoretical predictions of the model exploiting the variation in contract enforcement across courts within Italy. This is possible thanks to some institutional features that make the Italian legal system a good empirical setting for our analysis.

First, and most important, in case of litigation the Italian system automatically determines the court in charge of the lawsuit and/or the enforcement of the sentence made by another

[5] In other words, this can be a reasonable representation of the extensive margin of the participation to a GVC.

tribunal. Article 26 of the Italian Code of Civil Procedure states that the court in charge is the one where the majority of the losing firm's properties are located, that is, in our theoretical model, the court is determined by the location of the supplier of intermediate inputs (F). The court where is located the firm, therefore, is in charge also of the final enforcement of any decision for international disputes, even those made by foreign court or international arbitration. In other words, there is no *choice-of-law* clause, at least for the final enforcement. If the court where the intermediate input suppliers is located is inefficient, the foreign buyer may foresee a substantial reduction of its profits, arising from both the incentive of the supplier to deviate from the contract and the delayed compensation in case of controversy.

Second, in 2011 Italy had 165 tribunal jurisdiction areas, whose boundaries has been set in 1865 after the Italian unification, and that display large differences in contract enforcement.[6] As we said in the introduction, World Bank's Doing Business survey show a very poor performance of the Italian Judiciary system and a its great variability across different courts. Italy ranks 155th out of 185 countries in terms of trial length: for a first instance decision on a commercial dispute it might take 855 days in Turin and more than 2,000 days in Bari.

4 Data description

In our empirical exercise, we merge the firm-level data coming from the 9^{th} Census of Industry and Services of 2011 and the information on the efficiency of civil justice provided by the Italian Ministry of Justice. We use a special section of the Census — called "Indagine multiscopo" — which has been administered to the universe of firms with 20 or more employees and to a representative sample of the firms between 3 and 20 employees. Two different sampling schemes have been applied to firms with 3–9 and 10–19 employees: as a result, our sample contains information on the 39% of manufacturing firms with 10 to 19 employees, and on the 19% of those with 3 to 9. Overall we have information on the behavior of 75,006 manufacturing firms.

A notable feature of this dataset is that it exactly identifies the firms that participate to a GVC. Firms were asked whether they supply customized intermediate inputs to foreign companies, that is whether they had relations with other firms under the "*contratto di subfornitura*, L. 192/1998." This type of contract is specific to the case in which the buyer provides design and production criteria to the supplier that performs the physical transformation activities. We will also refer to these firms in what follows as "international subcontractors". Our data is not perfect, though. The most relevant limitation is that we do not observe the content of the contract, the value of the transaction and the identity of the partners. We are only able to identify, among firms, those that supply customized inputs abroad. A similar variable was used by Fort (2017) in her analysis on the sourcing strategies of US firms. When the firm belongs to a foreign group, we are also able to know if the majority of these supplies were realized on behalf of other firms of the group; in that case, the firm is dropped from the sample, since our contract incompleteness argument does not apply within the boundaries of a group. Our database contains 14,983 firms supplying customized goods to foreign firms outside their group. These pieces of information are integrated by other data on the firm's location, sector of activity, number of employees, revenues

[6]The number of courts were sensibly reduced in 2012 as a consequence of large budget cuts to the Judiciary administration.

and value added.

As already explained, we proxy the quality of contract enforcement with trial length. This is calculated by using the caseflow data provided by the Ministry of Justice.[7] For each of the 165 Italian judicial districts, we compute:

$$D_t = \frac{P_t + P_{t+1}}{E_t + F_t} \tag{10}$$

where P are pending cases at the beginning of the year, F are the new cases filed throughout the year, and E are the cases ended with a judicial decision or withdrawn by the parties during the year. The data only refer to ordinary civil proceedings and are expressed in years. In order to get rid of possible idiosyncratic volatility in the series of trial length, we take the average of the index between 2002 and 2007 as our measure of institutional quality.

As shown by equation (9) we expect the effect of local courts' efficiency on the probability of accessing GVC to scale up with the contract intensity of the goods provided. This is approximated by a sectoral index of relationship specificity derived from the Rauch's classification (Rauch, 1999). We measure the contract intensity as the share of differentiated products produced within each sector, using both the liberal and the conservative classification.

Table 1 contains some basic statistics on our sample of firms; besides the statistics on the full sample, we also report those on the universe of manufacturing firms with 20 or more employees. In our sample, the average size in terms of employees is 32.6, while average revenues and value added amount to roughly 9 and 2 million Euros; average value added per worker amounts to 44.6 thousand Euros. 56% of the firms in our sample is an exporter; a slightly lower percentage of firms supply customized inputs, but only 17.8% does it abroad. It has to be noted that most of the firms operate in contract-intensive sectors, as captured by an average Rauch index above 80% under both definitions. Bigger firms also display a higher labor productivity; moreover, they also have a greater probability of exporting and of supplying customized inputs, either domestically or abroad. The average contract intensity for the full sample and the big firms alone are remarkably similar. Interestingly, the average trial length to which firms are exposed does not significantly differ across firm size, suggesting that bigger firms do not tend to sort in the jurisdiction of more efficient courts.

In table 2, we show how firm characteristics vary with the exporting status. In line with the theory, domestic firms are on average smaller and less productive, while exporters are characterized by the largest average size (both in terms of employees and revenues) and by the highest value added per worker; this relative rank — although with greater magnitudes — is preserved in the more selected sample of big firms. In a similar fashion, firms that supply customized inputs abroad are larger and more productive than firms that do it only domestically, though being comparable to firms that do not sell customized goods at all in most dimensions. Most interestingly for our purposes, domestic producers are on average located in judicial districts characterized by a higher length of civil proceedings; this pattern also holds for international suppliers, located in better courts than domestic suppliers and firms not involved in subcontracting, hinting at a potential role played by local court efficiency on the exporting behaviour

[7] This is also the official measure used by the National Statistical Agency (ISTAT) to provide national figures and have been already used among others by Giacomelli and Menon (2016)

of a firm.

To further explore this point, Figure 3 displays two maps highlighting the geographical distribution of firms that supply customized inputs and the duration of civil proceedings by judicial district. The comparison of the two panels suggests a relevant negative correlation between the two variables. Firms participation into GVC is more frequent in the North and the Centre, and is limited to very narrow zones of the South, which is instead characterised by a longer duration of civil trials. The same correlation can be explored in a regression framework: table 3 displays the results of a court-level regression of the share of international subcontractors on the average duration of civil trials. The correlation is negative, meaning that less efficient courts are associated with a lower share of international suppliers of customized inputs, and remains significant even when controlling for a North-South dummy; significance vanishes when controlling for region fixed effects, though the coefficient remains negative even under this more demanding specification.

5 Empirical strategy

To test the first prediction of the theoretical model, that is if the effectiveness of contract enforcement affects the probability for a firm to engage in international subcontracting, we estimate the following equation:

$$y_{ic} = \alpha + \beta TL_c + \gamma X_i + \varepsilon_{ic} \tag{11}$$

where y_{ic} is a dummy indicating whether firm i, located in the jurisdiction of court c, supply customized inputs abroad. TL_c is a measure of quality of law enforcement (trial length, measured in years) in court c: the higher TL_c, the more inefficient the court. Finally, X_i is a vector containing firm level controls: it always includes size class fixed effects, that aim at controlling for the different sampling schemes used to collect data (remember that our data encompass the universe of the firms with 20 employees or more, while it is a representative sample of the firms with 3–9 and 10–19 employees). Besides this, X_i always includes a dummy for the firms located in the Southern regions; the purpose of adding this control is to ensure that our estimates are not simply picking up the effect of the North-South divide in both economic development and court efficiency.[8] Depending on the specification, X_i may also contain additional controls, such as industry fixed effects (4 digit of the Ateco2007 classification), log employment, value added per worker, and a dummy that indicates whether the firm belongs to a group. As discussed in previous sections, we expect the estimate of β to be negative if a higher level of court inefficiency — as measured by the average trial length — reduces a firm's probability of entering in an international GVC as a subcontractor.

To check the second theoretical prediction, however, we have to bring our empirical analysis a step further, exploring the existence of an heterogeneous effect of institutional quality across different levels of contract intensity. To do that, we estimate the following equation:

$$y_{ic} = \alpha + \beta_1 TL_c + \beta_2 CI_i + \beta_3 TL_c \times CI_i + \gamma X_i + \varepsilon_{ic} \tag{12}$$

[8] A civil trial lasts on average 3.3 years in the South, while it lasts 2 years in the rest of Italy.

Here CI_i measures the degree of contract intensity of the sector in which firm i operates, according to the classification proposed by Rauch (1999). Besides the already mentioned controls, under this specification the matrix X_i may also include a set of court dummies. The inclusion of these controls is intended to control for potential confounders that may be common to all firms belonging to the same court; nonetheless, adding court dummies will cause the effect of trial length *per se* (β_1) to be absorbed. In the same way, since the Rauch contract intensity index varies at the industry level, the inclusion of industry (4 digit) fixed effects will absorb the β_2 coefficient.

In the most requiring specification, we will therefore only be capturing the effect of judicial quality mediated through the level of contract intensity of the sector in which the firm operates, as captured by coefficient β_3. Under this approach, the access to GVC is explained by the interaction between an industry and an area characteristic. This specification closely follows the empirical strategy used by Rajan and Zingales (1998) to test the relationship between financial development and dependence on external financing, or the one used by Nunn (2007) in his study on law enforcement as a source of country level comparative advantages. In our case, we expect $\beta_3 < 0$ if the negative effect of court inefficiency (that is, a longer trial length) on the probability of a firm to supply customized inputs abroad scales up with the contract-intensity of the activities conducted, holding fixed all other characteristics.

A few things should be noted in the estimation of equations (11) and (12). Under this empirical strategy, we do not have a source of exogenous variation in the data: this implies that the causal interpretation of the coefficients rests on the discussion of potential sources of biases in our estimates.

First of all, there could be omitted variables which may influence the access to GVC, while being at the same time correlated with trial length. For example, contract intensive sectors generally display a higher average productivity (for example, because firms in those sectors make a more intensive use of skilled labor), which is a crucial predictor for the access to international markets and which, in Italy, tends to characterize the areas where the law enforcement is more efficient (North). Mechanisms of this kind may create a downward bias in our estimates. For this reasons, we control for firm-level determinants of international subcontracting like size and productivity. Moreover, the literature highlights additional factors that explain the probability of accessing a GVC, and that might in principle be influenced by the quality of local institutions, such as the degree of electronic codifiability of the activities performed by the firms, or the availability/endowment of ICT infrastructures (Fort, 2017). Though these mechanisms might be at work in Italy, they are not likely to affect our estimates: on one hand, product codifiability mostly varies across sectors, and we control for industry fixed effects at a very fine level (4 digits); on the other hand, differential endowments of ICT technologies at the local level are controlled for by the geographic fixed effects included (in the most demanding specification, we include court-level fixed effects). In general, the issue of omitted variable bias is more precisely tackled in section 7, by using a spatial regression discontinuity approach to control for smoothly-varying factors between two neighboring courts.

The second issue relates to reverse causality. Areas in which international sourcing is very diffuse may successfully lobby the Italian Ministry of Justice to maintain a good contracting

environment by keeping there the most efficient judges, court officers and clerks, thus negatively affecting our coefficients of interest. While we cannot exclude this occurrence, this issue looks much more relevant in cross-country analyses rather than in within-country (and, especially within-Italy) regressions. In Italy, decisions on the composition of local courts are made by the High Council of the Judiciary (HCJ), a central governing body of the judicial system whose independence is guarantee by the Italian Constitution (articles 105 to 107).[9] HJC decides according to the dispositions of two major laws: the first is the Royal Decree n. 12 issued on January 30th, 1941, the second is Law 195, published on March 24th, 1958. Both laws were issued in a completely different economic setting, well before problems related to international production fragmentation could even arise. This said, HCJ still retains some discretionary powers in the assignment of judges; yet HCJ is an extremely independent body, whose autonomy is warranted by the Constitution and jealously defended by its components.

Finally, a third issue is related to the problems of sorting or self-selection. Firms that supply customized inputs abroad might be induced to relocate in areas in which courts are more efficient. This would generate a negative bias in our coefficients of interest. We can test this issue by checking whether areas with a better quality of law enforcement tend to be more specialized in contract-intensive sectors. Figure 4 plots the average contract intensity at court level against the average trial length. We use both liberal and conservative definition of contract intensity as defined by Rauch (1999). Although this evidence is not conclusive about the role of sorting, the correlation between the two measures is weak, thus suggesting that sorting is unlikely to be the main driver of our results.[10]

6 Results

The estimation of equation (11) yields the baseline results reported in Table 4. As discussed above, the coefficient of interest is the one attached to trial length, which is our measure of institutional quality. As expected, the coefficient on trial length is negative throughout all the specifications, remaining highly significant as geographic and firm level controls are added. The magnitude of the coefficient remains remarkably stable, as we add industry fixed effects and other firm-level controls such as size (employees) and productivity (value added per worker). The estimate in column (3) tells us that a one-year increase in the length of civil trials would reduce the probability of supplying customized inputs abroad by 1.9 percentage points.

The inclusion of a dummy for the firms located in the Southern regions ensures that the estimated effect is not biased by secular differences between North and South, that influence both the quality of judicial institutions and the propensity of firms to participate in GVCs; the coefficient on this dummy tells us that being located in the South is associated with a 5% lower probability of supplying customized inputs abroad.[11] As expected, size and productivity

[9] Two-thirds of the HJC are made by judged, which are elected by all Italian judges. One-third is instead elected by the Parliament among University Professors of Law or Lawyers.

[10] Even Giacomelli and Menon (2016) provide evidence on the lack of sorting in response to court efficiency in Italy.

[11] All results are confirmed when we exclude Southern regions, that is when we eliminate a set of geographical units characterized by both weak contract enforcement and lagging economic conditions; results also hold when we introduce a finer set of regional (NUTS2) dummies.

positively correlate with the probability of engaging in international subcontracting. Maintaining commercial relationships with other firms of the group significantly increases the probability of entering a GVC.[12]

We then explore the possibility that the effects of institutional quality on the participation to GVCs may be heterogeneous, depending on the contract intensiveness of the industry in which the firm operates as suggested by the theoretical model. To test that, we then turn to the estimation of equation 12; the results are displayed in Table 5. Column (1) reports the estimates for the most parsimonious specification, which includes trial length, contract intensity and their interaction, along with the dummy for South and a set of sector fixed effects (2 digits level).[13] As expected, the coefficient on Rauch's measure is positive, confirming that the probability of entering a GVC is increasing in the scope for differentiation of the goods produced. The coefficient on trial length, instead, is non significant and very close to zero. The effect of institutional quality is mediated by the extent of contract intensity in the sector where a firm operates, as suggested by the coefficient on the interaction term, which is negative and significant: low contract enforcement has a detrimental effect on the participation to GVCs, increasingly so for industries characterized by a higher contract intensity. As more geographic and firm controls are added, the coefficient on trial length stays close to zero, while the one on the interaction term remains negative and significant throughout.[14]

In columns (2)–(4) we progressively add the firm controls, and the industry- and court- level fixed effects, which absorb the coefficient on contract intensity and on trial length, respectively. As more controls are added, the magnitude of the coefficient on the interaction term slightly reduces, though it does not suffer a huge drop: according to the most demanding specification in column (4), a one-year increase in trial length reduces the probability to operate as an international subcontractor by 0.4 percentage points for firms belonging to sectors at the 25th percentile of the (liberal) Rauch classification; the fall amount to 2.1 percentage points for industries at the 75th percentile.[15] A similar magnitude can be obtained when we look at the conservative definition of the Rauch index. To quantitatively assess the aggregate relevance of efficient legal institutions on firms' participation to GVCs, we calculate how would the overall share of firms engaged in international subcontracting vary, in the hypothetical situation in which all courts were as efficient as the best performing one. To do that, we equalize the trial length across tribunals, setting it to the one of the Vercelli court, which displays the lowest average trial duration in Italy (1.03 years). We then calculate for each tribunal the implied effect on GVC participation, keeping the contract intensity fixed at the average value registered at the court level. Finally, we aggregate these effects, appropriately weighting them for the

[12] Results are robust even to the inclusion of dummies identifying exporters and subcontractors (both domestic and international), with the aim of controlling for self-selection into either status. Note that these controls may in turn be plausibly affected by trial length (i.e. they could be outcome variables themselves), and are therefore very likely to configure as bad controls, thus leading to a downward bias of our parameter of interest. Despite decreasing in magnitude as expected, the estimate remains negative and significant even under this more requiring (and likely wrong) specification.

[13] Contract intensity varies at 4 digit level.

[14] Similar results are obtained if we use the conservative version of Rauch classification in place of the liberal one.

[15] The distribution of the Rauch indexes is characterized by a substantial mass of sectors producing only differentiated products; as a consequence, the 75th percentile of the distribution of the Rauch index (both liberal and conservative) is equal to 1.

number of firms in each court, to obtain a back of the envelope quantification of the aggregate effect: if all the courts were as efficient as the Vercelli one is, the share of subcontracting firms in Italy would raise by 2.2 percentage points, from 17.8 to 20%.

In Table 6 we check the robustness of our estimates, addressing two different concerns. First, the dependent variable in equations 11 and 12 equals to one if the firm is an international subcontractor; zero is instead attributed to both non-subcontractors and to subcontractors that only operate domestically. A possible concern relates to the fact that the negative coefficient we found may actually depend on the self-selection into the subcontractor status rather than on the effect of ineffective contract enforcement on the probability to enter a GVC. In order to reject this hypothesis, we re-run our estimates on subcontractors only (columns (1) and (2)). The estimates are robust to this sample cut, remaining negative and significant, with point estimates that are even higher than those presented before.

A second conspicuous concern relates to the presence of multi-plant firms. In section 5 we have discussed that in that case the court in charge of the execution may vary according to the relative size of the firm's assets across plants. The Census collects information on the number of plants belonging to each firm, and this allows us to exclude multi-plant firms from our analysis, in order to control for the potential identification problems related to the multi-localization of assets. Results are presented in the last two columns of table 6. Column (3) reports the estimates of equation (12) without interaction, while column (4) adds heterogeneous effects. The results are in line with a potential attenuation bias in our baseline estimates, due to measurement error: restricting our sample to single plants only, the point estimates are in fact slightly larger in modulus than the baseline ones.

Finally, we make a sanity check on the effects of local institutions on the exporter status as well (this is equivalent to a firm level estimate of Nunn (2007)). Table 7 replicates the previous specifications, using the dummy for exporters as a dependent variable. Results are similar both in sign and significance, but much stronger in magnitude. This consideration applies both to the specification with trial length alone and to the one with the interaction. In the latter case, a one-year increase in trial length would reduce the probability of being an exporter by 0.7 percentage points for firms at the 25th percentile of the (liberal) Rauch classification, and by 3.9 percentage points for those at the 75th percentile.[16]

7 Exploiting spatial discontinuities

In order to provide additional evidence on the mechanism at work, we adopt an alternative identification strategy that exploits the fact that the quality of the institutions discontinuously varies at the border dividing one court from another. The basic idea behind this estimation framework is that — if we consider two firms at two different sides of a court's boundary — they will only differ in the average trial length they are facing, once other geographically-varying confounding factors are controlled for; this empirical setting will therefore allow us to assess the causal impact of being subject to a less efficient court on the firm probability of engaging

[16] A possible concern is that these estimates are driven by the international subcontractors, whose negative relationship with trial length has already been documented; however, dropping these firms leaves the results on exporters basically unchanged.

in international subcontracting. It is worth remembering that the geographical boundaries of Italian courts do not coincide with those of other administrative divisions such as the provinces, so that there is no risk of picking up the effect of other institutional discontinuities.[17]

Building on other empirical works that exploit geographic discontinuities (see, for example, Holmes (1998); Black (1999); Dell (2010); Gibbons et al. (2013)), we adopt an estimation framework that allows us to identify an effect across multiple borders. We partition the boundaries of each court in several segments, one for every neighboring court;[18] henceforth, when we talk about borders we will be referring to these segments. Ideally, we would like to observe a firm's localization to determine its distance from the nearest border; since we are not able to observe a firm's exact position, we proxy it with the centroid of the municipality in which the firm is located. This plausibly leads to a measurement error, that should — if anything — attenuate our estimates.

For each border, it is straightforward to rank the two neighbouring tribunals according to their average trial length. As a consequence, for each border we can identify the set of municipalities (hence, of firms) located in the tribunal with the (relatively) better or worst institutions.[19] If we define belonging to a (relatively) bad court as our treatment of interest, we see that the probability for a firm of being treated experiences a discrete unitary jump at the border between tribunals. The linear distance from the nearest border will therefore be the running variable in our empirical exercise. We conventionally attach negative values of distance to municipalities (and firms) lying on the bad side of a border, and positive values to those belonging to the good side: moving from positive distance values towards the border, a firm will thus get treated when the distance drops down to zero. To test the continuity of the running variable across the borders, we implemented the test put forth by McCrary (2008), whose failure would be hinting at possible manipulations of the treatment assignment; the test is strongly rejected, thus providing another indirect evidence of no sorting across the border.

Having structured the problem like this, we will be estimating the following regression in the first place:

$$y_{icb} = \alpha + \gamma bad_{cb} + f(\text{border distance}_{ib}) + \delta_b + \delta_c + \beta X_i + \varepsilon_{icb} \tag{13}$$

where y_{icb} is a dummy indicating whether firm i, located in court c near border b has engaged in international subcontracting; bad_{cb} is the treatment dummy, equal to 1 if court c's performance is poorer than the one of the neighboring court belonging to the same border b. $f(\text{border distance}_{ib})$ is a polynomial of the distance from the nearest border, which aims at controlling for all the factors smoothly varying as a function of distance even within a single court. We explore different functional forms for this polynomial, by progressively increasing its order; moreover, in order to allow for the maximum degree of flexibility of our estimates, we allow the parameters of the polynomial to vary across treated and non-treated units. δ_b and δ_c are borders and courts fixed effects; as a consequence of pooling together multiple borders, it

[17] As discussed in section 3, the boundaries of the 165 tribunal jurisdictions were established in 1865 after the Italian unification, long before the creation of the provinces as self-standing administrative organizations.

[18] As a consequence, we get as many segments as the pairs of neighbouring tribunals we are able to single out in the administrative map of the courts.

[19] We are not able to find a neighbouring court for every municipality. This is the case, for example, of municipalities lying on the national boundaries or on some segments of the coastline. We are forced to exclude these municipalities from our analyses, which implies dropping around 10,000 firms.

is important to include these fixed effects, since our empirical setup is only valid within border and controlling for relative court efficiency.

Though in principle our identification strategy based on geographic discontinuities does not require additional controls, we still include them in certain specifications to improve the precision of our estimates, by providing additional balancing for firms across the border. X_i is the matrix containing firm level controls: as in equation 11, it includes 4 digits industry fixed effects and size class fixed effects.[20] Moreover, in certain specifications X_i may also contain additional controls, such as log employment, value added per worker and a dummy for trade mostly occurring within-group.[21]

The estimate of coefficient γ in equation 13 will yield the average effect of being subject to a slower tribunal on a firm's probability of engaging in international subcontracting. Since we have previously argued that the quality of judicial institutions is more binding for firms operating in a contract-intensive sector, we then verify whether the estimated average effect displays some heterogeneity across different levels of contract intensity. Based on recent contributions on the estimate of heterogeneous effects in a regression discontinuity design Becker et al. (2013); Accetturo et al. (2014), we estimate the following equation:

$$y_{icb} = \alpha + \gamma_1 bad_{cb} + \gamma_2 CI_i + \gamma_3 bad_{cb} \times CI_i + f(\text{border distance}_{ib}) + \delta_b + \delta_c + \beta X_i + \varepsilon_{icb} \quad (14)$$

where CI_i — again based on Rauch (1999) classification — proxies for the contract intensity of the sector in which firm i operates. For our argument to hold, the contract intensity should amplify the negative effect of belonging to a less efficient tribunal, hence, we would expect coefficient γ_3 to be negative.

Table 8 displays the results obtained estimating equation (13) across different specifications. Columns (1)-(3) report the estimates of the most parsimonious specifications, where we do not add any firm-level control and we just let the order of the distance polynomial vary. Using a linear distance polynomial yields, as expected, a negative coefficient, though not significantly different from zero. The linear distance polynomial is, however, a pretty rough approximation, and when we use a quadratic polynomial —as in column (2)— the coefficient on treatment increases in modulus and becomes significant; the estimates remain basically unchanged when we use a third order polynomial. Since we know that the results obtained under high-order polynomials are likely to be misleading (see Gelman and Imbens (2014)), we take the the quadratic distance polynomial specification as our preferred one, and in column (4) and (5) we add some firm level control. Results do not change appreciably and significances increase. The estimates attached to firm-level controls remain basically unchanged with respect to those presented in Table 4.

To provide a graphical illustration of our exercise and to show that the results are not driven by outliers, Figure 5 replicates the results on collapsed data. More specifically, we first net our dependent variable from border, court, industry and size class fixed effects; then we

[20] Industry fixed effects capture mostly technological and market-related characteristics that determine the role played by the sector in the international fragmentation of production (as for the codifiability of operations discussed above). Size class fixed effects control for the different sampling schemes used to collect data, which vary according to the firm's dimension (3–9, 10–19 and 20+ employees).

[21] As in section 6, we have also tried including a dummy for exporters and one for subcontractors, that we have already argued to be bad controls in our framework. When we add them to the model, the point estimates decrease as expected, though remaining negative and significant.

partition the border distance in equally spaced bins. The scatter plot in Figure 5 displays the bin averages of our netted dependent variable, along with a second order polynomial fit on distance. The fit suffers a sharp downward shift at the border: the difference the two lines returns the estimated effect of being subject to a lower-quality judiciary environment (corresponding to negative distance values).

It is difficult to compare the results obtained under this framework with those discussed in the previous section; this is because in our geographical discontinuity design the treatment is discrete and captures relative differences in court efficiency across borders, while in the previous case we had a direct quantification of the effect of trial length on subcontracting. We can, however, try to provide a rough quantification of the estimates obtained with spatial discontinuities. The estimate displayed in column (5) tells us that, on average, a firm located in a court characterized by a lower institutional quality has a 2.2% lower probability of engaging in international subcontracting. This coefficient has to be interpreted in the light of an average trial length difference across borders of about 0.6 years. Hence, if we wanted to force a comparison with the results presented in Table 4, we would state that the effect turns out to be quite larger when we identify it under the geographic discontinuity framework.[22]

We then turn to estimating equation (14), which takes into account the contract intensity of the sector in which the firms operate. Results are displayed in Table 9, and the specifications adopted are the same as those discussed in the previous table. The coefficient attached on treatment remains non-significant throughout all the specifications; the sign is negative, once we adopt a non-linear distance polynomial. As in Table 5, the coefficient on contract intensity *per se* is positive and significant in the specifications where it is not absorbed by sector fixed effects. What we are primarily interested in, however, is the coefficient on the interaction term, which is negative, significant and satisfactorily stable across all the specifications: a firm located in the jurisdiction of an inefficient court has a lower probability of supplying customized inputs abroad, and this effect is increasingly negative for the firms operating in more contract-intensive sectors. Figure 6 again provides a graphical illustration of our results: the exercise is equivalent to the one presented above, but now we split the sample between firms in sectors with low and high contract intensity (below the 25^{th} or above the 75^{th} percentile of the Rauch (1999) index). Panel (a) shows that at the border little or no effect can be identified for firms with low contract intensity; for those at the top of the Rauch classification, instead, the effect emerges clearly, as the fitted line shifts downward in the negative region. On top of this, it is interesting to notice that — irrespective of their position around the border — firms operating in more contract-intensive sectors on average enjoy a higher probability of engaging in international subcontracting.

As for the magnitude of the effects, we again provide a rough comparison with the results obtained in the previous section. The coefficient on the interaction term in column (5) means that the treatment effect scales up with the level of contract intensity, reducing the probability of entering GVCs by 0.3 percentage points for firms at the 25th percentile of Rauch distribution and by 1.7 for firms at the 75th percentile. This compares again to an average cross-border difference in trial length by 0.6 years. With a simple back of the envelope calculation, we

[22] Remember that in Table 4 we had found that a one-year increase in trial length would make the probability of engaging in international subcontracting decrease by 1.9 percentage points.

could state that if the treatment amounted to a one-year difference in trial length, the effect on the probability of international subcontracting would be negative by 0.5 and 2.8 percentage points for firms at the 25th and 75th percentile of the Rauch distribution, respectively. These magnitudes are slightly larger, but completely in line with what we had shown in Table 5.

In order to assess the soundness of these results, we conduct some robustness checks based on the sample of firms included in our regressions and on the specification of the distance polynomial. A typical robustness check when dealing with regression discontinuity designs involves replicating the results on progressively smaller samples, by shrinking the geographical buffer considered around the border; this check is intended to rule out the possibility of picking up spurious effects that are driven by distant observations. In our setup, we expect this robustness check to even strengthen our estimates. This is because in our empirical setup we have assumed the relevant border for comparison to be the nearest one from each municipality. However, this might not always be the case: in the first place, we have considered the linear distance from the border, while we have disregarded other physical and infrastructural factors (e.g. mountains or roads) that might make a border less accessible than it is through the simple fly distance criterion; second, the assignment of a municipality to a border is increasingly arbitrary as the municipality is closer to the geographical center of the tribunal jurisdiction area. As we shrink the buffer around the borders, these concerns become less and less relevant, as the arbitrariness of the border-municipality match vanishes; as a consequence, measurement error should also drop, so that we might expect our estimates to also gain in precision. We therefore replicate the specification in column (5) of Table 9 over progressively smaller samples, identified by reducing the buffer around each border. Results are displayed in Table 10. As a matter of fact, the estimates of both the treatment effect and the interaction term remain negative throughout the subsamples. The coefficient on the interaction gains in significance as the buffer around the border shrinks, and the point estimates even rise in magnitude when considering a 5km buffer.

Finally, we replicate the results in Table 9 using a bi-dimensional spatial polynomial in both latitude and longitude, in the spirit of Dell (2010). This is a more demanding version of the distance polynomial used so far, and better controls for all the factors that vary smoothly across space.[23] Results are displayed in Table 11. The estimates of the treatment effect *per se* almost drop to zero and remain non significant as before. Nonetheless, the coefficients on the interaction term remain strikingly similar — both in terms of point estimates and of significance — to the ones obtained using the simpler distance polynomial.

8 Concluding remarks

In this paper we study if and to what extent the quality of judiciary institutions at the local level influence the probability for a firm to enter GVCs. To do that, we use a special section the 2011 Italian census, targeted at providing statistical information on Italian firms' participation to the international fragmentation of production; this data source has the merit of exactly identifying the firms that sell customized inputs abroad (international subcontractors), that are the main subject of our study.

[23] To make an example, a second order polynomial in latitude and longitude would be defined as $lat + lon + lat \times lon + lat^2 + lon^2$.

We exploit the fact that Italy displays a substantial amount of heterogeneity in the quality of local institutions. We focus in particular on judiciary efficiency — measured by the length of civil trials at the court level — as the relevant dimension that is likely to reverberate on the capacity of a firm to sign customized inputs provisioning contracts with foreign counterparts. We argue that the inherent riskiness of a contract gets inflated when the judicial system is unable to guarantee an efficient and timely enforcement of the rule of law. Hence, firms subject to the jurisdiction of an inefficient court may face additional difficulties in entering GVCs as a subcontractor. This is a particularly relevant issue for a country like Italy, which ranks very low in cross-country comparisons on the effectiveness of contract enforcement.

Our results show that firms located in courts with a higher trial length in civil disputes are less likely to supply customized inputs to foreign firms: a one-year increase in trial length reduces the probability of entering a GVC by 1.9 percentage points. The effect is stronger for firms operating in sectors characterized by a strong contractual activity (which typically are the sectors that require high relationship–specific investments). For the firms at the 25th percentile of the distribution of the contract-intensity index, the effect of a one-year increase in trial length is almost negligible (0.4 percentage points), while it is much larger for those lying at the 75th percentile (2.1 percentage points). For an average level of contract intensity, the hypothetical scenario in which all the courts were as efficient as the best performing one (Vercelli, with an average trial length of 1.03 years) would imply an increase in the aggregate share of subcontracting firms by 2.2 percentage points, from 17.8 to 20%.

To corroborate our results, we adopt a more demanding identification strategy that exploits the fact that the quality of the institutions discontinuously varies at the border dividing one court from another. Under this empirical framework, we compare the firms lying at the two sides of each court boundary, and identify the treatment effect of being located in the side characterized by the worst quality of judicial institutions. The results confirm the negative and significant effect of trial length on the probability of supplying customized inputs abroad; also in this case, the effect is stronger for firms operating in contract-intensive sectors. As for the magnitude of these effects, a rough quantification exercise suggests that they are comparable across specifications. The empirical setup based on the spatial discontinuity across tribunals returns slightly larger estimates: one-year difference in trial length would negatively affect the probability of international subcontracting by 0.5 and 2.8 percentage points for firms at the 25th and 75th percentile of the contract intensity distribution, respectively.

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Tables

Table 1: Summary statistics

	Full sample		20+ employees	
	Mean	Std. dev.	Mean	Std. dev.
Dummy exporter	0.561	0.496	0.679	0.467
Dummy international subcontractor	0.178	0.383	0.236	0.425
Dummy subcontractor	0.527	0.499	0.568	0.495
Employees	32.621	154.454	68.339	239.728
Revenues (million €)	9.015	108.867	20.141	171.465
Value added (million €)	1.977	11.956	4.389	18.631
Value added per worker (thousand €)	44.600	75.794	52.999	38.806
Trial length (in years)	2.312	0.721	2.275	0.696
% Rauch liberal	0.820	0.289	0.822	0.287
% Rauch conservative	0.861	0.272	0.864	0.269

Source: 9*th* Census of Industry and Services and Italian Ministry of Justice.

Table 2: Summary statistics by firm status

	#	empl	revs (M€)	VA (M€)	VApw (th€)	trial length
(a) Full sample						
Domestic only	32,257	18.43	3.47	0.86	36.26	2.44
Exporting	41,208	43.73	13.36	2.86	51.13	2.21
No subcontr.	34,744	32.82	10.14	2.08	43.34	2.35
Domestic subcontr.	25,273	27.93	6.76	1.51	41.88	2.33
International subcontr.	2,573	46.52	12.02	3.13	54.97	2.17
Both	10,875	39.58	9.97	2.47	52.52	2.17
(b) 20+ employees						
Domestic only	9,422	43.86	9.17	2.23	42.78	2.42
Exporting	19,970	79.89	25.32	5.41	57.82	2.21
No subcontr.	12,704	75.30	24.95	5.11	54.33	2.29
Domestic subcontr.	9,622	58.73	15.51	3.36	47.71	2.33
International subcontr.	1,439	75.21	19.44	5.17	59.63	2.17
Both	5,627	67.29	17.38	4.33	57.35	2.18

Source: 9*th* Census of Industry and Services and Italian Ministry of Justice. The first column shown the numerosity of each group, while all the other statistics are group averages. The last column displays the average trial length in the judicial districts where the firms are located.

Table 3: Regression at court level

	(1)	(2)	(3)
Trial length	-0.0496***	-0.0201***	-0.0084
	[0.0051]	[0.0058]	[0.0054]
Dummy South		-0.0852***	
		[0.0099]	
Region FE	N	N	Y
R^2	0.383	0.584	0.770
Obs.	165	165	165

Notes: Variables are court-level averages. Robust standard errors in brackets. Significance level: * p<0.10, ** p<0.05, *** p<0.01.

Table 4: Baseline regressions

	(1)	(2)	(3)
Trial length	-0.0215***	-0.0190***	-0.0191***
	[0.0063]	[0.0046]	[0.0046]
Dummy South	-0.0850***	-0.0580***	-0.0532***
	[0.0090]	[0.0070]	[0.0068]
Log employees			0.0322***
			[0.0039]
VA per worker			0.0001**
			[0.0001]
Dummy business group			0.1332***
			[0.0082]
Size class dummy	Y	Y	Y
Industry FE	N	Y	Y
R^2	0.031	0.069	0.077
Obs.	73,465	73,465	73,435

Notes: The dependent variable is a dummy for firms exporting customized goods. Industry fixed effects defined according to the Ateco2007 classification at 4 digits. Three size classes are defined, reflecting the different sampling schemes adopted by the "Indagine multiscopo" survey: 3–9 employees; 10–19 employees; 20+ employees. Standard errors in brackets clustered at the court level. Significance level: * p<0.10, ** p<0.05, *** p<0.01.

Table 5: Heterogeneous effects by contract intensity

	(1)	(2)	(3)	(4)
Trial length	0.0033	0.0004	0.0005	
	[0.0056]	[0.0056]	[0.0056]	
Contract intensity	0.0661***			
	[0.0151]			
TL × CI	-0.0296***	-0.0236***	-0.0239***	-0.0210***
	[0.0062]	[0.0062]	[0.0062]	[0.0062]
Dummy South	-0.0630***	-0.0583***	-0.0535***	
	[0.0072]	[0.0069]	[0.0068]	
Log employees			0.0322***	0.0318***
			[0.0039]	[0.0039]
VA per worker			0.0001**	0.0001**
			[0.0001]	[0.0001]
Dummy business group			0.1331***	0.1322***
			[0.0082]	[0.0081]
Size class dummy	Y	Y	Y	Y
Sector FE	Y	N	N	N
Industry FE	N	Y	Y	Y
Court FE	N	N	N	Y
R^2	0.053	0.069	0.078	0.083
Obs.	73,465	73,465	73,435	73,435

Notes: The dependent variable is a dummy for firms exporting customized goods. The Rauch index in its liberal version is used as a measure of contract intensity; results do not vary when the conservative version is used. Sector fixed effects defined according to the Ateco2007 classification at 2 digits; industry fixed effects are instead defined at 4 digits. Three size classes are defined, reflecting the different sampling schemes adopted by the "Indagine multiscopo" survey: 3–9 employees; 10–19 employees; 20+ employees. Standard errors in brackets clustered at the court level. Significance level: * p<0.10, ** p<0.05, *** p<0.01.

Table 6: Robustness checks: restricting sample to subcontractors and single plants

	Only subcontractors		Only single plants	
	(1)	(2)	(3)	(4)
Trial length	-0.0357***		-0.0203***	
	[0.0082]		[0.0049]	
TL × CI		-0.0334***		-0.0239***
		[0.0125]		[0.0071]
Log employees	0.0933***	0.0939***	0.0509***	0.0505***
	[0.0056]	[0.0055]	[0.0043]	[0.0043]
VA per worker	0.0002	0.0002	0.0001*	0.0001*
	[0.0001]	[0.0001]	[0.0001]	[0.0001]
Dummy business group	-0.0672***	-0.0691***	0.1270***	0.1258***
	[0.0089]	[0.0090]	[0.0111]	[0.0110]
Dummy South	-0.0846***		-0.0536***	-0.1490***
	[0.0114]		[0.0072]	[0.0066]
Size class dummy	Y	Y	Y	Y
Industry FE	Y	Y	Y	Y
Court FE	N	Y	N	Y
R^2	0.132	0.144	0.081	0.088
Obs.	38,707	38,707	57,501	57,501

Notes: The dependent variable is a dummy for firms exporting customized goods. In the interaction term, the Rauch index in its liberal version is used as a measure of contract intensity; results do not vary when the conservative version is used. Industry fixed effects defined according to the Ateco2007 classification at 4 digits. Three size classes are defined, reflecting the different sampling schemes adopted by the "Indagine multiscopo" survey: 3–9 employees; 10–19 employees; 20+ employees. Standard errors in brackets clustered at the court level. Significance level: * p<0.10, ** p<0.05, *** p<0.01.

Table 7: Export as a dependent variable

	(1)	(2)	(3)	(4)
Trial length	-0.0398***	-0.0386***	0.0054	
	[0.0099]	[0.0098]	[0.0114]	
Contract Intensity			0.0875***	
			[0.0272]	
TL × CI			-0.0590***	-0.0390***
			[0.0119]	[0.0094]
Dummy South	-0.1405***	-0.1300***	-0.1427***	
	[0.0151]	[0.0149]	[0.0165]	
Log employees		0.1247***	0.1286***	0.1241***
		[0.0045]	[0.0047]	[0.0045]
VA per worker		0.0003	0.0003	0.0003
		[0.0002]	[0.0002]	[0.0002]
Size class dummy	Y	Y	Y	Y
Sector FE	N	N	Y	N
Industry FE	Y	Y	N	Y
Court FE	N	N	N	Y
R^2	0.204	0.223	0.157	0.238
Obs.	73,465	73,435	73,435	73,435

Notes: The dependent variable is a dummy for exporters. The Rauch index in its liberal version is used as a measure of contract intensity; results do not vary when the conservative version is used. Sector fixed effects defined according to the Ateco2007 classification at 2 digits; industry fixed effects are instead defined at 4 digits. Three size classes are defined, reflecting the different sampling schemes adopted by the "Indagine multiscopo" survey: 3–9 employees; 10–19 employees; 20+ employees. Standard errors in brackets clustered at the court level. Significance level: * p<0.10, ** p<0.05, *** p<0.01.

Table 8: Spatial regression discontinuity, baseline results

	(1)	(2)	(3)	(4)	(5)
Treatment (bad court)	-0.0050	-0.0224**	-0.0224*	-0.0223***	-0.0217***
	[0.0116]	[0.0101]	[0.0124]	[0.0077]	[0.0080]
Log employees					0.0308***
					[0.0042]
VA per worker					0.0000**
					[0.0000]
Dummy business group					0.1356***
					[0.0081]
Border FE	Y	Y	Y	Y	Y
Court FE	Y	Y	Y	Y	Y
Size class FE	N	N	N	Y	Y
Industry FE	N	N	N	Y	Y
Order of spatial polynomial	1st	2nd	3rd	2nd	2nd
R^2	0.026	0.026	0.026	0.076	0.084
Obs.	63,283	63,283	63,283	63,282	63,252

Notes: The dependent variable is a dummy for firms exporting customized goods. Industry fixed effects defined according to the Ateco2007 classification at 4 digits. Three size classes are defined, reflecting the different sampling schemes adopted by the "Indagine multiscopo" survey: 3–9 employees; 10–19 employees; 20+ employees. One-dimensional spatial polynomial based on the distance from the border. Standard errors in brackets clustered at the border and court level. Significance level: * p<0.10, ** p<0.05, *** p<0.01.

Table 9: Spatial regression discontinuity, heterogeneous effects by contract intensity

	(1)	(2)	(3)	(4)	(5)
Treatment (bad court)	0.0119	-0.0059	-0.0062	-0.0081	-0.0082
	[0.0145]	[0.0136]	[0.0150]	[0.0110]	[0.0116]
Contract Intensity	0.0770***	0.0770***	0.0771***		
	[0.0089]	[0.0088]	[0.0089]		
Treatment × CI	-0.0210**	-0.0209**	-0.0210**	-0.0174*	-0.0166*
	[0.0104]	[0.0104]	[0.0104]	[0.0097]	[0.0098]
Log employees					0.0308***
					[0.0042]
VA per worker					0.0000**
					[0.0000]
Dummy business group					0.1356***
					[0.0081]
Border FE	Y	Y	Y	Y	Y
Court FE	Y	Y	Y	Y	Y
Size class FE	N	N	N	Y	Y
Industry FE	N	N	N	Y	Y
Order of spatial polynomial	1st	2nd	3rd	2nd	2nd
R^2	0.028	0.028	0.028	0.076	0.084
Obs.	63,283	63,283	63,283	63,282	63,252

Notes: The dependent variable is a dummy for firms exporting customized goods. The Rauch index in its liberal version is used as a measure of contract intensity; results do not vary when the conservative version is used. Industry fixed effects defined according to the Ateco2007 classification at 4 digits. Three size classes are defined, reflecting the different sampling schemes adopted by the "Indagine multiscopo" survey: 3–9 employees; 10–19 employees; 20+ employees. One-dimensional spatial polynomial based on the distance from the border. Standard errors in brackets clustered at the border and court level. Significance level: * p<0.10, ** p<0.05, *** p<0.01.

Table 10: SRD robustness check: restricting sample around the border

	(1) full sample	(2) 20 km	(3) 15 km	(4) 10 km	(5) 5 km
Treatment (bad court)	-0.0082	-0.0066	-0.0082	-0.0134	-0.0061
	[0.0116]	[0.0110]	[0.0112]	[0.0150]	[0.0219]
Treatment × CI	-0.0166*	-0.0175*	-0.0159*	-0.0172*	-0.0249**
	[0.0098]	[0.0094]	[0.0087]	[0.0087]	[0.0117]
Log employees	0.0308***	0.0313***	0.0307***	0.0314***	0.0352***
	[0.0042]	[0.0043]	[0.0043]	[0.0048]	[0.0053]
VA per worker	0.0000**	0.0000**	0.0000**	0.0000**	0.0000*
	[0.0000]	[0.0000]	[0.0000]	[0.0000]	[0.0000]
Dummy business group	0.1356***	0.1380***	0.1382***	0.1416***	0.1377***
	[0.0081]	[0.0080]	[0.0082]	[0.0092]	[0.0146]
Size class FE	Y	Y	Y	Y	Y
Industry FE	Y	Y	Y	Y	Y
Border FE	Y	Y	Y	Y	Y
Court FE	Y	Y	Y	Y	Y
Order of spatial polynomial	2nd	2nd	2nd	2nd	2nd
R^2	0.084	0.084	0.085	0.085	0.092
Obs.	63,252	62,339	59,776	52,093	30,740

Notes: The dependent variable is a dummy for firms exporting customized goods. The Rauch index in its liberal version is used as a measure of contract intensity; results do not vary when the conservative version is used. Sample is progressively restricted, selecting firms belonging to a progressively narrower buffer around the court border. Industry fixed effects defined according to the Ateco2007 classification at 4 digits. Three size classes are defined, reflecting the different sampling schemes adopted by the "Indagine multiscopo" survey: 3–9 employees; 10–19 employees; 20+ employees. One-dimensional spatial polynomial based on the distance from the border. Standard errors in brackets clustered at the border and court level. Significance level: * p<0.10, ** p<0.05, *** p<0.01.

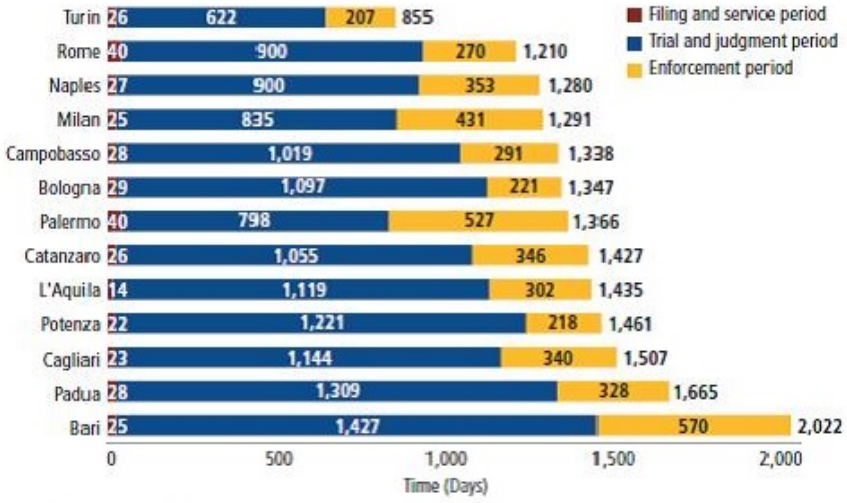
Table 11: SRD robustness check: bidimensional spatial polynomial

	(1)	(2)	(3)	(4)	(5)
Treatment (bad court)	0.0082	0.0087	0.0083	0.0065	0.0058
	[0.0117]	[0.0117]	[0.0118]	[0.0104]	[0.0109]
Contract Intensity	0.0768***	0.0766***	0.0764***		
	[0.0087]	[0.0087]	[0.0087]		
Treatment × CI	-0.0210**	-0.0209**	-0.0205*	-0.0175*	-0.0166*
	[0.0103]	[0.0103]	[0.0104]	[0.0096]	[0.0098]
Log employees					0.0308***
					[0.0042]
VA per worker					0.0000**
					[0.0000]
Dummy business group					0.1354***
					[0.0082]
Border FE	Y	Y	Y	Y	Y
Court FE	Y	Y	Y	Y	Y
Size class FE	N	N	N	Y	Y
Industry FE	N	N	N	Y	Y
Order of spatial polynomial	1st	2nd	3rd	2nd	2nd
R^2	0.028	0.028	0.028	0.076	0.084
Obs.	63,283	63,283	63,283	63,282	63,252

Notes: The dependent variable is a dummy for firms exporting customized goods. The Rauch index in its liberal version is used as a measure of contract intensity; results do not vary when the conservative version is used. Industry fixed effects defined according to the Ateco2007 classification at 4 digits. Three size classes are defined, reflecting the different sampling schemes adopted by the "Indagine multiscopo" survey: 3–9 employees; 10–19 employees; 20+ employees. Bidimensional spatial polynomial based on latitude and longitude. Standard errors in brackets clustered at the border and court level. Significance level: * p<0.10, ** p<0.05, *** p<0.01.

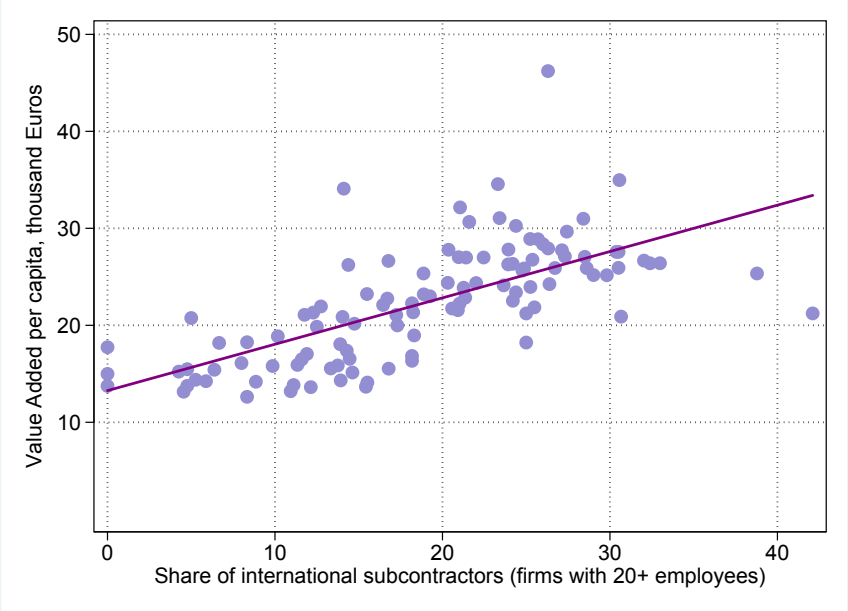
Figures

Figure 1: Heterogeneity in the efficiency of Italian civil justice



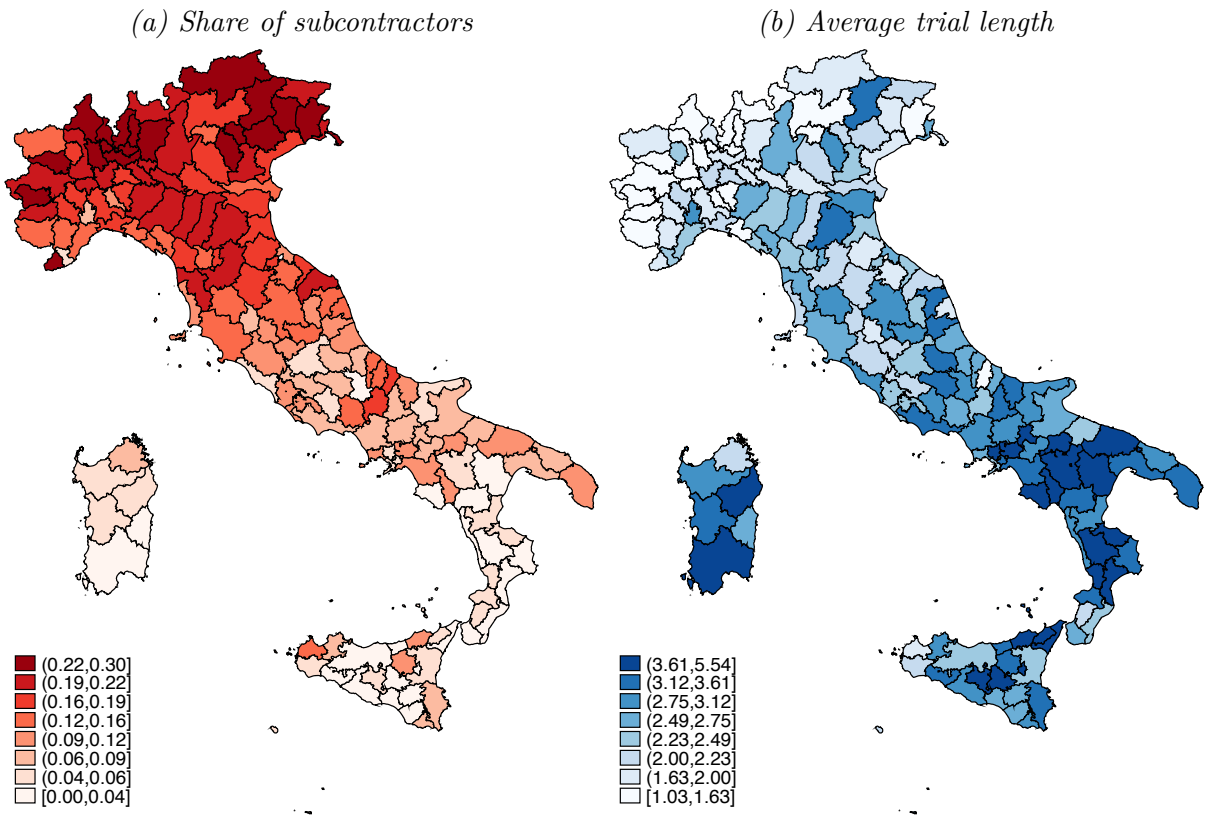
Source: Doing Business report.

Figure 2: Participation to GVCs and Value Added per capita at provincial level in Italy



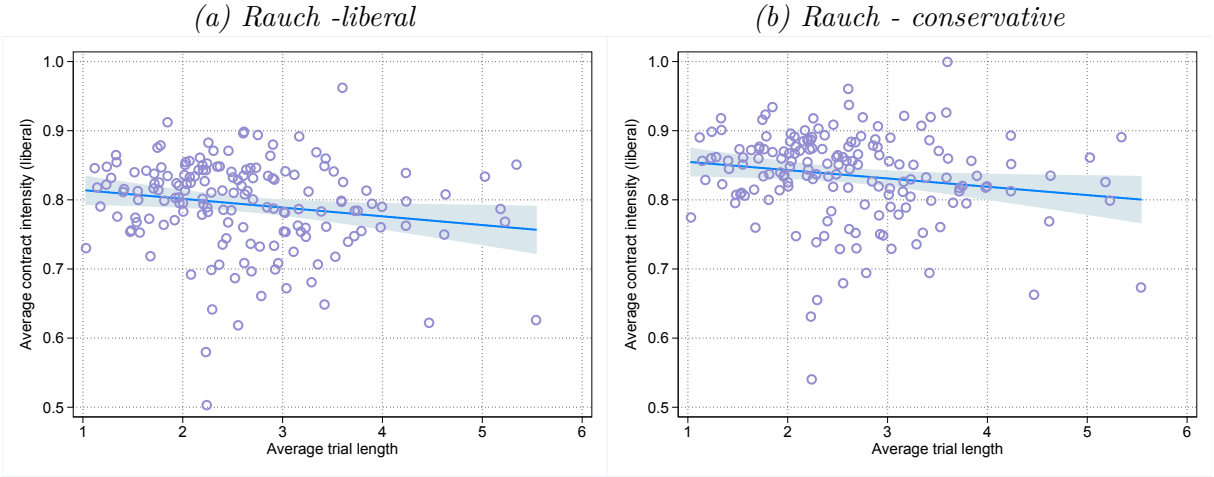
Source: 9*th* Census of Industry and Services and ISTAT National Accounts.

Figure 3: The geography of subcontracting and judiciary efficiency



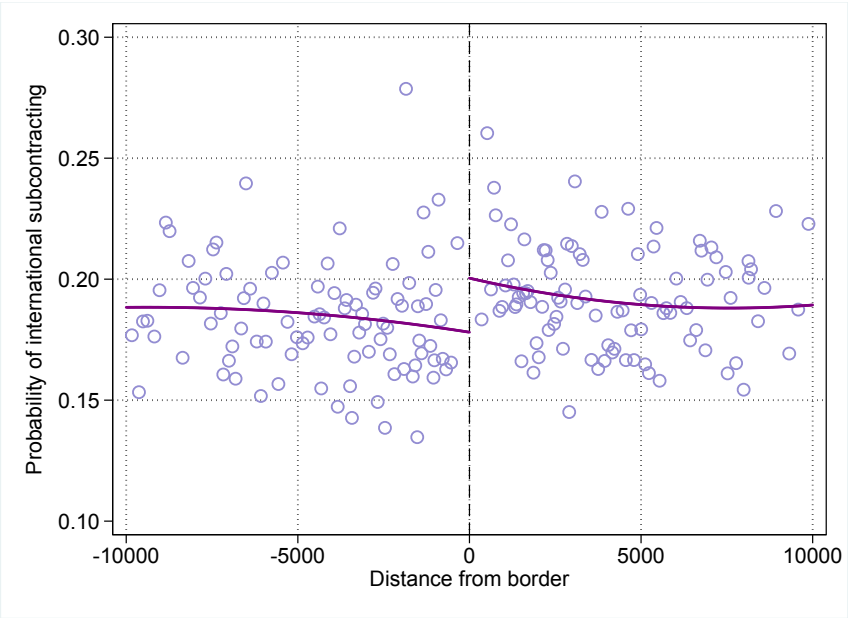
Source: 9*th* Census of Industry and Services and Italian Ministry of Justice. The left panel shows the share of firms participating in GVCs within each court.

Figure 4: Controlling for sorting



Source: 9*th* Census of Industry and Services and Italian Ministry of Justice. Each dot represents a court. On the y-axis we report the average contract intensity (according to Rauch (1999) liberal classification) across firms within a court. The x-axis represents the average trial length at the court level, expressed in years.

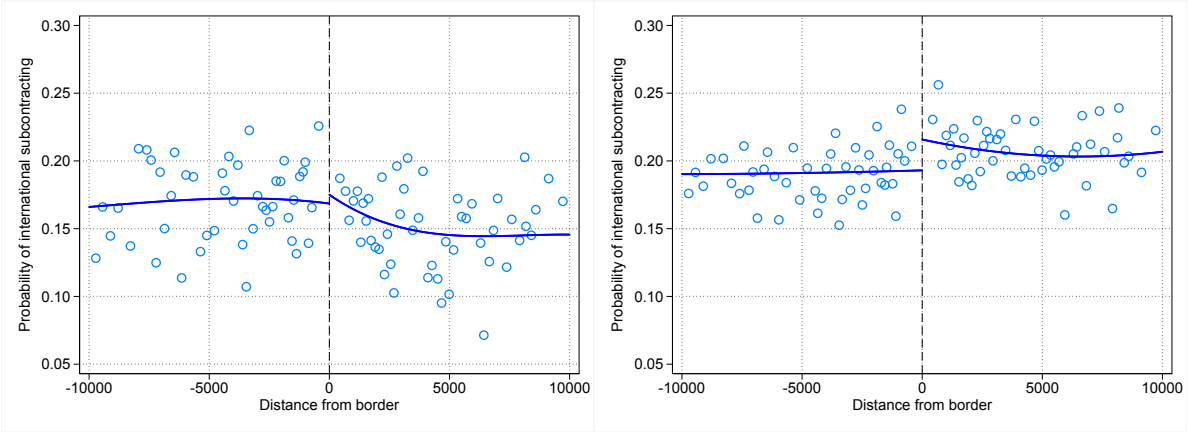
Figure 5: Spatial discontinuity, treatment effect at the border



The distance around the border has been partitioned in 200 equally-spaced bins. The dots represent the average within each bin of the dependent variable (dummy for international subcontracting), netted of border, court, industry and size class fixed effects. The line is a 3rd order polynomial fit.

Figure 6: Spatial discontinuity, heterogeneous effect by contract intensity

(a) Below 25^{th} percentile *(b) Above 75^{th} percentile*



In each panel, the distance around the border has been partitioned in 100 equally-spaced bins. The dots represent the average within each bin of the dependent variable (dummy for international subcontracting), netted of border, court, industry and size class fixed effects. The line is a 3rd order polynomial fit.