Timely Justice as a Determinant of Economic Growth[*]

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Abstract

We investigate how timeliness in enforcing legal contracts affects economic growth across countries. We focus on judicial timeliness as a proxy for courts' performance in a large panel of 169 countries over the 2004-2019 period. We show that, by raising uncertainty and promoting opportunistic behaviors in business transactions, slower courts hinder economic development. The relationship is robust to diverse model specifications and appears stronger for business environments more heavily relying on judiciaries such as economies undergoing rapid growth, countries characterized by low human capital levels and civil law jurisdictions.

JEL Classifications: O43, K41, H4.
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1 Introduction

Economists widely agree that proper enforcement of contracts is a necessary condition for economies to prosper (Montesquieu, 1748; Smith, 1776; Weber, 1905; von Hayek, 1973; Glaeser et al., 2004; Jayachandran and Kremer, 2006; Gennaioli et al., 2022). Judiciaries and economic growth are closely intertwined. The way the law is enforced is a key element of the institutional system governing society and the economy (Sala-i Martin et al., 2004); and this task is ultimately performed by judiciaries. In this study we investigate the link between the functioning of the judiciary and economic growth. After going over the theoretical reasons why a fast judiciary ought to benefit economic development, we perform empirical analyses exploiting both temporal and spatial variation in a cross-country dataset of 169 nations.

We propose a number of extensions to the extant literature. First, to our knowledge no previous study has attempted to link judicial timeliness and economic growth both across countries and over time. To tackle the endogeneity problems that commonly affect cross-country studies seeking to show the effect of institutions on economic performance, we apply advanced econometric methods to motivate the robustness of our results. Previous studies have already identified the impact of judicial timeliness on the economy (Chemin, 2009a; Kondylis and Stein, 2023; Ichino et al., 2023; Chemin et al., 2023). It is useful to supply further comparative analysis of how judicial systems' functioning contributes to growth, explaining the variance in economic prosperity across the world, as in Chemin (2020, 2021)

Second, we specifically look for evidence on the relationship between judicial performance and economic growth in countries with more court-dependent business environments. The previous literature suggests that in countries with high growth, low human capital and of civil law origin the court system is more relevant in resolving commercial disputes. Economies experiencing high level of growth are usually characterized by impersonal and high frequency economic transactions for which relational contracting is not as well equipped as a formal judiciary (Williamson, 1985; Johnson et al., 2002; Eisenberg et al., 2013). Alternative dispute resolution mechanisms that avoid the shortcomings of some judiciaries poor performances are

less likely to work in societies affected by low levels of human capital (Bosio et al., 2022). Finally, jurisdictions belonging to the Civil Law legal family are usually characterized by higher levels of procedural complexity that make litigating more cumbersome (La Porta et al., 1998; Djankov et al., 2003b).

We rely on data regarding multiple years to exploit not only cross-sectional differences but also within-country time variance. We exploit variation in judicial timeliness across 169 countries for the period 2004-2019 to examine the contribution of judicial timeliness to economic growth and estimate the structural parameters consistently. We estimate a series of dynamic panel-level specifications and robustness-related variants to find evidence of a statistically significant and consistently positive relation between judicial timeliness and economic growth. Our estimates suggest that 100 extra days needed to solve a case (about one-third of a standard deviation) is associated with a GDP decrease of about 1.2 percentage points. The effect is not uniform among subsamples of countries: countries in which economic transactions rely more on judicial enforcement are consistently more heavily affected by this relation. Nations with elevated growth trajectories are impacted 73% more than the average economy. The hypothesized relationship under scrutiny is equally 47% stronger in countries with low human capital. Civil law jurisdictions are affected 33% more than in the full sample.

The remainder of the paper is structured as follows. Section 2 presents the theoretical framework with respect to the importance of enforcing institutions - and more specifically the timeliness of justice - for economic growth. Section 3 and 4 describe, respectively the data employed and our empirical strategy. Section 5 presents our estimates, while in Section 6 our results undergo several robustness checks. Conclusions are drawn in Section 7.

2   Courts and economic growth

Contracts need to be enforced in order to foster economic performance (Weber, 1905; von Hayek, 1973). When it comes to explaining the economic success of countries via legal determinants, the literature has focused on how the historical evolution of legal systems (for example, common law vs. civil law) might explain today's variance in countries' prosperity. Proponents of this view have argued that

the evolutionary nature of judge-made-law, attributed to common law systems, allows legal institutions to better adapt to changes in societies (von Hayek, 1960), and also that common law systems supply a better environment for the development of private markets (La Porta et al., 1998; Djankov et al., 2002).

These results do not take into account the substantial differences in economic development that exist today among countries sharing the same legal tradition. That is, why is that two countries with a similar legal system and level of development can still differ greatly when it comes to contract enforcement? Among countries belonging to the common law tradition we find at the same time the United States and the United Kingdom, but also Bangladesh and Ghana.

It is only recently that scholars have started to investigate the way laws are actually enforced. Accordingly, enquiry should focus not just on formal laws, but also on how these are enforced (Hodgson, 2006). If institutions are "humanly devised constraints" (North, 1990), their effectiveness depends on how they are implemented (Bosio et al., 2022). A well-functioning court system eases the establishment of new commercial relations, lowering barriers to entry and fostering markets' development, thus ultimately enhancing economic growth.

But to what extent do judiciaries affect the economy? As markets become more complex, impersonal trade in economic transactions with many (anonymous) business partners takes the place of repeated dealings, in which reputation alone might be sufficient to make opportunistic behaviors not remunerative. As we move away from repeated games to "one-shot" interactions, impersonal exchange must be accompanied by some sort of "third-party" enforcement that lowers the transaction costs arising from the uncertainty in performance of contractual obligations (North, 1990). Trading partners usually encourage suppliers/creditors to undertake investments by writing long-term contracts. In a world of incomplete contracts that cannot be fully enforced by courts (Grossman and Hart, 1986), once investment costs are sunk, there is an immediate incentive to renege on contractual obligations and try to capture trading partners' rents. On the other hand, if transaction costs associated to searching for new business partners are high, suppliers will try to use their monopoly power and impose higher prices (Chemin, 2009b). Within this setting, judiciaries play an important role in limiting opportunistic behavior, by reducing uncertainty in economic interactions.

A well-functioning judiciary acts as an important deterrent against economic agents' willingness to deviate from previously signed contracts (Williamson, 1985). And conversely, a flawed institutional mechanism devoted to enforcing the law might make such deviations more attractive, as the discounted value of future monetary (and sometimes non-monetary) punishments will necessarily drop. Such opportunism would undermine economic transactions, as firms become unwilling to trust partners and offer them trade credit in their business transactions, due to the diminished likelihood of this credit being repaid (Chemin, 2009b).

Not only would transactions costs thus rise in the event of an "imperfect" judiciary, but financing opportunities would likewise be constrained. A deficient law enforcement will incentivize opportunism on borrowers' side: Anticipating the difficulty that creditors face when recovering their loans, debtors will be more incentivized to default. However, a vicious circle would push creditors themselves to anticipate borrowers' opportunistic behavior and consequently reduce the availability of credit (Jappelli et al., 2005) or increase interest rates (Visaria, 2009). Post-contractual opportunism incentivized by judicial institutions' poor performances also affects firms' employment decisions (Ichino et al., 2023) and firms' dynamics (Melcarne and Ramello, 2020).

2.1 Measures of Court Performance

Different measures related to judicial performance have been used in the scholarly literature. We select as our main measure judicial timeliness (JT), proxied by means of the time taken by courts to dispose of litigation. It is worth noting that, although previous literature has often used JT as a synonym for judicial efficiency, the concepts of efficiency and effectiveness ought to be distinguished (Marciano et al., 2019). Efficiency captures judiciaries' productive dimension, which can be concisely summarized by the input-to-output ratio. Effectiveness instead concerns the ability of a court system to respond to the demand for justice[1].

Concentrating on a specific institutional dimension of effectiveness such as ju-

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[1]These two dimensions can sometimes be connected, but they lie in distinct planes. While the optimal result for the social planner would be efficient courts in an effective judiciary, the two things do not necessarily proceed in step direction and effectiveness, measured by time, is the most relevant for markets and economic agents (Marciano et al., 2019).

dicial timeliness has some clear advantages when it comes to identifying the relationship between the judiciary and economic performance. First of all, timeliness is a fairly stable indicator of judicial performance. In fact, substantial changes in judicial performance are the outcome of reforms affecting the law, the judiciary's organization, or general litigation habits (Melcarne and Ramello, 2015). This last-mentioned aspect is more troublesome to deal with in the context of our analysis, as it is not subject to government policy. We therefore have to control for it in the econometric model.

3   Descriptive statistics

A description of all variables alongside the descriptive statistics and the corresponding sources is seen in Table 1. Our dependent variable is the growth rate of GDP calculated through the output-related method, obtained from the recent edition of Penn World Tables (Feenstra et al., 2015). The vector of control variables is built in the spirit of cross-country growth regression framework and includes i) the investment share of GDP, ii) the level of government revenue as a share of GDP, iii) population size, iv) population growth, v) indicator of exchange-rate distortions, and vi) trade openness measured as a share of exports and imports over GDP. All control variables are collected from the recent edition of Penn World Tables. Our sample comprises a balanced panel of 169 countries for the period 2004-2019 which yields a sample of 2,704 country-year observation pairs.

[Table 1 about here.]

Among our subsamples of interest, judicial timeliness varies to different extents. Civil law countries tend to have slightly faster judiciaries than their common law counterparts (640 *vs.* 649 days). More intuitively, nations characterized by higher growth rate (620 days) and higher human capital (563 days) enjoy substantially more timely courts than low growth (665 days) or low human capital (681 days) countries.

3.1 Judicial Timeliness

The timeliness variable corresponds to the time needed to resolve judicial disputes over a typical contract default situation. While significant variations within jurisdictions surely exist as judges might differ in their decision making process even when facing observably similar cases (Chan et al., 2022), our timeliness metric measures year-country averages. This variable was created by a survey methodology submitted to a large pool of cooperating law firms in every country of the dataset (Djankov et al., 2003b). Although survey data might present limitations connected to hypothetical answers, these limitations supply a unique vantage point. Since the respondents are professionals who on a daily basis solve these kinds of cases within their national judicial system, their answers are grounded in everyday experience. In addition, the peculiarity of this dataset helps to overcome an opposite critique that is raised about data coming from enterprise surveys: that they might capture idiosyncratic local characters which affect the overall comparability. In this respect, the planned and uniform construction of the questionnaire avoids the interference of uncontrolled factors and enhances the comparability of results across countries. Also, in comparison with other available datasets, this sample is wider in terms of number of countries and longitude. It is no coincidence that this dataset has been used by many scholars, including recently by Bosio et al. (2022); Kalkschmied (2023); Bosio (2024). Later we test the robustness of our estimates on a subsample of countries for which we were able to obtain administrative data concerning judicial timeliness.

If the nature of JT data yields advantages in terms of institutional measurement, as discussed in Section 2.1, on the other hand it might pose a problem concerning the quantity-quality trade-off. Timeliness does not necessarily capture the "qualitative" dimension of judges' work. There might be a trade-off between judicial performance in its quantitative dimension (as we measure timeliness) and the intrinsic quality of justice as delivered by courts. For example, the necessity of respecting procedural hurdles and other physical constraints necessarily slows down the work of courts (Chemin, 2012). In such a case, reducing time might be detrimental to the economy. That said, the available empirical evidence shows, at best, no relationship between judicial timeliness and a country's quality of justice

(Bray et al., 2016; Coviello et al., 2019; Melcarne et al., 2021).

As emphasized above, the source of our courts' effectiveness variable has both advantages and drawbacks. However, to our best knowledge, an administrative source-JT metric covering the same pool of countries across the same time span does not exist. A viable second-best alternative might be found in the reports published by the European Commission for the Efficiency of Justice (CEPEJ). The CEPEJ has the merit of collecting administrative data on all relevant characteristics of judicial systems, including the length of judicial procedures, from the Ministries of Justice's statistical offices of its 47 member states. However, in addition to a reduced sample size, this dataset presents two further shortcomings. First, data collection is biannual. Second, not every country consistently reports all statistics on every report, thus making the panel unbalanced[2].

Two noteworthy insights can be drawn from this particular comparison. First, the time to disposition varies widely across countries in a similar manner to the World Bank's judicial timeliness variable. For instance, the disposition time in our sample varies from a mere 13 days in the Russian Federation to 849 days in Malta. And second, countries with a lengthy disposition times such as Malta and Bosnia and Herzegovina tend to experience a gradual reduction in disposition times, improving the effectiveness of their judiciary over time. Others such as Greece, France and Italy have tended to undergo a deterioration of disposition time up to the present day, whilst elsewhere the length of disposition has remained relatively stable over time. Against this backdrop, Figure 1 compares, both statically and dynamically, the World Bank's judicial timeliness variable to the CEPEJ's average disposition time variable. In Panel (a) the variables exhibit a high correlation coefficient of +0.55 and is statistically significant at 1% (*i.e.*, p-value = 0.000). A potential critique could emphasize "dynamic inconsistency", implying that over time correlation between CEPEJ and WB measures wanes due to issues in reporting. If this critique was true, then average change in WB delay variable should not predict average changes in CEPEJ variable and vice versa, and should yield a very low, possibly zero correlation. Panel (b) reports average changes (geometric mean) in CEPEJ measure against average changes in WB

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[2]The data on judicial delays in European countries can be found here. We use data for 38 countries extracted from Reports dating from 2006 through 2014, for a total of 5 waves.

measure of delay. Correlation coefficient between both variable is +0.39 and is statistically significant at 5% (i.e. p-value = 0.027).

[Figure 1 about here.]

We replicated our baseline cross-country panel-level growth regressions by replacing the judicial timeliness variable with the CEPEJ disposition time variable whilst retaining the full set of confounders[3]. Evidence confirms our prior estimates, suggesting that reducing the disposition time by one standard deviation (*i.e.*, roughly 158 days) is associated with a 0.1 increase in annual growth. The estimated coefficient is statistically significant at 1% and does not deviate much once the standard errors are clustered on both country and yearly dimension. Therefore, the negative effect of increasing delays suggests that our findings are robust to the choice of the timeliness variable, and partially rule out subjectivity bias as the underlying explanation of our previous findings.

4 Identification strategy

4.1 Baseline model

The empirical analysis to shed light on the relationship between judicial timeliness and economic growth was conducted on a cross-country dataset of 169 countries and for a panel of years (2004-2019). Accordingly, it enables us to exploit both spatial and temporal variation in JT in order to explain changes in GDP growth rates. The baseline model includes country-fixed effects as well as a number of standard controls. While the use of country-fixed effects does not solve endogeneity concerns decisively, it largely tackles the issue of "omitted variable bias". By including both lagged growth rates and lagged JT variable, we are able to partially address the possible endogeneity of both growth and timeliness into our dynamic panel specification (Acemoglu et al., 2019). The baseline model we estimate is represented by the following equation with endogenous JT in the presence

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[3]A table with these estimates is available in the online appendix.

of unobserved country- and time-fixed effects:

$$\Delta y_{i,t} = \alpha_0 + \sum_{k=1}^{K} \hat{\alpha}_k \cdot \Delta y_{i,t-k} + \hat{\beta} \cdot JT_{i,t} + \sum_{k=1}^{K} \hat{\beta}_k \cdot JT_{i,t-k} + \mathbf{X}'_{i,t}\hat{\pi} + \delta_i + \epsilon_{i,t} \quad (1)$$

Where $\Delta y_{i,t}$ represents GDP growth rate between $t-1$ and t in country i at time t, the coefficient vector $\alpha_k = (\alpha_1, \ldots, \alpha_K)$ represents lagged state dependence and indicates a source of persistence. Our key parameter of interest is $\hat{\beta}$, which represents the contribution of judicial timeliness variable (JT) to economic growth, where we expect $\hat{\beta} < 0$. The coefficient vector $\beta_k = (\beta_1, \ldots, \beta_K)$ captures the past realization of judicial timeliness.

The vector $\mathbf{X}$ comprises a set of structural growth confounders and includes investment share of GDP, government size, trade openness, exchange rate distortions, population growth and population size. Furthermore, δ_i is a full set of country-fixed effects unobserved by the econometrician and comprises time-invariant sources of heterogeneity bias. The stochastic disturbances are denoted by $\epsilon_{i,t}$ and comprise idiosyncratic errors and transitory shocks where we assume i.i.d $\sim (\sigma^2, 0)$.

4.2 Panel vector-autoregressive growth model

Next we estimate the following panel vector-autoregressive (VAR) semi-differenced linear equations:

$$\Delta y_{i,t} = \sum_{t=1}^{p} b_p \cdot \Delta y_{i,t-p} + \sum_{t=1}^{p} \beta_{JT} \cdot JT_{i,t-p} + \sum_{t=1}^{p} b_X X_{i,t-p} + \varepsilon_{i,t} \quad (2)$$

where Δy is a $1 \times k$ vector of growth rates, JT represents the judicial timeliness variable, X is an additional growth-confounding variable added iteratively to the model, and ε captures transitory shocks and growth impulses. The $k \times k$ vectors $\mathbf{b}$ are the parameters to be estimated.

We estimate the structural relationship between growth and judicial timeliness using fixed-effects transformation to ensure that the effects are not confounded by unobserved heterogeneity. The traditional approach to estimate structural VAR

10

specification is to use the set of lagged dependent variables. We use GMM estimation to obtain consistent estimates of Equation 2 as previously suggested by Kiviet (1995); Everaert and Pozzi (2007) among others.

Our key assumption is that the transitory shocks to growth and judicial timeliness are serially uncorrelated on average. This ensures that first-difference transformation of Equation 2 may be consistently estimated by instrumenting the lagged differences with differences and levels of $y_{i,t}$ from earlier periods. Since contemporaneous JT and its lagged level exhibit a high country-level temporal dependence and persistence, the proposed strategy should satisfy the relevance assumption and facilitate a less cumbersome isolation of the growth effect of judicial timeliness from both observable and unobservable confounders.

As a remedy, we follow Arellano and Bover (1995) who propose forward orthogonal deviation as an alternative transformation which does not have the weaknesses inherent in FD transformation. Instead of using deviations from past realizations, we subtract the average of all available future observations to minimize the data loss. Hence, since past realizations are not included in this transformation, the instruments remain valid and with $T \geq 4$, realizations are necessary to produce instruments in levels.

5 Results

5.1 Baseline fixed-effects estimates

Table 2 reports the fixed-effects estimated relationship between judicial timeliness and economic growth using output-side growth rates of GDP as the dependent variable. The set of estimated specifications is varied and entails both the full sample of 169 countries as well as distinctive institutional variants (such as civil-law and common-law subsamples), dividing countries according to their level of human capital and and growth rate. The re-analysis of the relationship across subsamples is particularly informative, as it allows us to gauge the variance of our relationship of interest for countries with different degrees of court-dependent business environments. Each specification contains the full set of country and year fixed effects and the full set of structural control variables.

[Table 2 about here.]

Column (7) of Table 2 reports the relationship between judicial timeliness and economic growth estimated over the full sample. The estimated coefficient on judicial timeliness is positive and statistically significant at 5%. The estimated coefficients on the first and second lag of JT do not appear to be statistically significant, which implies that anticipatory effects of increasing delays are seldom noticeable and only weakly perceivable. Without loss of generality, full-sample estimates suggest that lengthier judicial procedures are quite strongly negatively associated with the GDP growth rate. Our point estimate (-0.000117) from column (7) suggests that one standard deviation increase in JT (303.01 days) is associated with a reduction of 3.5 percentage points in yearly GDP growth rate. We also tried to exploit 5 years averages instead of year-to-year changes in JT. Despite minimal changes in the model due to a sharp reduction in the number of observations, estimates (not shown in the table but available upon request) remain similar both in size and significance. In Columns (1) through (6) we investigate whether judicial timeliness has a more pronounced relationship with economic performance in court-dependent business environments.

In Columns (1) and (2) we distinguish countries according to their average growth rate being, respectively, below or above median. It emerges that the overall effect estimated in column (7) derives from economies with above-median growth trajectories. The estimated coefficient for high growing countries is 73% higher than the full sample's one, while the one for slowly growing economies is not statistically different from zero.

In Columns (3) and (4) we follow Bosio et al. (2022) and divide countries into two sub-samples distinguishing between high/low (above/below median) Public Sector Capacity (PSC) in order to account for differences in levels of human capital. We observe that the significance of the relationship of interest seems to be driven by countries with low PSC, while judicial timeliness appears not related to growth in high PSC countries. Countries with low human capital appear to be affected about 48% more by the relationship of interest than the average country.

Column (5) presents the baseline estimate restricted to the subsample of civil-law countries, confirming our baseline evidence of negative but still statistically sig-

nificant coefficient of the judicial timeliness variable. In particular, it emerges that the relationship between judicial timeliness and economic growth is 33% stronger in civil law countries than in the full sample. By contrast, column (6) considers common-law countries and indicates no relationship between judicial timeliness and economic growth. Therefore, our evidence suggests that the estimated effect is prevalent in civil-law jurisdictions.

5.2 Dynamic panel estimates

Table 3 reports Arellano and Bond (1991) dynamic panel estimates of the relationship between judicial timeliness and GDP growth. In order to account not only for the levels (Panel A) of judicial timeliness, but also its changes, we have re-estimated Equation 1 using first differences of JT[4] (Panel B).

[Table 3 about here.]

The evidence consistently reinforces the estimated association between judicial timeliness and GDP growth. Our coefficient of interest gains substantial strength in magnitude and statistical significance. In column (7) of Panel A our full sample estimates are now significant at the 1% level, while the coefficient's size increases almost tenfold: a 100 days decrease in JT (about one third of a standard deviation) is now associated with an 11% boost to economic growth. In columns (1) through (6) we pursue our distinction between countries according to their degree of court-dependent business environments, finding consistent results. The association between judicial timeliness and GDP growth remains around 30% stronger in civil law countries than in common law ones. The same effect appears to be tenfold stronger in high growth countries than in their low growth counterparts. Economies with low human capital are more heavily hit by judicial timeliness than countries with higher human capital. Adopting first differences of JT rather than its levels as done in Panel B, does not alter our results.

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[4]We would like to thank Matthieu Chemin for this suggestion.

13

5.3 Decomposing the effect by level of per capita GDP

Perhaps the most important question arising from the positive effect of improving judicial timeliness on GDP growth rate concerns the heterogeneity of the effect with respect to the level of per capita GDP. Such an analysis may partially unravel whether richer or poorer countries are more disproportionately hurt by increasing judicial slowness in terms of the growth shortfall and subsequent slowdown. By decomposing the baseline effect we can disentangle whether poorer countries such as Bangladesh and Guatemala are more adversely affected by increasing delays than rich countries such as the United States and South Korea, or vice versa.

Using the World Bank's four-fold classification of countries into income groups[5] we estimate the baseline growth specification by piecewise excluding each income block from the full-sample specification to tackle the sensitivity of the baseline estimate to the exclusion of group blocks[6]. In this way, the underlying differences in the estimated coefficients roughly indicate which income group exerts the most disproportionate impact on the overall investigated effect. Leveraging against a full-sample specification in column (1), columns (2) splits low-income countries from the specification. The estimated short-run and long-run growth coefficients are statistically significant at 10% and confirm the negative coefficient of JT. Column (3) excludes lower-middle income countries from the main specification. The re-estimated relationship indicates and confirms a positive relationship between judicial timeliness and economic growth which appears to be borderline significant (*i.e.*, p-value = 0.173). Column (4) splits the upper-middle income economies from the full specification and the corresponding estimates indicate a statistically weak effect of increasing delays on GDP growth reinforced by short-run coefficient (*i.e.*, p-value = 0.311) and its long-run counterpart (*i.e.*, p-value = 0.388). Against this backdrop, column (5) considers a specification excluding high-income economies from the full sample whereupon a negative and statistically significant effect of increasing judicial delays on the growth rate of GDP is confirmed at 10% significance threshold. Taken altogether, the empirical decomposition of the effect by income groups suggests that increases in judicial delay hurt low- and middle-

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[5]Low income, lower-middle income, upper-middle income, high income.
[6]Table with estimates is available in the online appendix.

income economies such as Haiti, Guatemala and Bangladesh disproportionately more than high-income economies.

5.4 Decomposing the effect of judicial timeliness by growth quantiles

The next question to ask concerns the heterogeneity of this hypothesized income-specific effect. For example, are low-growth economies more disproportionately impacted by prolonged delays than high-growth economies?

To address this point, we performed quantile-specific estimates of the growth-timeliness relationship across various tails of the growth distribution estimated using quantile regression estimators and confidence intervals and null hypothesis test to conduce inference. We distinguish between six different tails of the growth distribution, ranging from the 5th percentile to the 95th percentile. This relatively broad spectrum of tails allows us to better capture the sensitivity of the growth process to increasing delays from the low-growth end to the high-growth equilibrium.

The evidence from quantile-specific decomposition of the growth effects provides several noteworthy insights. First, the estimated timeliness coefficient appears to be indistinguishable from zero at the lower tails of the growth distribution. In particular, the estimated quantile-specific JT coefficient is statistically insignificant from the 5th percentile to the median. Second, the estimated growth effect of increasing delays is particularly strong from the 75th percentile to the 95th percentile, with evidence of the strongest effect at the 90th percentile. This implies that high-growth economies undergoing a more rigorous growth acceleration appear to be most severely affected by prolonged judicial time. Since the lagged values of the growth variables are properly included in the growth regressions, it is unlikely that past persistence or idiosyncratic shocks would be the key driver of the difficulty of transition back to high-growth equilibrium.

5.5 Intermediate Outcomes

In Table 4, we empirically explore some of the transmission mechanisms at work behind the negative relationship between increasing judicial delays and economic growth. Since it is nearly impossible to understand the nexus between judicial delays and growth without a more elaborate analysis of the intermediate outcomes, the postulated channels are important to unravel specific pathways through which increasing delays ultimately dampen growth dynamics.

[Table 4 about here.]

Previous research on accounting for sources growth invariably suggests that between 50 percent and 70 percent of cross-country per capita income gaps can be explained by the differences in total factor productivity (Hsieh and Klenow, 2010). Two particular explanations of TFP differences have been proposed, emphasizing both efficiency and technology rationale. According to the latter, technological progress has been uneven due to improvement of the production function through some factor intensity but not others (Allen, 2012). By contrast, the efficiency rationale emphasizes a distinctive and fundamental importance of the institutional differences that bend directly on allocative and productive efficiency of the economy. For instance, Hsieh and Klenow (2010) show that if capital and labor-based inputs in the manufacturing industries in China and India were used as efficiently as in the United States, TFP would increase by 30%-50% and 40%-60%, respectively. Against this backdrop, Jerzmanowski (2007) shows that while factor inputs account for around one third of the variation in output per worker, two thirds of the underlying variation is attributable to total factor productivity whereupon 43 percent of gains came from efficiency improvement and 26 percent from technology differences. Since the existing evidence almost undeniable highlights the importance of institutional differences, the question that arises naturally is whether increasing delays can explain the variation in total factor productivity.

To this end, we use Feenstra et al. (2015) measure of TFP level relative to the United States frontier and link it with the judicial delay variables. By estimating the baseline dynamic panel-level specification for the intermediate outcomes, we show that increasing judicial delays tend to produce statistically significantly lower total factor productivity both across and within countries. The estimated

16

coefficient in column (1) is large, and highlights prolonged judicial delays as an important binding constraint and distortion on the overall TFP. In columns (3) and (4) we examine the relationship between judicial delays and factor intensity. The evidence suggests that increasing judicial delays do not translate into a higher labor-to-capital ratio, as indicated by the coefficient on labor share of GDP. By contrast, column (4) indicates that prolonged judicial delays are associated with a marked and notable reduction in capital stock per worker although the magnitude of the effect is about half as large as in the TFP specification. Therefore, our evidence further corroborates the notion that increasing judicial delays tend to raise the overall cost of capital which tends to skew the capital intensity by reducing the stock of capital per effective unit of labor. Further evidence in column (4) also suggests that longer judicial delays are also associated with a notable and statistically significant reduction in overall rate of return on investment although it should be noted that the magnitude of the effect is around 40 percent lower compared to the effect of delays with respect to the stock of capital per worker.

The empirical evidence almost unequivocally suggests that deteriorating court performance tends to have non-trivial consequences for rate of return on the investment and is consistent with prior evidence (Srhoj et al., 2023). More specifically, the negative coefficient indicates distortive and corrosive effects of judicial delays with respect to the rate of return on investment which tends to have debilitating and adverse impacts on capital formation, further reinforced by the point estimates in column (3). We also find some evidence that prolonged judicial delays tend to proliferate the incentives for informality (Galiani and Weinschelbaum, 2012). In particular, our estimates in column (5) indicate that increasing time to disposition is associated with a somewhat larger residual share of GDP, suggesting that increasing delays tend to increase the cost of formality, although the estimated effect is not statistically significant at conventional levels and pales smaller and less substantial compared to the effect of delays with respect to capital stock, return on investment and TFP.

6 Robustness

6.1 Panel vector-autoregressive estimates

Results from Tables 2 and 3 suggest a negative and significant relationship between judicial timeliness and growth. In this section we wish to further investigate the chain and arrow of causation between institutional performance and growth (Glaeser et al., 2004). Do longer delays decrease GDP growth? Or conversely, are slow-growing countries less able to afford more efficient judiciary? Panel vector-autoregressive framework allows us to investigate this issue.

[Table 5 about here.]

Table 5 reports panel vector-autoregressive (VAR) estimates of the growth specification assuming both growth and judicial timeliness as simultaneously interdependent and endogenous variables. Such an approach allows us to partially address the concerns that might arise from the endogeneity of judicial timeliness, despite the full set of fixed effects and lagged values of both key variables being included in the model. In addition, the direction of causation between judicial timeliness and economic growth can be appropriately tested in the framework of interdependent and simultaneously endogenous variables. By disentangling the relationship, our analysis should be able to uncover whether longer judicial delays induce growth shortfall or, conversely, whether deteriorating economic conditions increase judicial delays.

To avoid the risk of model over-dimensionality, each auxiliary growth confounder from the baseline specification is separately added to the panel VAR model specification (Sala-i Martin et al., 2004). It should be noted that Table 5 reports the results of two specifications. More specifically, Panel A reports the results of the specification where the dependent variable is the GDP growth rate whereas the lagged JT is the key variable of interest. By contrast, Panel B reports the results of the estimated specification where timeliness is the dependent variable whereas the lagged rate of GDP growth is the primary explanatory variable. As in the standard panel VAR setting, two-equation framework allows us to better unravel whether more prolonged judicial procedures precede lower rate of GDP growth or vice versa.

The evidence from panel VAR estimated specifications confirms our prior results. It suggests that the effect of increasing judicial delays on GDP growth is both negative and statistically significant within 5% to 10% bounds in five out of six specifications. The estimated structural parameter on the lagged JT variable is within the range of -0.0006 to -0.003 and appears to be consistent with our baseline estimates. At the minimum, our estimates imply that decreasing judicial delays by 100 days is associated with an increase in GDP growth rate of 0.06 percentage points, *ceteris paribus*. Therefore, our estimates predict that reducing judicial delays from the highest level observed in our sample (*i.e.*, 1785 days in Guinea-Bissau) to the lowest level (*i.e.*, 120 days in Singapore) should translate into a permanent 0.99 percentage point increase in GDP growth. At a roughly 1 percentage point faster rate of growth, the time taken to double per capita GDP would decrease by six years. At the maximum, our estimates imply that reducing judicial delay from the highest observed level to the lowest one in our sample predicts up to a 5 percentage point faster growth rate. In the long run, maintaining such acceleration would notably reduce the time necessary to double per capita GDP, by around 40 years.

Our estimates imply non-trivial growth benefits from reduced judicial delays. For example, if a country prone to long delays such as Italy were to reduce judicial delay from its temporal mean value (*i.e.*, 1216 days) to the mean of the world judicial frontier of 216 days (*i.e.*, New Zealand), its growth rate would improve by 1.8 percentage points in the long-run. At its current growth rate of 1.2 percent, Italy would need 60 years to double its per capita GDP. At a 1.8 percentage point faster growth rate, the time to double per capita GDP would drop to 24 years. Panel C reports Wald-Granger causality tests between the full set of interdependent variables, and indeed suggests that the null hypothesis of no structural relationship between timeliness and growth can be summarily rejected, whilst the evidence against the null hypothesis between growth confounders and growth rate is more uncertain. Therefore, our analysis offers relatively strong support for a chain of causation that runs from increased judicial delays to lower GDP growth.

7 Conclusions

In this paper we empirically assess the existence of a positive relation between judicial timeliness and economic growth in court-dependent business environments. Our sample comprised 169 countries for the 2004-2019 period for which we used several indicators of judicial timeliness and examine their contribution to the trajectories of economic growth.

Our results suggest that courts poor performances can be considered as detrimental to economic growth. Although this particular relationship has already been shown by studies focusing one country at the time, there have been few attempts to empirically assess this phenomenon on a wider cross-country perspective, an exception being Chemin (2021).

Our results are closest in spirit to Djankov et al. (2003a), who hypothesize that in certain countries effective institutions shift out the production possibility frontier of the economy. We show evidence that courts, as public institutions, indeed matter in countries where judicial enforcement is more relevant in resolving commercial disputes. High growing economies are characterized by impersonal transactions more depending on courts than the type of relational contracting typical of low growth countries. As a consequence, economic growth is 73% more influenced by judicial enforcement. The relationship is also 47% more constraining for economies characterized by low human capital, in which alternative dispute resolution mechanisms are less frequently available. Civil-law countries and their more complex procedures are 33% more adversely affected by increasing judicial delay.

In the long-term term, such an acceleration is far from trivial and reinforces our findings on the importance of steadfast and timely judiciary in improving the trajectories of economic growth. Our estimated coefficients for JT are robust to a variety of specification checks across a multitude of static and dynamic panel-estimators. The relation between judicial timeliness and economic growth is particularly strong in those business environments more relying on judicial enforcement as high growing economies, civil law jurisdictions and low human capital countries. By treating economic growth, its confounders and judicial timeliness as simultaneous endogenous variables, our evidence confirms - despite the inherent

limitations - the effect of judicial timeliness on growth, and rules out with strong confidence the hypothesis that deteriorating economic conditions lead to prolonged judicial delays.

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Figure 1: Average disposition time in civil and commercial litigious cases and judicial timeliness across 41 countries, 2004-2019 – CHANGE X/Y AXIS
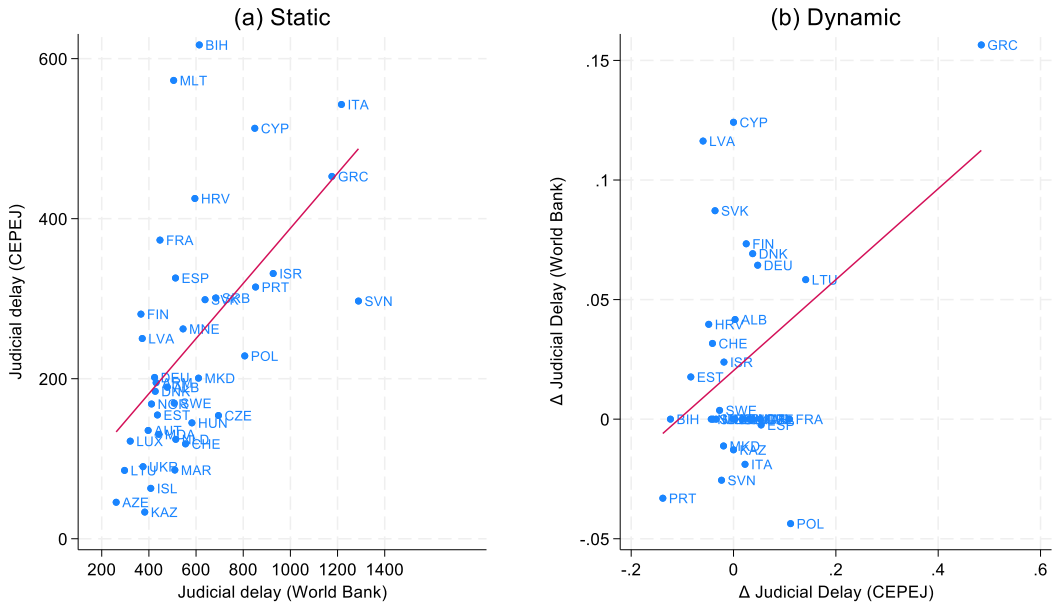
Table 1: Descriptive statistics

	Obs	Mean	Std. Dev.	Min	Max
Panel A: Outcome variables					
Growth rate of GDP	2,535	0.042	0.097	-1.604	0.601
(output-side)				(Venezuela)	(Antigua and Barbuda)
Panel B: Key treatment variable					
Judicial timeliness	2,704	642.01	303.01	120	1785
				(Singapore)	(Guinea Bissau)
Panel C: Structural covariates					
Investment GDP	2,704	0.232	0.089	-0.029	0.925
share				(Venezuela)	(Djibouti)
Government size	2,704	0.184	0.075	0.014	0.751
				(Haiti)	(São Tomé and Principe)
Trade openness	2,704	-0.077	0.189	-2.096	0.757
				(Antigua and Barbuda)	(Azerbaijan)
Exchange rate	2,704	0.009	0.097	0	1
distortions				(Portugal)	(Syria)
Population growth	2,535	0.014	0.015	-0.045	0.175
				(Syria)	(Qatar)
Population size	2,704	2.041	1.895	-3.072	7.268
(log)				(St. Kitts and Nevis)	(China)

All variables in Panel A and C are extracted from Feenstra et al. (2015). Judicial timeliness's methodology can be found in Djankov et al. (2003b).

Table 2: Fixed-effects estimates, output-side GDP

	Low Growth	High Growth	Low HCI	High HCI	Civil-law only	Common-law only	Full sample
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Panel A: State dependence coefficient							
Growth rate	-0.125***	-0.0650	-0.0818	-0.109*	0.0176	-0.0938	-0.000739
	(0.0380)	(0.0545)	(0.0570)	(0.0552)	(0.0690)	(0.0638)	(0.0591)
Panel B: Treatment variable							
JT	1.60e-05	-0.000203*	-0.000173*	-2.66e-05	-0.000156*	-6.75e-05	-0.000117**
	(7.42e-05)	(0.000103)	(8.78e-05)	(6.24e-05)	(8.08e-05)	(6.69e-05)	(5.71e-05)
JT_{t-1}	-3.35e-05	0.000155	0.000190	-2.78e-05	1.06e-05	0.000144**	5.02e-05
	(8.71e-05)	(0.000155)	(0.000126)	(7.57e-05)	(0.000116)	(6.48e-05)	(7.98e-05)
JT_{t-2}	2.58e-05	2.24e-05	-6.11e-05	9.37e-05*	8.72e-05	-4.23e-05	3.67e-05
	(5.29e-05)	(7.56e-05)	(7.41e-05)	(5.37e-05)	(5.51e-05)	(6.19e-05)	(4.25e-05)
Within R2	0.353	0.114	0.112	0.181	0.157	0.113	0.139
countries	81	84	77	77	116	49	165
obs	1,134	1,176	1,078	1,078	1,624	686	2,310

Notes: the table reports fixed-effects estimated relationship between judicial timeliness and economic growth in a sample of 169 countries for the period 2004-2019. The dependent variable is output-side growth rate of GDP. All regressions includes country fixed effects and controls for investment share of GDP, government size, trade openness, exchange rate distortions, population growth and size. Standard errors are adjusted for arbitrary heteroskedasticity and serially correlated stochastic disturbances within countries into country-specific and temporal clusters using non-nested multi-way clustering scheme for finite-sample adjustment of the empirical distribution function. Cluster-robust standard errors are denoted in the parentheses. Asterisks denote statistically significant coefficients at 10% (*), 5% (**), and 1% (***), respectively.

Table 3: Dynamic panel-level estimates, output-side GDP

	Low Growth	High Growth	Low HCI	High HCI	Civil-law only	Common-law only	Full sample
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Panel A: Levels of Treatment variable							
JT	-6.42e-05	-0.00116***	-0.000520*	-0.000223	-0.000895***	-0.000679*	-0.00112***
	(0.000311)	(0.000424)	(0.000271)	(0.000222)	(0.000235)	(0.000352)	(0.000262)
Panel B: First Differences of Treatment variable							
dJT	-0.000122	-0.00115***	-0.000569**	-0.000212	-0.000763***	-0.000485*	-0.00115***
	(0.000306)	(0.000386)	(0.000238)	(0.000194)	(0.000259)	(0.000260)	(0.000310)
countries	81	84	77	77	116	49	165
obs.	972	1,008	924	924	1,392	588	1,980

Notes: the table reports Arellano and Bond (1991) linear dynamic panel estimates of the relationship between judicial timeliness and economic growth in a sample of 169 countries for the period 2004-2019. The dependent variable is output-side growth rate of GDP. All regressions includes country fixed effects and controls for investment share of GDP, government size, trade openness, exchange rate distortions, population growth and size. Standard errors are adjusted for arbitrary heteroskedasticity and serially correlated stochastic disturbances within countries into country-specific and temporal clusters using non-nested multiway clustering scheme for finite-sample adjustment of the empirical distribution function. Cluster-robust standard errors are denoted in the parentheses. Asterisks denote statistically significant coefficients at 10% (*), 5% (**), and 1% (***), respectively.

Table 4: Intermediate Outcomes

VARIABLES	(1) TFP	(2) labor % GDP	(3) Capital stock/L	(4) IRR	(5) Residual trade % GDP
time	-7.20e-05*	4.62e-05	-3.42e-05*	-2.05e-05*	3.59e-05
	(4.06e-05)	(3.20e-05)	(1.82e-05)	(1.18e-05)	(2.70e-05)
Observations	1,624	1,834	2,313	1,834	2,366
R-squared	0.768	0.582	0.973	0.471	0.339
Number of c	116	131	166	131	169

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 5: Panel VAR estimated effects of judicial timeliness on economic growth

Conditioning variable ($Y2$)	Investment GDP share	Government size	Trade openness	Exchange rate	Population growth	Population size
	(1)	(2)	(3)	(4)	(5)	(6)
Panel A: Vector-autoregressive coefficients set						
Growth$_{(t-1)}$	.014	.041	.038	.076	.081	.078
	(.246)	(.094)	(.108)	(.099)	(.092)	(.086)
JT$_{(t-1)}$	-.006	-.0006**	-.002*	-.003*	-.002*	-.001*
	(.012)	(.0003)	(.001)	(.002)	(.001)	(.0009)
Panel B: Vector-autoregressive coefficients set: judicial delay sub-specification						
JT$_{(t-1)}$	1.270	.990***	1.152***	1.156***	1.189***	.873***
	(1.282)	(.043)	(.302)	(.384)	(.422)	(.150)
Growth$_{(t-1)}$	-.078	-.069	-.095	-.096	-.096	-.078
	(.267)	(.078)	(.122)	(.111)	(.123)	(.071)
Panel C: Wald-Granger causality test						
JT	[0.828]	[0.036]	[0.076]	[0.101]	[0.117]	[0.100]
Y2	[0.799]	[0.001]	[0.086]	[0.905]	[0.001]	[0.283]
countries	169	169	169	169	169	169
obs.	2,197	2,197	2,197	2,197	2,197	2,197

Notes: the table reports panel vector autoregressive estimates of the relationship between judicial timeliness and GDP growth for a sample of 169 countries in the period 2004-2019 assuming a simultaneous interdependence between growth, judicial delays and the growth confounding variables reported in each column. The standard errors are adjusted for arbitrary heteroskedasticity and serially correlated stochastic disturbances at the country level. Asterisks denote statistically significant sample coefficients at 10% (*), 5% (**) and 1% (***), respectively.