OECD Regional Development Papers

Do local court inefficiencies delay public works? Evidence from Italian municipalities

By: Francesco Decarolis, Gianpiero Mattera, Carlo Menon

Public procurement accounts for around 12% of global GDP and 63% of expenditures are managed by subnational governments across OECD countries. In Italy, municipalities can impose penalties on contractors for breaches of contract, for example delays in delivery, often leading to contractors suing the municipality in local courts, which can in turn further delay delivery. As such the efficiency of the local judiciary can have a strong bearing on the final delivery of public works. This study assesses the causal effect of those efficiencies on the ultimate delay in the execution of local public contracts. The results show that inefficient courts lead to further delays in the execution of public works that are already long overdue. However, inefficient courts also appear to deter companies to pursue litigation in cases where delays were much lower. Overall, the impact on long-overdue contracts prevails and the aggregate effect is negative: the total delay in the execution of local public contracts in the 25% least efficient courts is more than twice as large as in the 25% most efficient courts.

JEL codes: H11, H57, K41
Keywords: Court efficiency, public procurement, Quantile regression, spatial discontinuity, municipalities, Italy.

ABOUT THE OECD

The OECD is a multi-disciplinary inter-governmental organisation with member countries which engages in its work an increasing number of non-members from all regions of the world. The Organisation's core mission today is to help governments work together towards a stronger, cleaner, fairer global economy. Through its network of specialised committees and working groups, the OECD provides a setting where governments compare policy experiences, seek answers to common problems, identify good practice, and co-ordinate domestic and international policies. More information available: www.oecd.org.

ABOUT OECD REGIONAL DEVELOPMENT PAPERS

Papers from the Centre for Entrepreneurship, SMEs, Regions and Cities of the OECD cover a full range of topics including regional statistics and analysis, urban governance and economics, rural governance and economics, and multi-level governance. Depending on the programme of work, the papers can cover specific topics such as regional innovation and networks, sustainable development, the determinants of regional growth or fiscal consolidation at the subnational level. OECD Regional Development Papers are published on http://www.oecd.org/cfe/regional-policy.

OECD Working Papers should not be reported as representing the official views of the OECD or of its member countries. The opinions expressed and arguments employed are those of the author(s).

Working Papers describe preliminary results or research in progress by the author(s) and are published to stimulate discussion on a broad range of issues on which the OECD works. Comments on Working Papers are welcome, and may be sent to the Centre for Entrepreneurship, SMEs, Regions and Cities, OECD, 2 rue André-Pascal, 75775 Paris Cedex 16, France.

This paper is authorised for publication by Lamia Kamal-Chaoui, Director, Centre for Entrepreneurship, SMEs, Regions and Cities, OECD.

Acknowledgements

The authors are grateful to Nadim Ahmad, Rudiger Ahrend, Monica Brezzi, Emanuele Ciani, Domenico Depalo, Pamela Giustinelli, Dario Lunardon, Paulo Magina, Ana-Maria Ruiz Rivadeneira and Olmo Silva for useful comments and insights. Chiara Motta provided excellent research assistance. Decarolis gratefully acknowledges financial support from the European Research Council (ERC-2015-StG-679217).[1]

[1] Francesco Decarolis: Department of Economics, Bocconi University, Milan, Italy; Gianpiero Mattera: OECD, Directorate for Science, Technology and Innovation; Carlo Menon: OECD, Centre for Entrepreneurship, SMEs, Regions and Cities.

Table of contents

Acknowledgements 3

Key messages 5

1 Introduction 6

2 Institutions and Incentives 8
- Institutions I: The geography of judicial efficiency in Italy 8
- Institutions II: The public procurement system 9
- Incentives: a basic conceptual framework 10

3 Identification and econometric specification 12
- Data 12
- Empirical Strategy: spatial discontinuity design 13
- Regression framework 14

4 Results 16
- Aggregate effect at municipality level 17

Conclusions and policy recommendations 19

References 21

Annex A. Data construction 24

Key messages

- Delays in the construction of public infrastructures, such as roads or schools, harm citizens and businesses and constitute a significant impediment to economic growth. In Italy, more than 75% of contracts accumulate some delay, often resulting in municipalities (who collectively manage more than two billion euro per year in procurement expenditures) applying penalties proportional to the length of delay, and, in turn, contractors litigating in local courts. This can lead to further delays in the completion of public works.
- Inefficient courts can add to these delays. However the relationship between efficiencies and further delays is non-trivial as inefficient courts may also act as a deterrent to contractors seeking perceived redress.
- Leveraging a granular dataset covering the universe of public contracts issued at municipality level in Italy, this paper confirms that hypothesis. The results show that inefficient courts lead to further delays in the execution of public works that are already long overdue. However, the decision of a firm to delay the contract execution depends on the perceived efficiency of the local court. For small delays in contract completions, the likely costs associated with the court case can be larger than the penalty, and, so, act as a deterrent to litigation, in turn avoiding further delays in completion. Indeed the perception of inefficient courts may also work to incentivise firms to complete contracts on time. Overall, however, the impact on long-overdue contracts prevails and the aggregate effect is negative: the total delay in the execution of local public contracts in the 25% least efficient courts is more than twice as large as in the 25% most efficient courts.
- Possible solutions to remedy these inefficiencies, and the associated impacts on public delivery that delays incur, include the creation of specialised courts with jurisdiction over disputes involving public procurement and the establishment of alternative dispute resolution (ADR) systems that can help resolve procurement-related cases without a trial.

1 Introduction

Nearly all activities where the public sector is involved, from defence to transportation, from education to healthcare, require the public sector to procure works or goods from private contractors. Public procurement at the subnational level accounts on average for 63% of total procurement spending across OECD countries (OECD, 2015), accounting for around 12% of global GDP in 2018 (Bosio et al., 2020).

However, a significant share of contracts are often completed with a delay (over 75% in Italy), resulting in penalties for contractors imposed by local procuring municipalities. In such cases, contractors are able to appeal against penalties by turning to local courts. This can, in turn, lead to additional delays in the completion of projects, especially when the courts are inefficient, resulting in socio-economic impacts on citizens and local economies who stand to benefit from completed works.

It is no coincidence therefore that foreign aid agencies spent a total of $5.4 billion USD between 1996 and 2016 on various judicial reform programs (Chemin, 2020). Indeed, the fundamental role that courts play in effective contract enforcement is the main reason why a well-functioning judicial system is considered a pillar of economic development (North, 1990; Djankov et al., 2003; Acemoglu and Robinson, 2012).[2]

This study assesses the causal effect of civil justice efficiency on the delays in public contract execution, taking Italy – with 165 local courts with sole jurisdiction to resolve disputes – as an example.

The perceived efficiency of local courts can affect the completion of contracts in a number of ways. Underpinning all scenarios is the central trade-off all contractors are likely to face. In absence of exogeneous risks at the execution stage, the company can compress profits and complete on time, reducing the risk of paying penalties and potential legal costs to recuperate penalties. Alternatively, the contractor can increase profits by delaying works (e.g., hiring fewer workers, renting less machinery), paying penalties and, if litigation is pursued, legal costs. If exogenous shocks create delays that are not due to strategic choices of the contractor, the latter still has the option to reduce profits (or incur losses) to try to still deliver in time, or rather face the litigation risk. The type of trade-off is therefore valid across different risk profiles.

The degree or at least perception of inefficiency of the local court is a determinant in considering that trade-off.

- For contracts that are on-track or likely to be only slightly overdue, an inefficient court may motivate contractors to accelerate the execution of contracts rather than pay for the costs of a long lawsuit, which may often outweigh any potential penalties.
- For contracts that are long overdue, however, the penalties imposed may be sufficiently onerous that firms choose to pursue court cases despite the inefficiencies. Therefore, the contractor may have an incentive to maximise profits by further delaying the execution of the contract (*strategic*

[2] Indeed, strong contract enforcement has been found to impact significantly on the availability and cost of credit (Qian and Strahan, 2007; Fabbri, 2010; Ponticelli and Alencar, 2016), the development of financial credits (Djankov et al., 2008), competition in markets (Johnson et al., 2002) and trade patterns (Berkowitz et al., 2006; Nunn, 2007)

effect), bearing the risk of having to sue the municipality if it decides to impose penalties. In addition, if the contractor does eventually go to court, the final delivery of the contracted work may be further delayed until the litigation is settled (*direct* effect).

Consistent with these scenarios, results indicate that justice inefficiency has opposite effects on short- and long-overdue contracts, respectively. The potential recourse of using inefficient courts appears to reduce delays for the top 20% of contracts with least delay, while inefficient courts appear to increase delays in the bottom 20% of contracts (i.e., the longest overdue). This means that in less efficient courts there is a higher incidence of both works that are delivered on time or with little delay (less than 80% of the contracted duration) and works that are delivered with a long delay (exceeding 120% of the contracted duration). The incidence of works with an average delay (between 80 and 120% of the contracted duration) is, on the other hand, lower.

The net impact for citizens – measured in days of delay – is estimated by calculating the aggregate effect at municipality-level. The analysis shows that the negative outcome on long-overdue contracts outweighs the positive outcome on short-overdue contracts and judicial inefficiency leads to more days of delay in aggregate. The effect is sizeable: the relative delay in contracted works is about 50% larger in a court that ranks at around 120th place (out of 165) of the court efficiency ranking than in a court that ranks at around 40th place.

The study has important implications for regional policy. First, it highlights the importance of addressing possible obstacles to the effective functioning of local courts as a tool to reduce large delays in public works. Second, it points to an important dimension of spatial heterogeneity in local business conditions (at least in the Italian case) that does not normally attract attention in the regional policy debate. While there is an important role for the central government to ensure that this heterogeneity is reduced, local policy makers may provide tailored solutions, including designing contracts that can mitigate the negative effect of judicial efficiency on local procurement.

2 Institutions and Incentives

Institutions I: The geography of judicial efficiency in Italy

The geography of civil justice in Italy is a remarkable case of historical legacy and institutional inertia that results in significant differences in court inefficiency across the national territory. This section illustrates the specific institutional setting, while section 3 discusses how it supports the chosen identification strategy.

Over the period of time covered by this paper's analysis (2002-2012), the functioning of the Italian civil justice system was assigned to 165 courts, covering the whole national territory. The geography of these courts was established in 1865, straight after the unification of Italy, taking into account the judicial systems of the previously independent states. Since then and until 2013, no existing court has been removed, and a few new courts were established in the 1960s and 1990s.[3] As a result of this historical inertia, court jurisdictions do not systematically match administrative boundaries. However, they never cross regional borders and, in some cases, their borders overlap with provincial borders.[4]

Another remarkable characteristic of the Italian judicial geography relates to the large variation in the degree of inefficiency across courts. This is visible in Figure 1, which maps the average length of civil proceedings (measured in days) by court jurisdiction over 2002-2012. While there is a systematic geographical pattern (Southern courts on average are twice as slow as Northern ones) there is still a fair amount of variation within regions and between neighbouring courts.

Several factors may explain these variations. First, the difference across macro-regions (North, Centre, and South) may partly be explained by a variation in the litigation rate (expressed as the number of disputes brought to courts relative to the population), which is higher in Southern regions. Second, the national government is in charge of allocating resources among the courts, with limited flexibility to adjust for changes in local demand. Third, the supply side also shows significant variation. In fact, there is substantial randomness in the distribution of judges' productivity among courts (Coviello, Ichino, and Persico, 2015) and this tends to be persistent due to the impossibility for local courts to select and appoint judges, as well as the absence of effective court management systems and incentive mechanisms for judges to expedite proceedings.

Civil proceedings are assigned to courts on a geographic basis. For public procurement contracts, except in special circumstances, the proceeding will be assigned to the court overseeing the geographic area where the contracting authority (CA) is located. Since the CAs in the sample are municipalities, it is straightforward to associate each procurement contract to the relevant court.

[3] In the last 50 years, 11 new small courts have been established (5 in the 1960s and 6 in the 1990s). The findings are unaffected by excluding these courts. See Giacomelli and Menon (2017) and Bianco et al. (2007) for further details.

[4] Regions and provinces are the administrative units which correspond to level 2 and level 3 in the Eurostat NUTS classification, respectively.

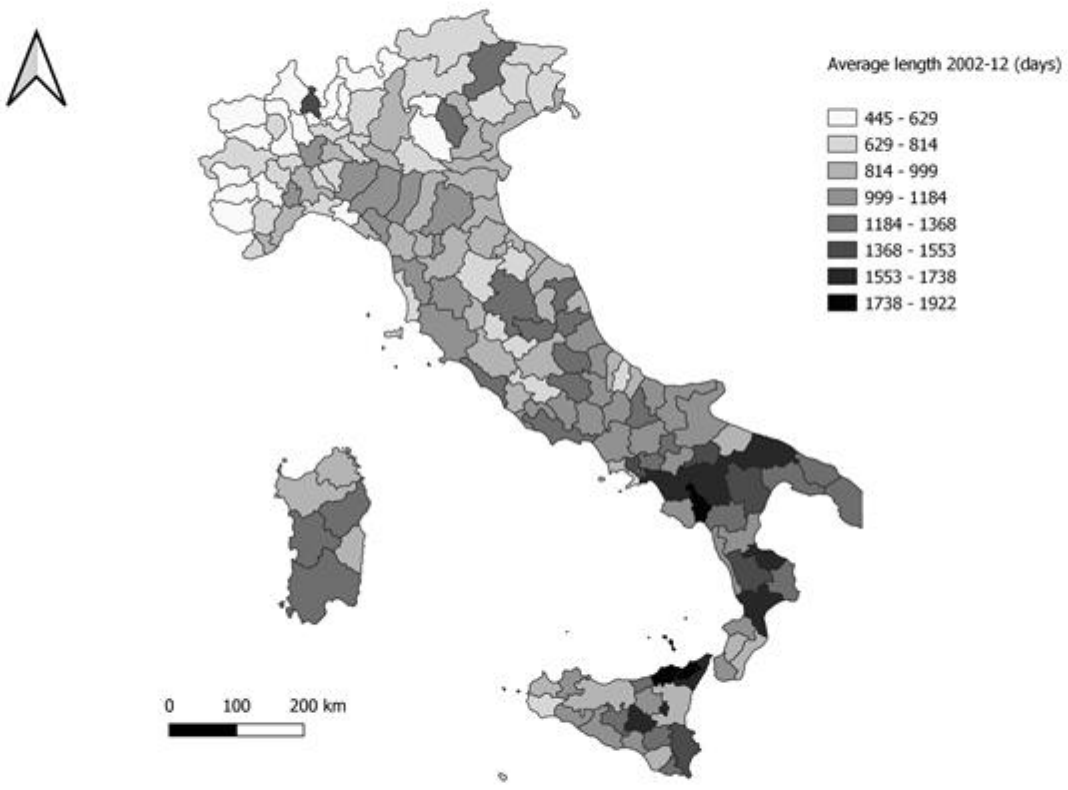
Institutions II: The public procurement system

The procurement of contracts for the construction and maintenance of public infrastructure follows detailed rules. Depending on the contract value and other characteristics, these rules derive from the EU Directives on procurement, national legislation, local authority regulations, or, typically, a combination of all of the above (Decarolis and Giorgiantonio, 2005). Frequently, the system requires a CA – for instance, the procurement office of a municipality – to draw up a call for tender, which includes, among other contractual details, the contract duration (i.e., the delivery time to complete the job). Moreover, it also specifies the procedure to solve potential contractual disputes, with civil courts being the default contract enforcement institutions.[5]

If a dispute emerges during the contract execution, both the CA and the supplier can act as plaintiffs. However, various mechanisms are in place to help solve disputes and avoid the opening of a court case.

Figure 1. Even contiguous courts show large variation in efficiency

Average length of civil proceedings, 2002-12



Note: The figure reports the yearly average length (in days) of civil proceedings across the 165 courts in Italy.
Source: ISTAT and Italian Ministry of Justice.

[5] Any alternative dispute resolution system that is common in the US procurement system (such as arbitration) is hardly ever adopted.

The exact nature of these mechanisms varies depending on whether the dispute regards in-scope work (i.e., features of the job as originally planned) or out-of-scope work (i.e., modifications of the originally planned job). For both types, both the CAs and the suppliers are entitled to negotiate if the dispute involves a relatively "minor share" of the contract value,[6] Otherwise consensual (extrajudicial) contract resolution is the only possibility.

Finally, CAs can take advantage of a few tools to induce suppliers to comply with contract specifications. The first tool relies on the timing of payments, distributed over the contract duration to allow a CA to delay them if not satisfied with the work's progress. The second tool is to apply penalties to the last payment instalment. These penalties are calculated per-day of delay and their amount is proportional to the contract value.[7] The third tool is the execution of a supplier's financial guarantees that, by law, take the form of an irrevocable letter of credit to be paid immediately at the CA's request. With all these tools available, a CA will act as the plaintiff before a court only in those rare circumstances where the behaviour of a supplier caused damages for a CA, beyond those that the penalties and the financial guarantees are meant to restore. For this reason, nearly all court cases involve firms suing CA and not vice versa.

Incentives: a basic conceptual framework

The institutional framework described so far drives a precise sequence of actions taken by CA and its suppliers when delays occur in contract execution. Firstly, the CA applies the penalty to the last payment due to its supplier, which can either accept the penalty or sue the CA before a court. If the firm opts for undertaking a judicial action, the CA can either defend itself before the court or rescind the penalty. Court cases generate for the plaintiff both fixed costs, sustained when opening the case, and variable costs, which are commensurate with the duration of the trial.

Payoffs from delays in executing the contracted works can compensate the costs of judicial action, as firms benefit from not having to undertake additional costs that would be required to complete the contract promptly. Conversely, the delay has a negative payoff for the CA, as it suffers monetary and reputational damages from not having the infrastructure available for the taxpayers. These factors, coupled with the cost structure and the action sequencing described above, imply that there is likely to be a non-linear relationship between contract delays and court inefficiency.

When delays are small, a CA can only impose a small penalty on the firm, thus making the cost of starting a court case for the firm likely larger than the benefit that a firm might obtain by having the penalty restored. Such an incentive not to sue a CA is stronger in slower (inefficient) courts, where the expected length of the trial would discourage firms to pay higher variable costs to restore a moderate penalty. Indeed, in these cases, the presence of less efficient courts also acts as an incentive to deliver contracts on time, as the only realistic way to avoid incurring penalties.

As the delay grows however, so does the penalty and, hence, the incentives for a firm to pursue litigation. In particular, if the marginal cost of going to trial is sufficiently low,[8] there will be a cut-off value for delay (not observable by the econometrician) after which, taking into account their expected probability of

---

[6] Typically up to one-fifth of the initial contract value.

[7] In more detail, penalties are commensurate with the days of delay and proportional to the amount of the contract or the performance of the contract. The penalties due for delayed fulfilment are calculated daily between 0.3 per thousand and 1 per thousand of the net contractual amount, to be determined considering the extent of the consequences related to the delay, and in all cases, cannot overall exceed 10 percent of said net contractual amount.

[8] The assumption is that variable costs are linear to the number of days of trial, i.e. marginal cost is constant.

success[9] in addition to court fees, the firm has a positive expected payoff by choosing to bring the case to a court.

In such a setting, the inefficiency of the court is a critical factor for further delays, reflecting both a direct and a strategic effect. The direct effect derives from the fact that, by starting a trial, the contract completion is interrupted, accumulating further delays until the case is settled. The strategic effect is a consequence of the direct effect: envisaging a long court case impeding the completion of the public work, a firm anticipates that a CA would accommodate its delay without imposing any penalty. The firm strategically takes advantage of this possibility, increasing its profits by delaying the job.[10]

[9] It is assumed that the expected probability of success is the same across all courts. To the best of the authors' knowledge, there are not data available to test this assumption, but it appears plausible at least for the bigger courts that employ many judges, which should ensure that subjective differences in the interpretation of the relevant national laws are averaged out. While the issue is partially addressed in the robustness tests, this is an area that deserves further exploration in future work, including by developing specific indicators on the expected probability of success at court level.

[10] There are many legal technicalities that are ignored for the sake of simplicity. For instance, following this accommodating the strategic introduction of some out-of-scope modifications in the contract to justify why a longer execution is not a delay to which penalties are applicable. Otherwise, the public administrator acting on behalf of a *CA* which decides not to impose any penalty on a belated firm would expose himself to a serious threat of being sued for damages. They can indeed be prosecuted by the Court of Auditors for not having applied the penalty to which a *CA* was entitled.

3 Identification and econometric specification

Data

The analysis builds upon a large dataset that merges data on average length of first instance civil proceedings at court level, and data on procurement performance at the contract level. The average length of civil proceedings is commonly used as a proxy for the strength of contract enforcement, e.g., in the World Bank "Doing Business" ranking (World Bank, 2020), as well as in the economic literature (Fabbri, 2010; Giacomelli and Menon, 2017). Such data are provided by ISTAT, the Italian national statistical office, and the Italian Ministry of Justice. Public procurement data come from a large database maintained by the Italian Anti-corruption Authority (ANAC), which comprises information on all public work contracts awarded between 2002 and 2012. These procurement auctions include the universe of public works contracts solicited by Italian public CA over the sampling period. Most contracts involve the maintenance or construction of roads and (non-military) buildings, or more specialized works on public infrastructure. On average across the whole period, the total amount of contracted work is equal to 2.18 billion euros per year. To focus on a homogeneous sample of CAs, the sample is limited to contracts that were issued by municipalities. The dataset includes two proxy measures of contract irregularities: delay and cost overrun. The distribution of cost overruns in the data has multiple discontinuity points due to thresholds set by the law and the local regulations for the allowed cost renegotiation.[11] For delays, there are no pre-specified thresholds in the law and, accordingly, the distribution observed in the data is rather smooth. For this reason, the analysis focusses on delays, leaving the discussion on cost overruns in the appendix.[12] Following Decarolis (2014), time delay is measured as the ratio between the length of delay in delivering the contract and the length of the contract.

Descriptive statistics (Appendix, Table A.1) are reported separately for both the full sample (roughly 38,000 contracts) and the sample of municipalities located along a jurisdiction border (roughly 21,000 contracts). The border-discontinuity design described below requires restricting the analysis to the latter sample. The viability of this approach is reinforced by the observed similarities in the main statistics reported for the two samples.[13]

---

[11] In fact, what a "minor share" is depends on both the national law and a plethora of regional regulations: in most regions, modifications implying a cost overrun of up to 5 percent of the contract value are subject to a straightforward authorization process; for the next 15 percent of the contract value the authorization process is more involved but still relatively straightforward (all the rights are allocated to the *CA*, which can ask modifications up to this threshold); finally, if the modifications involve one fifth of the original contract value or more, contract resolution is typically unavoidable. See Decarolis and Giorgiantonio (2005) and Decarolis and Palumbo (2015).

[12] The results using cost overruns are qualitatively similar to those using delays, although less sharply defined.

[13] The appendix includes a table A.2 that reports descriptive statistics for a sample of firms that have won at least one contract in two or more court jurisdictions. To mimic the main identification strategy, descriptive statistics are calculated for the most and least efficient courts in each border group. Also in this case, differences in mean are minimal and never significant.

Empirical Strategy: spatial discontinuity design

The conceptual framework suggests that a firm's behaviour may change depending on the perceived court efficiency, and the related contract enforcement level. When delay and expected penalties are limited, a more inefficient court (i.e. where civil proceedings are particularly long) discourages suing, making the firm's threat of going to trial against the CA less credible. Conversely, for higher values of delays, a slower and inefficient court increases the benefits of suing a CA. The expected penalties are indeed likely to be greater than the expected total cost connected to civil proceedings, increasing the likelihood of firms opting for challenging the CA before a court.

If the effect of court inefficiency on procurement performance did not change at different points of the procurement performance distribution, the following empirical specification would hold:

$$Y_{itp} = L_{kt}\beta + \varepsilon_{ipt} \qquad (1)$$

where subscripts i, t, p denote contract, year, and place (i.e., the area in which the municipality issuing the contract is located) respectively. Y_{itp} is the measure of procurement performance of interest (i.e., delays) while L_{kt} corresponds to the average length of judicial civil procedures in court k at time t. However, a key insight of this contribution is the emphasis on the differential effect that court efficiency might have at different points of the delay distribution. For this reason, the empirical approach used for the analysis is based on quantile regressions. In particular, it models the τ^{th} quantile of the distribution of the procurement outcome Y as a conditional function of L as follows:

$$Q_{yitb}(\tau \mid L_{kt}) = L_{kt}\beta(\tau) \qquad (2)$$

where the coefficient of the main regressor, $\beta(\tau)$, is conditional upon the quantile of interest τ.

However, the model is likely to deliver inconsistent estimates due to a systematic omitted variable bias. Delays in contract execution are likely driven by multiple factors, some of which might also be associated with court efficiency. To address this issue, the estimation follows a spatial discontinuity design (Duranton et al., 2011; Black, 1999; Holmes, 1998), which was first applied to the case of civil justice inefficiency in Italy by Giacomelli and Menon (2017).

The empirical strategy consists of restricting the sample to observations that are located near a spatial discontinuity that affects only the variable of interest (i.e., judicial inefficiency), and in mean-differentiating all the variables within the group of observations that share the same discontinuity. This is operationalised by limiting the sample to municipalities located on either side of a jurisdiction border and augmenting the model in equation (2) with a set of border dummy variables δ_b, which identify municipalities located at either side of a given jurisdiction border.

In the data, the border groups comprise on average 12.5 municipalities. Panel (a) of Figure 2 provides a graphic representation limited to the Italian northern regions for the sake of readability: among all of the municipalities (thin grey lines), only those along jurisdiction borders (darker bold lines) are used, and different colours define border groups.

Panel (b) provides an example of the source of variation that is captured by the empirical specification. Eight municipalities (the border group) are all located on the jurisdictional border *A* (in red), four of them refer to court *Y* and the other four to court *X*. The empirical strategy consists in restricting the attention only to contracts stipulated by the *CAs* that refer to these eight municipalities (i.e. the border group) and the border dummies δ_b are instrumental for exploiting the source of variation that comes from the differential of judicial efficiency between courts Y and X.

Two conditions are required at the discontinuity (i.e. jurisdiction borders) to produce consistent estimates: *i)* court inefficiency displays a discrete variation; and *ii)* all other unobserved factors that may affect the outcome vary smoothly. The first condition is evident in Figure 1: large discontinuities are present for most border groups. The second assumption cannot be validated empirically. However, the peculiarity of the institutional setting lies in the fact that jurisdiction borders do not match any other type of administrative boundary. Giacomelli and Menon (2017) provide supporting evidence on the exogenous nature of jurisdiction borders by showing that a series of variables unlikely to be affected by the length of civil proceedings (ranging from the crime rate to proxies for social capital) have indeed the same value at both sides of the discontinuity, and display the same distribution in efficient and inefficient courts. Other unobservable variables, such as e.g. civicness or litigation propensity, are also assumed not to show discrete jumps at the border.

Although their analysis reveals causal effects of court efficiency on the size and growth of firms incorporated in different jurisdictions, the analysis controls for firm heterogeneity by including fixed effects for the identity of the firm performing the contract. The main estimates thus exploit within firm variation in court efficiency resulting from firms winning contracts across municipalities located on opposite sides of jurisdiction borders.

Regression framework

The presence of border dummies entails the introduction of a large number of fixed effects. This, however, implies that standard quantile methods may provide inconsistent estimates of the main regressor due to its inflated variability. Koenker (2004) suggests a solution to this problem by employing a penalized fixed effects estimator for longitudinal data, with LASSO penalty to shrink fixed effects to zero. Hence, similar to standard quantile regression models, the effects of covariates are permitted to be dependent upon the quantile of interest. However, individual effects are treated as pure location shifts and are not quantile dependent.

Therefore, the following quantile function is estimated:

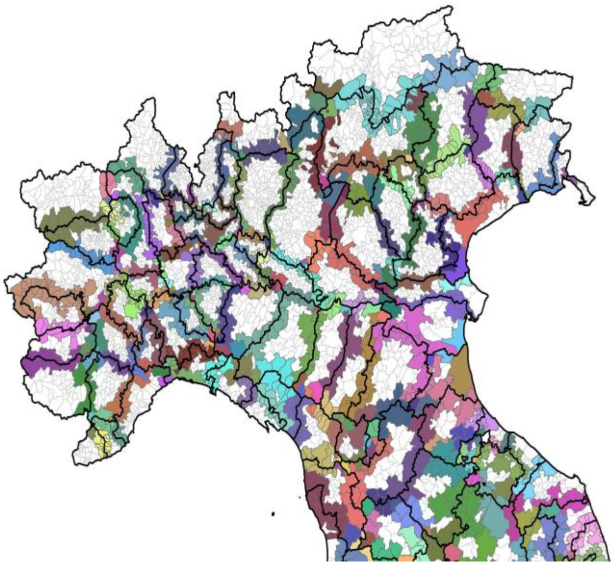
$$Q_{yitb}(\tau \mid L_{kt}, \delta_b, \gamma_r, \vartheta_t, \zeta_i) = \delta_b + L_{kt}\beta(\tau) + \gamma_r + \vartheta_t + \zeta_i + \varphi_f \qquad (3)$$

where the border dummies δ_b are instrumental to exploit judicial spatial discontinuity for identification. The model is further augmented with a set of year (ϑ_t), region (γ_r) and contract value (ζ_i) fixed effects, which help to control, respectively, for unobserved heterogeneity over time and across regions, as well as for the amount awarded.

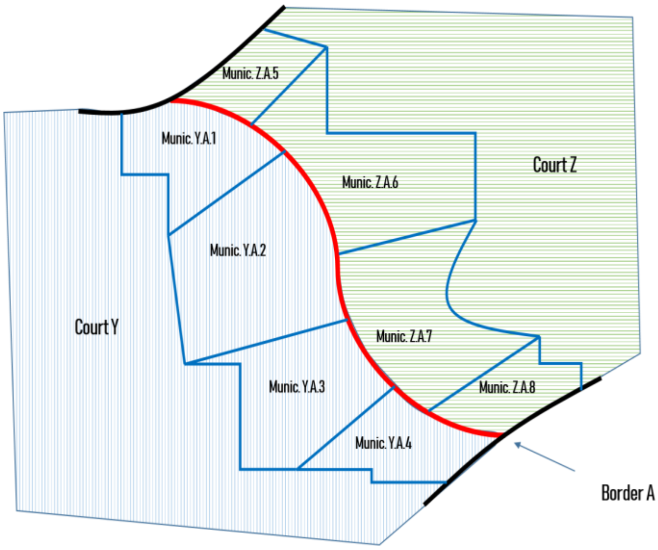
The inclusion of firm fixed effects, φ_f, is particularly important as it allows us to control for any unobserved, firm-specific heterogeneity which could be particularly salient as firms might self-select into contracts, in part based on their different attitudes toward court efficiency.[14]

[14] Robust standard errors are estimated using the generalized bootstrap method proposed by Bose and Chatterjee (2003). This procedure requires us to define the factor variable that identifies the data panel structure, and jurisdiction borders b play this role in the analysis. To each border, a random weight is randomly drawn from a unit exponential distribution. Note that weights are not assigned to observations, implying that different contracts awarded in the same border will be assigned the same random weight.

Figure 2 - Jurisdiction and municipality borders



(a)



(b)

Note: The map in the panel (a) shows jurisdiction (dark bold lines) and municipality borders (thinner grey lines) for Italian northern regions. Different colours identify municipalities located at both sides of each jurisdiction border, which correspond to the border groups in the specification. Panel (b) provides an example of the different geographic entities that enter in the specification: the border *A* in red identifies the border between jurisdictions *Y* and *Z*, while municipalities *1-8* correspond to a *border group*.

4 Results

In line with the basic theoretical framework, the estimates show that an increase in court inefficiency leads to a diverging effect on procurement delays. For smaller delays, the relatively low level of penalties and higher variable lawsuit costs make a firm less willing to sue a CA with an inefficient jurisdiction, thus marginally reducing the time delay to deliver the contract. In case of larger delays, the expected net gains for the firm to further delay the delivery of the contract with an inefficient jurisdiction becomes positive (strategic effect), and a lawsuit that pauses the works for a longer period of time becomes more likely (direct effect). In Figure 3, the top two panels present model specifications not including firm fixed effects, while the bottom panels augment these same three models with firm fixed effects. Each panel specifies the exact set of fixed effects that are included.

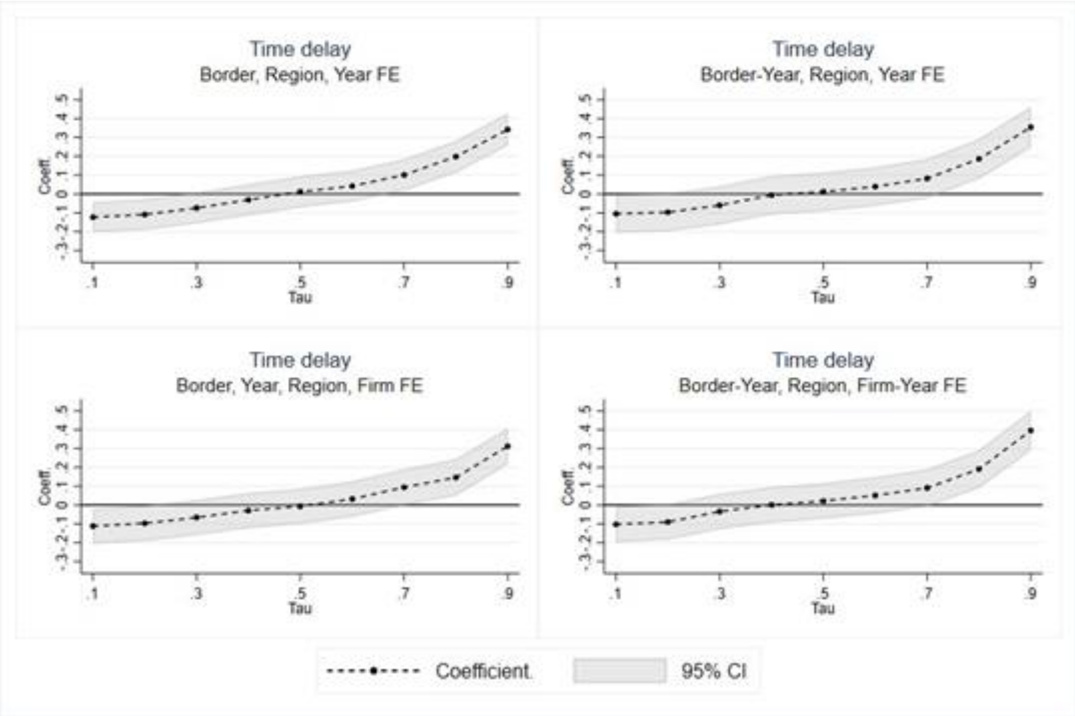
Court inefficiency significantly affects the tails of the delay distribution: baseline estimates indicate a significant positive impact on upper deciles with coefficients associated to the top 80th percentile ranging from 0.146 to 0.198 across the different specifications used. This means that a 10% reduction in the length of proceedings reduces the actual duration (i.e., contracted duration plus delay) of long-overdue contracts by 1.5-2%. The impact of judiciary inefficiency on the lower tails of the delay distribution is also significant, with coefficients related to the 20th percentile ranging from -0.109 to -0.09. This means that a 10% reduction in the length of proceedings increases the actual duration of long-overdue contracts by around 1%. Considering that the percentage difference in average proceeding length between courts at the 25th and 75th percentile of the distribution is about 50%, both effects are sizeable.

The results are remarkably robust as all models deliver qualitatively similar results. The diverging effect on the delay distribution is confirmed by controlling for unobserved border- and regional-specific yearly shocks (right-upper panel). In particular, border-year fixed effects represent a useful refinement of the empirical strategy, allowing us to compare contracts that are performed in the same period and issued in municipalities at the two sides of a border. The inclusion of such dummies produces only minor effects on the enforcement coefficients along the distribution of time delay (right-upper panel): the size of coefficients related to top quantiles of the distribution decreases slightly, while coefficients at the bottom of the distribution show a larger decrease (the coefficient associated with the 20th percentile reduces to -0.187).

The analysis is extended by adding firm fixed effects to control for the effects of firm idiosyncratic characteristics on procurement outcomes. Coupled with border dummies, firm fixed effects help refine the estimates by capturing the within-firm variation between efficient and inefficient courts. The comparison of the estimates reported in the top and lower panels of Figure 3 suggests that the inclusion of firm fixed effects also has a minor impact on the estimates. With firm fixed effects included (lower-left panel), the size of coefficients for the top 90th percentile is even higher than in the case without these fixed effects.

An additional robustness test looks at whether the results differ depending on the court size (measured as the total residing population). One possible channel through which court size may play a role is uncertainty in expected probability of winning the case for the contractor. Smaller courts employ fewer judges. Decisions are less collegial and more subjective, and it is statistically more likely that cases are handled by a judge with a track-record of “partisan” decisions. Thus, extreme outcomes are more likely in small courts. To the extent that the smaller court size translates into higher uncertainty in the expected leniency of the judges toward the contractors’ (or CA’s) instances, this could act as a further incentive to speed up works in order to avoid court litigation for short-overdue contracts. This hypothesis is supported by limiting the sample to the 50% biggest courts, as the coefficients on the first two deciles (i.e., for the shortest-overdue contracts) turn insignificant.[15]

Figure 3. Baseline estimates and Firm Fixed Effect Quantile Regressions



Notes: The figure displays quantile estimates and 95 percent confidence intervals (red area) based on equation 3. Dependent variable: Time delay is a contract level measure, calculated as the difference between the actual and the contractual time as a percentage of the contractual time. Values below -0.5 and above 5 were dropped. Negative values correspond to cases where the contract has been delivered in advance of contractual terms. Independent variable: Length of judicial procedures varies at court-year level, measured as the natural logarithm of the sum of pending cases at the beginning and at the end of year t, over the sum of the new cases filed during the year and the cases that ended with a judicial decision or were withdrawn by the parties during the year.

Aggregate effect at municipality level

Given the non-linear effect uncovered by the quantile regressions, welfare effects are unclear: do public works in municipalities with slower courts accumulate more or less delay, in aggregate? This question is addressed with a regression at municipality level, in which the dependent variable is the aggregate delay ratio, calculated as the net sum of all days of delay (positive or negative) over the sum of the contracted length of all contracts issued by the municipality over the period under analysis. The identification strategy mirrors the approach adopted for the quantile regressions, adapted to a cross-sectional setting. The estimated model is therefore as follows:

$$Y_{ikbr} = \delta_b + L_k\beta + \gamma_r + \varepsilon_{ikbr} \qquad (4)$$

The explanatory variable of interest is the average length of judicial proceedings in the court k *in* which the municipality is located (L_k); border group (δ_b) and region (γ_r) dummies are also included. The model is estimated with OLS with standard errors clustered at court level. A robustness test estimates an alternative

[15] Results are available upon request.

specification with total delay as dependent variable, and total contracted length as a control variable.[16] The results (reported in Table 1) show that judicial inefficiency leads to more days of delay in aggregate, and the effect is sizeable: in the preferred specification, a month (30 days) increase in average trial length causes an increase of 1,5 percentage points of the aggregate delay ratio. Considering that there are 15 months difference between the court at the 25th and 75th percentile of distribution, the difference in delay between municipalities in the two groups is approximately 22.5 percentage points, compared to an average baseline delay ratio of 39%.

Table 1. Regressions at municipality level

	Delay ratio		Days of delay	
Length judicial procedures (months)	0.0165***	0.00646*	83.80**	176.3**
	(0.00551)	(0.00342)	(39.05)	(80.50)
Total contracted length			0.193***	0.203***
			(0.0207)	(0.0181)
Constant	-0.140	0.170	-1,438	-5,360*
	(0.188)	(0.108)	(1,467)	(3,028)
Observations	146	1,845	146	1,847
R-squared	0.296	0.353	0.937	0.985

Notes: The table displays the results from regression (OLS) analysis at municipality level. All regressions include border dummies and region dummies, and the sample is restricted only to municipalities located along a jurisdiction border. The dependent variables are the ratio of the total days of delay of all contracted works in the period 2002-12 over their contracted length (col. 1 and 2); and the total days of delay of all contracted works in the period 2002-12 (col. 3 and 4). In col. 1 and 3 the sample is restricted to municipalities with more than 20,000 inhabitants in the 2011 Census, and the observations are unweighted; in col. 2 and 4 all border municipalities are included the observations are weighted by their population in the 2011 Census. Standard errors are robust and clustered at court level. ***, **, and * indicate significance at the 1, 5, and 10 percent critical level.

[16] In order to account for the skewed distribution of municipality size (the median population is about 4,600), the analysis is restricted to municipalities with at least 20,000 inhabitants in the 2011 Census, or observations are weighted by municipality population.

Conclusions and policy recommendations

This paper assesses the effect of weak contract enforcement on ex-post contract performance in the context of public work procurement. Inefficient courts lead to further delay in the execution of public works that are already long overdue, but create an incentive for companies to avoid litigation, which may also lead to less delay for works that are on-track or little overdue.

Based on these findings, an interesting question relates to which justice reforms would be desirable, and the sheer size of public procurement (OECD, 2015; Bosio et al., 2020) makes this a question of primary importance. Delays in the construction of public infrastructures hurt citizens and businesses, including through impacts on economic growth. Inefficient courts, by worsening delays for those contracts experiencing larger delays, can exacerbate these costs. Policy interventions can address the two channels through which court inefficiency affects delays, i.e. the *direct and strategic* effects.

Speeding up court cases involving public contracts would address the *direct* effect. A range of solutions exists to achieve this goal. One straightforward solution would be to create a fast-track within courts for cases involving procurement contracts. This could prioritise those cases involving infrastructure where delays are more substantial in terms of their length or economic impact, as well as cases in which the contractor is a small or medium-sized enterprise (SME) that has less capacity to deal with lengthy judicial proceedings (OECD, 2018). A more proactive solution could entail enhancing out-of-court mechanisms or alternative dispute resolution (ADR) systems. In the US, the major reform of the Federal Acquisition Regulation under the Clinton presidency in the 1990s saw numerous legislative enactments and executive orders encouraging the use of ADR techniques to resolve disputes involving the Government, including procurement-related cases (Schooner, 2001).

The second set of remedies involves curbing the *strategic* exploitation of court inefficiency by private suppliers. There is a well-established literature in public procurement dating back to Spulber (1990) arguing why this is a daunting task. The intrinsic uncertainty existing in contract procurement and the difficulty for the contractor and the CA to foresee all technical aspects of the planned works lead to the risk of selecting those contractors that are laxer about respecting a pre-defined timeline, and thus are also more likely to seek ex post renegotiations. This risk is especially pronounced in public procurement due to the mandatory use of open competition auctions to select suppliers, as competition fosters adverse selection and moral hazard. Solutions offered in the literature to ease this problem range from the use of performance bonding (Calveras et al., 2004; Ganuza, 2007), to the introduction of vendor rating systems (Decarolis et al., 2016), to changes in the auction format (Burguet et al., 2012). The complexity of the problem entails the impossibility of identifying an always optimal solution: for instance, performance bonding is known to substantially increase a supplier's price bids, while a vendor rating system only makes sense with frequently procured contracts. Nevertheless, it would be important for future research to better link the analysis of these procurement reforms to their interactions with the issue of the efficiency of the court systems as they jointly contribute to the definition of procurement outcomes.

Another effective solution to reduce ex-ante the risk of litigation is enabling municipalities to be good contracting authorities. This may include strengthening the capacities of local civil servants to prepare well-designed tenders and contracts, as well as streamlining the legal framework regulating (local) public procurement. Beyond the direct effect of weaking the incentives for contractors to resort to litigation and having fewer delays due civil proceedings, the reduced workload in courts would also lead to more efficient courts.

While this paper focuses on a specific and commonly investigated aspect of contract enforcement weakness – i.e., the length of first-degree proceedings – future work may look at other factors that may vary at court level, such as differences in contractors' expected probability of winning the case or the appeal rate. This would give a clearer picture of the different aspects of the functioning of civil justice that deserve further improvements.

References

Aberra, A. and Chemin, M. (2017). Does Legal Representation Increase Investment? Evidence from a Field Experiment in Kenya. Technical report, working paper.

Acemoglu, D. and Johnson, S. (2005). Unbundling institutions. *Journal of political Economy*, 113(5):949–995.

Acemoglu, D. and Robinson, J. A. (2012). *Why nations fail: The origins of power, prosperity, and poverty*. Crown Books.

Bajari, P., Houghton, S., and Tadelis, S. (2014). Bidding for incomplete contracts: An Empirical Analysis of Adaptation Costs. *American Economic Review*, 104(4):1288–1319.

Berkowitz, D., Moenius, J., and Pistor, K. (2006). Trade, law, and product complexity. *Review of Economics and Statistics*, 88(2):363 – 373.

Bianco, M., Giacomelli, S., Giorgiantonio, C., Palumbo, G., and Szego, B. (2007). La durata (eccessiva) dei procedimenti civili in Italia: offerta, domanda o rito? *Rivista di Politica Economica*, 47(9-10):3 – 53.

Black, S. E. (1999). Do better schools matter? Parental valuation of elementary education. *Quarterly Journal of Economics*, 114(2):577 – 599.

Bose, A. and Chatterjee, S. (2003). Generalized bootstrap for estimators of minimizers of convex functions. *Journal of Statistical Planning and Inference*, 117(2):225 – 239.

Bosio, E., Djankov, S., Glaeser, E. L., and Shleifer, A. (2020). Public procurement in law and practice. Working Paper 27188, National Bureau of Economic Research.

Burguet, R., Ganuza, J., and Hauk, E. (2012). Limited liability and mechanism design in procurement. *Games and Economic Behavior*, 76(1):15 – 25.

Calveras, A., Ganuza, J., and Hauk, E. (2004). Wild bids. Gambling for Resurrection in Procurement Contracts. *Journal of Regulatory Economics*, 26:41–68.

Chemin, M. (2009a). Do judiciaries matter for development? Evidence from India. *Journal of Comparative Economics*, 37(2):230–250.

Chemin, M. (2009b). The impact of the judiciary on entrepreneurship: Evaluation of Pakistan's Access to Justice Programme. *Journal of Public Economics*, 93(1-2):114–125.

Chemin, M. (2012). Does court speed shape economic activity? Evidence from a court reform in india. *The Journal of Law, Economics, & Organization*, 28(3):460–485.

Chemin, M. (2020). Judicial Efficiency and Firm Productivity: Evidence from a World Database of Judicial Reforms. *The Review of Economics and Statistics*, 102(1):49–64.

Clark, D. and Merryman, J. (1976). Measuring the duration of judicial and administrative proceedings. *Michigan Law Review*, 75:89 – 99.

Coviello, D., Ichino, A., Persico, A. (2015). The Inefficiency of Worker Time Use. *Journal of the European Economic Association*, 13(5):906–947.

Coviello, D., Moretti, L., Spagnolo, G., and Valbonesi, P. (2018). Court efficiency and procurement performance. *The Scandinavian Journal of Economics*, 120(3):826–858.

D'Alpaos, C., Moretto, M., Valbonesi, P., and Vergalli, S. (2013). Time overruns as opportunistic behavior in public procurement. *Journal of Economics*, 110(1):25–43.

De Silva, D. G., Dunne, T., Kosmopoulou, G., and Lamarche, C. (2017). Contract Modification and Bidding in Highway Procurement Auctions. *mimeo*.

Decarolis, F. (2014). Awarding price, contract performance, and bids screening: Evidence from procurement auctions. *American Economic Journal: Applied Economics*, 6(1):108–32.

Decarolis, F. and Giorgiantonio, C. (2005). Local Public Procurement Regulations: The Case of Italy. *International Review of Law and Economics*, 43:209 – 226.

Decarolis, F. and Palumbo, G. (2015). Renegotiation of public contracts: An empirical analysis. *Economics Letters*, 132:77–81.

Decarolis, F., Spagnolo, G., and Pacini, R. (2016). Past performance and procurement outcomes. Working Paper 22814, National Bureau of Economic Research.

Djankov, S., Hart, O., McLiesh, C., and Shleifer, A. (2008). Debt enforcement around the world. *Journal of Political Economy*, 116(6):1105 – 1149.

Djankov, S., La Porta, R., Lopez-de Silanes, F., and Shleifer, A. (2003). Courts. *The Quarterly Journal of Economics*, 118(2):453–517.

Duranton, G., Gobillon, L., and Overman, H. G. (2011). Assessing the effects of local taxation using microgeographic data. *Economic Journal*, 121(555):1017 – 1046.

Fabbri, D. (2010). Law enforcement and firm financing: Theory and evidence. *Journal of the European Economic Association*, 8(4):776 – 816.

Ganuza, J.-J. (2007). Competition and cost overruns in procurement. *The Journal of Industrial Economics*, 55(4):633– 660.

Giacomelli, S. and Menon, C. (2017). Does weak contract enforcement affect firm size? Evidence from the neighbourâs court. *Journal of Economic Geography*, 17(6):1251–1282.

Grenier, J. and Pattanayak, C. W. (2011). Randomized evaluation in legal assistance: What difference does representation (offer and actual use) make. *Yale LJ*, 121:2118.

Guasch, J. L., Laffont, J.-J., and Straub, S. (2008). Renegotiation of concession contracts in Latin America: Evidence from the water and transport sectors. *International Journal of Industrial Organization*, 22(7):1267–1294.

Holmes, T. J. (1998). The effect of state policies on the location of manufacturing: Evidence from state borders. *Journal of Political Economy*, 106(4):667 – 705.

Johnson, S., McMillan, J., and Woodruff, C. (2002). Courts and relational contracts. *Journal of Law, Economics, and Organization*, 18(1):221 – 277.

Koenker, R. (2004). Quantile regression for longitudinal data. *Journal of Multivariate Analysis*, 91(1):74–89.

Koenker, R. W. and Bassett, G. (1978). Regression quantiles. *Econometrica*, 46(1):33–50.

Kondylis, F. and Stein, M. (2018). *The speed of justice*. The World Bank.

Lewis, G. and Bajari, P. (2011). Procurement with Time Incentives: Theory and Evidence. *Quarterly Journal of Economics*, 126(3):1173–1211.

Lichand, G. and Soares, R. R. (2014). Access to justice and entrepreneurship: Evidence from brazilâs special civil tribunals. *The Journal of Law and Economics*, 57(2):459–499.

Lilienfeld-Toal, U. v., Mookherjee, D., and Visaria, S. (2012). The distributive impact of reforms in credit enforcement: Evidence from indian debt recovery tribunals. *Econometrica*, 80(2):497–558.

North, D. (1990). Institutions and their consequences for economic performance. *The limits of rationality*, pages 383–401.

Nunn, N. (2007). Relationship-specificity, incomplete contracts, and the pattern of trade. *Quarterly Journal of Economics*, 122(2):569 – 600.

OECD (2015), “Size of public procurement”, in Government at a Glance 2015, OECD Publishing, Paris.

OECD (2018), “SMEs in Public Procurement: Practices and Strategies for Shared Benefits”, OECD

Public Governance Reviews, OECD Publishing, Paris. https://doi.org/10.1787/9789264307476-en

Palumbo, G., Giupponi, G., Nunziata, L., and Sanguinetti, J. S. M. (2013). The economics of civil justice: new cross country data and empirics. Economics department working paper 1060, OECD.

Ponticelli, J. and Alencar, L. S. (2016). Court enforcement, bank loans, and firm investment: evidence from a bankruptcy reform in brazil. *The Quarterly Journal of Economics*, 131(3):1365–1413.

Qian, J. and Strahan, P. E. (2007). How laws and institutions shape financial contracts: The case of bank loans. *Journal of Finance*, 62(6):2803 – 2834.

Ryan, N. (2020). Contract enforcement and productive efficiency: Evidence from the Bidding and Renegotiation of Power Contracts in India. *Econometrica*, 88(2):383–424.

Sandefur, J. and Siddiqi, B. (2013). Delivering justice to the poor: theory and experimental evidence from liberia. In *World Bank Workshop on African Political Economy, Washington, DC, May*, volume 20.

Schooner, S. L. (2001). Fear of oversight: The Fundamental Failure of Businesslike Government. *American University Law Review*, 50(3).

Spulber, D. F. (1990). Auctions and contract enforcement. *Journal of Law, Economics and Organization*, 6(2):325–44.

World Bank (2020). *Doing Business 2020*. World Bank Group, Washington, D.C.

Annex A. Data construction

Data on procurement

The analysis uses data on the universe of public procurements for works occurring at the municipal level in Italy and maintained by the Anti Corruption Authority (ANAC). The sample chosen includes contracts issued within the period 2002-12. The dataset includes information on the identity of the municipality that issues the contract along with the municipality fiscal code, identity of the awarding firm, starting date as well as awarding and delivery date. Contract level information includes the reserve price, auction format, type of works covered by the contract. The dataset covers the contract from its implementation period until its actual delivery date, thus measuring delays. Other variables include the contract value (i.e., the price at which the CA initially awarded the contract) and the final value, which might differ from the contract value in case of renegotiation between the firm and the CA.

The primary dependent variable is the delay in contract completion. This latter is the difference between the actual delivery date and the delivery date foreseen in the contract, calculated as a share of the contract length (the difference between the delivery date and starting date). This delay ratio is bounded within the interval [-0.5, 5] to remove possible outliers. It follows that the variable delay ratio's negative values represent contracts that firms delivered before the foreseen delivery time. In this appendix, cost overruns are also assessed as an alternative outcome. This variable represents the difference between the final value and the contract value, as a share of the contract value. In the analysis, the variable is left and right truncated within the values [-0.5,2.5] to drop possible outliers.

Data on court efficiency

Court efficiency is proxied by the average length of the first instance civil proceedings in each court (more detail in the paper). Case flow data, provided by the Italian Ministry of Justice, are used to construct the primary independent variable (length of judicial proceedings), an estimate of the average lifetime of court proceedings (in days). For any court *k*:

$$L_t = \frac{P_t + P_{t+1}}{E_t + F_t} * 365 \qquad (4)$$

where Pt and Pt+1 reflect, respectively, pending cases registered in the court k at the beginning of the year t and year t+1, Ft the new cases filed during the year, and Et the cases that ended with a judicial decision or were withdrawn by the parties during the year.[17]

Descriptive statistics

Descriptive statistics are presented below (Table A.1) for both the full and border sample (i.e., the sample of municipalities located at a jurisdiction border, used in the quantile analysis). Despite the significant reduction in the number of observations, the border sample presents similar characteristics with respect to the full sample. Table A.2 reports descriptive statistics based on a sample of firms that that have awarded at least one contract on both sides of a certain border (e.g., one contract issued by a municipality to which

[17] A similar index was firstly developed by Clark and Merryman (1976) to estimate the average turnover of stock inventories, which is used especially in cross-country comparisons, to estimate the length of proceedings when actual data are not available. See also Palumbo et al. (2013).

corresponds an efficient court and another contract where the corresponding court is less efficient). Differences in mean are in almost all cases not significantly different from zero.

The figure A.1 plots the residuals of an auxiliary regression of time delay on a set of fixed effects, which control for the size of the contract in value terms (at Eur 500,000 levels), the average year between the initiation of the contract and the due date, the region of the CA, and the border dummies. Standard errors are two-way clustered at the province and border level. The figure shows that the distribution of time delay of contracts in municipalities located in the bottom 25% slowest courts is characterized by fatter tails than the corresponding distribution in municipalities located in the top 25% fastest courts.

Table A.1. Descriptive statistics: total and border samples

		(1)		(2)		(3)
		Efficient courts		Inefficient courts		Total
Variable	N	Mean/SE	N	Mean/SE	N	Mean/SE
Time delay	4121	0.877	3724	0.903	7845	0.889
		[0.016]		[0.017]		[0.011]
Cost Overrun	2786	0.085	2579	0.082	5365	0.083
		[0.003]		[0.003]		[0.002]
Discount	3658	0.153	3392	0.146	7050	0.150
		[0.002]		[0.001]		[0.001]
Contract length	4121	230.130	3724	222.954	7845	226.723
		[2.299]		[2.320]		[1.635]
Res. price ('000 Euro)	4095	469.898	3700	484.510	7795	476.833
		[7.164]		[8.568]		[5.541]
Value of the contract ('000 Euro)	3716	404.723	3427	418.524	7143	411.344
		[8.383]		[7.573]		[5.677]
N. bidders	4079	31.327	3698	31.751	7777	31.528
		[0.620]		[0.634]		[0.443]
Fixed assets (firm, mln Euro)	3504	3.036	3084	3.223	6588	3.124
		[0.221]		[0.231]		[0.160]
Turnover (firm, mln Euro)	3529	14.267	3114	12.455	6643	13.418
		[0.885]		[0.806]		[0.603]
Employment	3511	38.540	3093	38.593	6604	38.565
		[1.646]		[1.675]		[1.175]

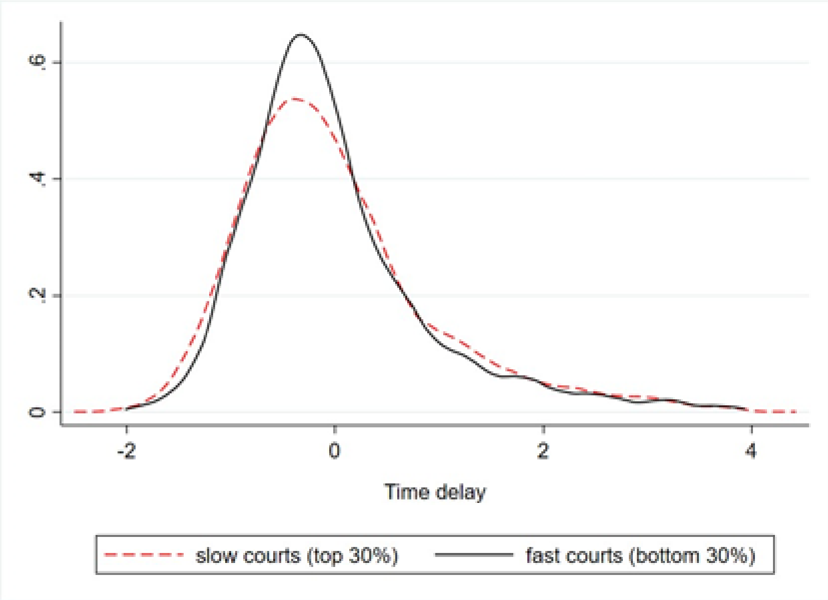
Note: The table displays descriptive statistics (mean and SE) calculated across the border, no border and the whole sample. The border sample includes all contracts issued by CAs located at the border between two or more different courts. The no border group includes all other contracts issued by CAs not located on borders. The all sample is composed of both these samples.
Source: Authors' calculations.

Table A.2. Descriptive statistics: firms across the borders

		(1)		(2)		(3)	t-test
		Efficient courts		Inefficient courts		Total	Difference
Variable	N	Mean/SE	N	Mean/SE	N	Mean/SE	(1)-(2)
Time delay	4121	0.877	3724	0.903	7845	0.889	-0.025
		[0.016]		[0.017]		[0.011]	
Cost Overrun	2786	0.085	2579	0.082	5365	0.083	0.003
		[0.003]		[0.003]		[0.002]	
Discount	3658	0.153	3392	0.146	7050	0.150	0.007***
		[0.002]		[0.001]		[0.001]	
Contract length	4121	230.130	3724	222.954	7845	226.723	7.176**
		[2.299]		[2.320]		[1.635]	
Res. price ('000 Euro)	4095	469.898	3700	484.510	7795	476.833	-14.612
		[7.164]		[8.568]		[5.541]	
Value of the contract ('000 Euro)	3716	404.723	3427	418.524	7143	411.344	-13.801
		[8.383]		[7.573]		[5.677]	
N. bidders	4079	31.327	3698	31.751	7777	31.528	-0.425
		[0.620]		[0.634]		[0.443]	
Fixed assets (firm, mln Euro)	3504	3.036	3084	3.223	6588	3.124	-0.186
		[0.221]		[0.231]		[0.160]	
Turnover (firm, mln Euro)	3529	14.267	3114	12.455	6643	13.418	1.812
		[0.885]		[0.806]		[0.603]	
Employment	3511	38.540	3093	38.593	6604	38.565	-0.054
		[1.646]		[1.675]		[1.175]	

Note: Border sample. The table displays descriptive statistics (mean and SE) based on a sample of firms that performed at least one contract in two different court jurisdictions. Efficient courts identifies those courts that show, on average over all available years, the lowest level of judicial efficiency for each border group while inefficient courts refer to all other courts within the same group. The value displayed for t-tests are the differences in the means across the groups. Standard errors are robust. ***, **, and * indicate significance at the 1, 5, and 10 percent critical level.
Source: Authors' calculatioms.

Figure A.1. Time delay: distribution across the border



Note: the line in black shows the residual distribution when the average length of judicial procedures is below or equal to the 30th percentile level. The red dashed line plots the residual distribution when the average length of judicial procedures is above or equal to the 70th percentile level.
Source: Authors' calculations.