Why is litigation so costly to growth?

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October 3, 2023

VERY PRELIMINARY DRAFT
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Abstract

The present paper analyzes the causal link between litigation costs and economic growth. Costly litigation decreases the probability of economic transactions' judicial enforcement, thus favoring post-contractual opportunistic behavior. As a consequence, this translates in less investments, credit shortage and higher interest rates. We exploit the variation in the prohibition of pactum quota litis, litigation fee concentration and the timing of WTO membership and GATT agreement, as plausibly exogenous sources of variation in litigation costs and use it to estimate the long-run growth and development in a cross-section of 140 countries for the period 2003-2015.

JEL Classifications: ...
Keywords: ...

1 Introduction

In the aftermath of the 2008 financial crisis, governments all around the world have been struggling to recover and achieve economic growth. While no "magic recipe" guarantees this outcome, economists tend to unanimously agree that protection of property rights is a necessary condition for economies to develop and prosper. In fact, a relatively non-controversial principle in modern economics is that property rights need to be protected in order to foster economic performance. Members of different school of thoughts agree on the fact that the protection of property rights is a necessary condition to encourage investments in both human and physical capital and thus to foster economic growth (Acemoglu et al., 2001; Glaeser et al., 2004; Rodrik et al., 2004). However, while most literature has mainly focused on how different political institutions or different legal origins might help explain the variance in nations' economic performance indicators (La Porta et al., 1998), only recently scholars have started to pay more attention to the associated enforcing mechanisms. The necessity of embracing a similar perspective is due to the fact that even the most efficiently designed rule will at best be ineffective if not properly enforced. Accordingly, not only formal laws (or otherwise said *de jure* institutions) must be enquired, but equally the way these are enforced (*de facto* institutions) (Hodgson, 2006; Voigt, 2013). If institutions are to be considered as "humanly devised constraints" (North, 1990), the effectiveness of such constraining effect depends directly on such *de facto* institutions which are ment to implement them (Safavian and Sharma, 2007).

If this is true, it is necessary to shift scholarly attention on the judiciary as it has the role of making the institutional environment (property rights included) effective. A "well functioning" court system will ease the establishment of new commercial relations, lowering barriers to entry and at the same time fostering markets' dynamics, thus ultimately enhancing economic growth (Johnson et al., 2002). This is because the judiciary is the main instrument available to economic agents to solve the legal disputes arising from their transactions. While Alternative Dispute Resolution systems (ADRs) are a sort of niche limited to international trade, informal non-judicial methods of law enforcement based on repetitional mechanisms are plausible only in long-term relationships within small groups (Johnson et al., 2002; Dixit, 2003). Accordingly, national judiciaries are in charge of processing the vast majority of litigation.

But why litigation matters? Each time a case is brought to court, uncertainty arises with respect to the property rights hereby litigated. Economic actors might behave opportunistically and exploit the incapacity of the judicial system to enforce contractual obligations (Williamson, 1985). A "good" judiciary acts as an important deterrent against economic agents' willingness to deviate from previously signed contracts. At

the contrary, flawed justice might in the short-run make more attractive similar alternatives, as the discounted value of future monetary (and sometimes non-monetary) punishments will necessarily drop. Similar opportunism would undermine economic transactions, as firms would not be willing to trust partners and offer them trade credit in their business transactions, as the likelihood that this credit would be repaid diminishes (Chemin, 2009). Not only transactions costs would arise in the event of an ineffective judiciary, but equally credit would be constrained. A similar law-enforcement will incentivize opportunism on the side of borrowers: anticipating the difficulty that creditors will 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 to reduce the availability of credit (Jappelli et al., 2005; Chemin, 2009) or to increase interest rates (Visaria, 2009). Post-contractual opportunism equally affects firms' investments and markets' structure. Trading partners usually encourage suppliers to undertake an investment by writing long-term contracts. However, in a world of incomplete (or unenforceable) contracts, once investment costs are sunk, there is an immediate incentive to renege on contractual obligations and try to capture the trading partner's rent. On the other side, if transaction costs associated to searching for new business partners are high, the supplier will try to use its monopoly power and impose higher prices (Chemin, 2009). Similar institutional frictions would dissuade an efficient level of *ex ante* investments, deterring some (mutually beneficial) transactions from even taking place.
Once clarified the importance of a "well-performing" judiciary for economic interactions, the present paper wishes to build on this literature and move the discussion to a yet overlooked aspect of judicial performance: litigation costs, *i.e.*, the "price" that litigants must bear to obtain judicial enforcement of their legal claims. Trying to understand the causal link between litigation costs and economic performance is no mean feat. Our hypothesis is that, increasing the fee required to have a legal obligation enforced further exacerbates the aforementioned post-contractual opportunistic behavior. As the price for legal services increases, this should prevent meritorious cases to reach court, with negative effects for legal certainty. *Ceteris paribus*, investments should be hindered by such costs, with negative consequences not only in terms of credit shortage and higher interest rates, but also for employment (Autor, 2003). All in all, we hypothesize a negative impact of litigation costs on economic performance. To our very best knowledge no previous work has attempted to shed light empirically on this causal relation. In order to face this challenge, we exploit the variance in litigation costs across 171 national judiciaries. While relying on cross-country data implies several shortcomings, we propose several identification strategies below in order to isolate the the effect of litigation costs on economic performance.

The remainder of the paper proceeds as follow. Section 2 proposes the identification strategy adopted in order to isolate the causal impact of litigation costs on economic growth. Section 3 describes the data employed, while Section 4 shows our estimates. Conclusions are drawn in Section 5.

2 Identification Strategy

2.1 Ordinary Least Squares and Instrumental Variables

Our goal is to examine the contribution of litigation cost to economic growth consistently without omitting the previously identified confounders and growth covariates. The basic cross-sectional relationship between litigation and growth takes the following form:

$$\ln\, y_i = \tilde{\phi}_0 + \tilde{\phi}_1 \ln\, C_i + \mathbf{X}_i'\beta + \varepsilon_i \tag{1}$$

where $i = 1, 2, ..., N$ denotes the number of countries. The key covariate of interest is $\tilde{\phi}_1$ which denotes the contribution of litigation cost, C, to per capita GDP, y. The vector $\mathbf{X}$ comprises the previously identified confounders and covariates that either simultaneously or directly shape economic growth independently of litigation such as the institutional covariates, legal history covariates and physical geography covariates. The stochastic disturbance is denoted by ε.

Under identically and independently distributed error term and in the absence of omitted variables, the underlying OLS relationship in Eq. 1 yields reasonably unbiased and consistent estimates of the contribution of litigation cost to long-run economic growth. The fundamental problem arising from the OLS relationship in Eq. 1 concerns the statistical identification of the mechanism between litigation cost and economic growth. Since the effect of litigation on growth and development is plausibly driven by the set of omitted variables which jointly influence covariates and the outcome of interest, the litigation cost is unlikely to exhibit an exogenous effect on growth and development. This implies that the covariance restriction on the relationship between the error term and litigation cost is likely to fail, $cov(C_i, \varepsilon_i) \neq 0$, which suggests that the OLS estimates in Eq. 1 may be merely the result of omitted variable bias and, hence, fail to unveil the true causal effect of litigation on growth and development The failure of the exogeneity assumption also implies that it is nearly impossible to unbundle the reverse relationship between litigation and growth.

We mitigate the potential reverse causality and omitted variable bias by exploiting four plausibly exogenous sources of variation that allow us to isolate the effect of litigation on growth and development from alternative observable sources of variation.

First, we use the variation in *quota litis* provision as documented by (Djankov et al., 2003). *Quota litis* provision or contingent fee, allows plaintiffs to pay their attorneys' legal service with a share of the sum obtained in court. The idea is that opportunistic attorneys are able to exploit an informational advantage with respect to their clients and extract a higher rent in terms of legal fees. On the opposite, where contingent fee is prohibited, the greater accountability deriving from hourly fee should imply lower costs. Under the most restrictive assumptions, it is highly unlikely that the presence or absence of quota litis provision could directly influence growth and development levels through an independent and excludable channel.

Second, we exploit the variation in the litigation fee concentration between the attorney, court and the enforcement stage of litigation. For i-th country, we compute the Hirschmann-Herfindahl index of litigation fee concentration in the following form:

$$HHI_i^{fee} = \left(\frac{\text{Attorney fee}_i}{\text{Total cost}_i}\right)^2 + \left(\frac{\text{Court fee}_i}{\text{Total cost}_i}\right)^2 + \left(\frac{\text{Enforcement fee}_i}{\text{Total cost}_i}\right)^2 \quad (2)$$

And use it to partially mitigate the endogeneity of the litigation cost and the associated reverse casuation between growth and development and litigation cost. We assume that the variation in fee concentration between countries is unlikely to be an independent and mutually excludable source of variation in growth and development levels across countries, and maintain that the contrasting variation in the fee concentration affects growth and development outcomes only through the litigation cost but not through the alternative covariates.

Third, as advocated by the pioneering work of Rose (2004, 2005); Subramanian and Wei (2007); Drabek and Bacchetta (2004); Ferrantino (2010); Tang and Wei (2006), we consider the date of accession to WTO and GATT, and use both as plausibly exogenous sources of variation in growth and development which are affected only through the litigation channel per se. Specifically, we construct the set of dummy variables, indicating the year of WTO access and GATT agreement in the following form:

$$\Delta_i^{WTO} = 1 \cdot [T_i^{WTO} \in \{\tau_{i+k}^{WTO} - \tau_{i+k}^{WTO}\}] \quad (3)$$

$$\Delta_i^{GATT} = 1 \cdot [T_i^{GATT} \in \{\tau_{i+k}^{GATT} - \tau_{i+k}^{GATT}\}] \quad (4)$$

where T denotes the country-specific year of WTO admission and GATT agreement whilst τ denotes the range of observed years of admission and agreement from i-th country to k-country where, by default, k corresponds to the size of the sample. Our key identifying assumption is that the variation in *quota litis* provision, fee structure, and dates of WTO admission and GATT agreement is orthogonal to the growth and development and affects the underlying outcome of interest only through the litigation cost. Econometrically, our assumptions comprise the set of covariance restrictions where we impose the zero covariance moment condition on the relationship between the plausibly exogenous sources of variation and the stochastic disturbance term, *i.e.*, $cov(\varepsilon_i, QuotaLitis_i) = 0$, $cov(\varepsilon_i, HHI_i^{fee}) = 0$, $cov(\varepsilon_i, \Delta_i^{WTO}) = 0$ and $cov(\varepsilon_i, \Delta_i^{GATT}) = 0$.

To address the endogeneity and the associated reverse causality between the litigation cost and growth and development, our identification strategy proceeds in two stages. In the first stage, we build the OLS relationship between the litigation cost and its four instrumental variables (IV) which takes is:

$$\ln C_i = \gamma_0 + \gamma_1 \cdot (QuotaLitis)_i + \gamma_2 \cdot HHI_i^{fee} + \gamma_3 \cdot \Delta_i^{WTO} + \gamma_4 \cdot \Delta_i^{GATT} + \mathbf{X}_i'\mu + u_i \quad (5)$$

where $\mathbf{X}$ denotes the set of growth and development covariates from the structural setup while u is the first-stage disturbance term. In the first stage, we assume and test for the strength of the relationship between the each IV and the litigation cost. Under the most aggressive assumption, the non-zero relationship between the litigation cost and each IV can be described by the set of covariance moment restrictions, *i.e.*, $cov(QuotaLitis_i, lnC_i) \neq 0$, $cov(HHI_i^{Fee}, lnC_i) \neq 0$, $cov(\Delta_i^{WTO}, lnC_i) \neq 0$ and $cov(\Delta_i^{GATT}, lnC_i) \neq 0$. In the second stage, we use the predicted values of $\ln C_i$ from Eq. 6 to generate the structural effect of litigation on growth and development, and isolate it from the alternative observable growth confounders. Under the zero covariance moment conditions, the effect of litigation on growth and development does not suffer from omitted variable bias and unveils the true causal effect of litigation by ensuring the orthogonality condition on the random error term. The second-stage relationship between the litigation cost and growth and development that takes place is:

$$\ln y_i = \theta_0 + \theta_1 \cdot \ln \hat{C}_i + \mathbf{X}_i'\psi + e_i \quad (6)$$

where $\hat{C}$ is the predicted litigation cost from the first stage OLS relationship in Eq. 5. If the set of covariance restrictions on the error term and non-zero first-stage covariance conditions hold, then $\theta_1 > 0$ should hold while a large sample should eliminate the idiosyncracies commonly associated with the institutional measures in cross-country growth setup. Hence, $\operatorname*{plim}_{N\to\infty} \theta_{1,IV} = \tilde{\phi}_{1,OLS} + cov(Z_i, C_i)/cov(Z_{i,\varepsilon_i}) \times \sigma_\varepsilon/\sigma_Z$, which implies that for a zero covariance restriction between the IV, denoted by Z, and the litigation cost, denoted by C, the sampling IV estimator should yield a structural estimate no different from its OLS counterpart. Hence, for any non-zero covariance between Z and C, the underlying OLS estimator is biased proportional to the covariance moment restriction ratio while the IVs may be a plausibly exogenous source of variation in growth and development.

2.2 Matching on Nearest Neighbors

Our strategy to further isolate litigation costs on growth is based on the observational matching by the nearest neighbors. The idea is to construct a paired weighing matrix, and compare the per capita GDP by matching its level on the full covariate set depending on whether the *quota litis* is in place. Suppose the pre-matched isolated effect of *quota litis* on per capita GDP can be best characterized through a simple constant linear model:

$$\lambda_1 = E(y_1 - y_0) \tag{7}$$

Where λ_1 denotes the average exogenous effect of quota litis on per capita GDP, y_1 is the per capita GDP of i-th country where quota litis is prohibited and y_0 is the counterpart per capita GDP in j-th country where quota litis is not prohibited. If the prohibition of quota litis is denoted as a simple indicator function $I_i^{QuotaLitis}$, the effect of prohibiting quota litis on the i-th treated countries can be written as $\delta_1 = E(y_1 - y_0 | I_i^{QuotaLitis} = 1)$. Matching the country-level observations on the prohibition of quota litis requires the specification of the covariate vector set and the weighing matrix used to net out the effect of quota litis given the country-level nearest counterpart. Let $\mathbf{x_i} = \{x_{i1}, x_{i2}, \ldots, x_{ip}\}$ denote the full covariate vector, and let $\mathbf{w_i} = \{w_{i1}, w_{i2}, \ldots, w_{ip}\}$ describe the vector of weights used to construct the weighing matrix. Suppose $i = 1, 2, \ldots, N$ describes the treated group of countries where quota litis is prohibited while $j = 1, 2, \ldots, J$ denotes the control group where the prohibition is not in place.

We measure the covariate-level distance between the treated group and control group in terms of per capita GDP as the outcome of interest through a simple parametric vector norm:

$$\| x_i - x_j \|_{S \in \mathbb{R}} = \{(x_i - x_j)' \mathbf{S}^{-1} (x_i - x_j)\}^{-1/2} \tag{8}$$

where S denotes the positive semi-definite symmetric matrix with equal tails. The distance in per capita GDP between the treatment and control sample is used to explain the observed gaps in per capita GDP across countries. The per capita GDP gaps are approximated using the set of nearest-neighbor indices for i-th observation from the treatment sample. Using the distance definition from Eq. 8, we compute the set of covariate-level nearest-neighbor indices between quota litis and non-quota litis country-level observations:

$$\mathbf{\Phi_m^x(i)} = \left\{ \begin{array}{ll} j_1, j_2, \ldots, j_m \mid QuotaLitis_{j_k} = 1 - QuotaLitis_i, & \| x_i - x_{j_k} \|_S < \| x_i - x_l \|_s, \\ QuotaLitis_l = 1 - QuotaLitis_i, & l \neq j_k \end{array} \right\} \tag{9}$$

where $\mathbf{\Phi^x_m(i)}$ denotes the set of nearest-neighbor indices, and m denotes the required match count to isolate the effect of quota litis on per capita GDP. In particular, m is the smallest number such that the number of country-level elements in each set $m_i =\mid \mathbf{\Phi^x_m(i)} \mid= \sum_{j\in\mathbf{\Phi^x_m(i)}} w_j$ equals the desired match count within the desired caliper limit $\mid\mid x_i - x_j \mid\mid_S \leq c$. It is important to stress that the march count for i-th observation may not be equal to m because of cross-observation ties and potentially insufficient degrees of freedom within the caliper limit.

Our strategy proceeds by weighing the country-level observation based on the set of nearest neighbor indices. The key question pertains to the choice of scaling matrix (S) from Eq. 8. We construct a Mahalanobis-type of scaling matrix and use it to weigh the covariate-level distance between i-th country and j-th country:

$$S = \frac{(\mathbf{X} - \bar{\mathbf{x}}'\mathbf{1_n})'\mathbf{W}(\mathbf{X} - \bar{\mathbf{x}}'\mathbf{1_n})}{\sum_i^n w_i - 1} \tag{10}$$

where $\mathbf{1_n}$ is an $n \times 1$ vector of ones, $\bar{\mathbf{x}} = (\sum_i^n w_i x_i) \,/\, (\sum_i^n w_i)$ and $\mathbf{W}$ is an $n \times n$ diagonal matrix containing frequency weights. Combining the Mahalanobis scaling matrix with the set of nearest neighbor indices In Eq. 8 for the countries where quota litis is not prohibited, we predict the potential per capita GDP as a function of its observed counterpart.

Using the nearest neighbor indices, we predict the potential outcome for i-th observation as a function of observed y_i:

$$\hat{y}_{ti} = \begin{cases} y_i, & \text{if Quota Litis}_i = t_i, \\ \frac{\sum_{j\in\Phi(i)} w_j y_j}{\sum_{j\in\Phi(i)} w_j}, & otherwise \end{cases} \tag{11}$$

for $t_i \in \{0, 1\}$ which denotes the i-th country treatment status. Regardless of the error variance distribution, the full treatment effect and the full treatment effect of quota litis on the treated is computed as the weighted distance between the observed per capita GDP and the potential per capita GDP using the covariate-level element sets. For the sake of brevity, we may write the treatment effect of quota litis, and the effect on the treated as:

$$\hat{\tau}_1 = \frac{\sum_{i=1}^n w_i(y_{1i} - y_{0i})}{\sum_{i=1}^n w_i} = \frac{\sum_{i=1}^n w_i(2t_i - 1)\{1 + K_m(1)\}y_i}{\sum_{i=1}^n w_i} \tag{12}$$

$$\hat{\delta}_1 = \frac{\sum_{i=1}^n t_i w_i(\hat{y}_{1i} - \hat{y}_{0i})}{\sum_{i=1}^n t_i w_i} = \frac{\sum_{i=1}^n \{t_i - (1 - t_i)K_m(1)\}y_i}{\sum_{i=1}^n t_i w_i} \tag{13}$$

where $K_m(1) = \sum_{j=1}^n I\{i \in \Phi(j)\}w_j / \sum_{k\in\Phi(j)} w_k$ is the matched covariate element set which ensures that the covariate characteristics between the treatment and control samples are used to match country-level observations, and obtained the full effect of quota litis. Using the match covariate element set, the variance of the full effect and the effect on the treated can be written as follows:

$$\hat{\sigma}_\tau^2 = \frac{\sum_{i=1}^n w_i[(\hat{y}_{1i} - \hat{y}_{0i} - \hat{\tau}_1)^2 + \hat{\xi}_i^2\{K_m^2(i) + 2K_m(i) - K_m'(i)\}]}{(\sum_{i=1}^n w_i)^2} \tag{14}$$

$$\hat{\sigma}_\delta^2 = \frac{\sum_{i=1}^n t_i w_i[(\hat{y}_{1i} - \hat{y}_{0i} - \hat{\delta}_1)^2 + \hat{\xi}_i^2\{K_m^2(i) - K_m'(i)\}]}{(\sum_{i=1}^n t_i w_i)^2} \tag{15}$$

Furthermore, let ξ_i^2 denote the conditional per capita GDP variance such that $\xi_i^2 = var(y_{ti} \mid x_i)$. Assuming that ξ_i^2 does not vary with the treatment-related covariates, the mean effect of quota litis corresponds to the distance between the i-th and j-th country-level per capita GDP weighted by the elements of the covariate set. Our strategy is to use a parsimonious model specification with the full covariate set and compute the full-sample variance of per capita GDP driven by the quota litis for the treatment and control samples as well as for the treated-only sample:

$$\xi_\tau^2 = \frac{1}{2\sum_i^n w_i} \sum_{i=1}^n w_i \left[\frac{\sum_{j\in\Phi(i)} w_j\{y_i - y_i(1-t_i) - \hat{\tau}_1\}^2}{\sum_{j\in\Phi(i)} w_j} \right] \tag{16}$$

$$\xi_\delta^2 = \frac{1}{2\sum_i^n t_i w_i} \sum_{i=1}^n t_i w_i \left[\frac{\sum_{j\in\Phi(i)} t_i w_j\{y_i - y_i(1-t_i) - \hat{\delta}_1\}^2}{\sum_{j\in\Phi(i)} t_i w_j} \right] \tag{17}$$

where the standard moment restrictions on w apply. Since it is quite likely that the conditional outcome variance depends on the covariates or treatment, we may require an estimate for ξ_i^2 at each observation. In this case, a second matching procedure is required where we match the observations within the same treatment group. Define the within-treatment matching set:

$$\Theta_h^p(i) = \{j_1, j_2, \ldots, j_{h_i} \mid t_{j_k} = t_i, \|x_i - x_{j_k}\|_S < \|x_i - x_{j_k}\|_S, t_l = t_i, l \neq j_k\}$$

where h is the desired set size, and where the number of elements in each set, $h_i = |\Theta_h^x(i)|$, may vary depending on ties and the value of the caliper which implies that $\xi_{t_i}^2(x_i) = \sum_{j\in\Theta(i)} w_j(y_j - \bar{y}_{Theta})^2 / \sum_{j\in\Theta(i)} w_j - 1$, where $\bar{y}_{\Theta i} = \sum_{j\in\Theta(i)} w_j y_j / \sum_{j\in\Theta(i)} w_j - 1$, denotes the treatment-control weight-matched level of per capita GDP depending on the prohibition of quota litis.

2.3 Matching on Propensity Scores

The main *caveat* arising from matching the country-level observations based on the prohibition of quota litis by the nearest neighbor of full covariates concerns the exogeneity of quota litis. The internal validity of matching on nearest neighbors hinges on the assumption that quota litis does not affect per capita GDP directly but only through a pre-determined channel such as litigation cost. If the prohibition of quota litis is endogenous to per capita GDP, one might not be able to properly isolate the effect of litigation cost from other observable sources of growth and development which implies that another set of instruments would be necessary for to isolate the effect of quota litis prohibition on growth and development. Our strategy to address the potential non-exogeneity of the prohibition of quota litis is to use the propensity score matching framework (Rosenbaum and Rubin, 1983; Abadie and Imbens, 2006, 2016) to overcome the potential identification trap arising from the endogeneity of quota litis.
Suppose $I_i^{QuotaLitis} = 1 \cdot [i \in \{0,1\} \in \mathbb{R}]$ denotes the country-level indicator of the prohibition of quota litis. Denote the prohibition of quota litis as a simple treatement model which denotes the probability of prohibiting the quota litis depending on the full set of covariates, namely, $p(\mathbf{X}_i, I_i^{QuotaLitis}, \gamma)$ which is our measure of the propensity score used to match country-level observations depending on the finite dichotomous interval.
Our propensity score matching strategy proceeds in several steps. The first step is to build a criteria used to match the outcome observations on the treatment model of the quota litis propensity score. We construct the set of nearest-neighbor indices of i-th observation where the quota litis is prohibited. This implies that the nearest neighbor indices should correspond to the differences in the estimated propensity score between i-th country and j-th country:

$$\Phi_m^P(i) = \{I_{j_k}^{QuotaLitis} = 1 - I_i^{QuotaLitis} \mid \hat{p}_i(t) - \hat{p}_{j_k}(t) \mid < \hat{p}_i(t) - < \hat{p}_l(t) \mid, t_l = 1 - t_i, l \neq j_k\} \tag{18}$$

Where $\Phi_m^P(i)$ denote the matrix of nearest-neighbor indices for i-th observation, $\hat{p}_i(t) = p(\mathbf{X}_i, I_i^{QuotaLitis}, \gamma)$ is the estimated propensity score obtained either through a probit or logit estimator, and m is the number of elements in each set $m_i = \mid \Phi_m^P(i) \mid = \sum_{j \in \Phi_m^P(i)} w_j$, which denotes the total number of matches for each propensity score. Analogously, we define the within-treatment covariate-level matching set:

$$\Theta_h^p(i) = \{j_1, j_2, \ldots, j_{h_i} \mid t_{j_k} = t_i, \mid \hat{p}_i(t) - \hat{p}_{j_k}(t) \mid < \mid \hat{p}_i(t) - \hat{p}_{j_k}(t) \mid, t_l = 1 - I_i^{QuotaLitis}, l \neq j\} \tag{19}$$

which allows us to estimate the potential GDP per capita gain or loss in the absence of the prohibition of quota litis, and where h is the desired number of matches that may vary with the caliper limit, the density of cross-observation ties, and the value of the caliper where, by default, $h_i =\mid \Theta_h^p(i) \mid$. By computing the matching set using Eq. 19, we estimate the potential per capita GDP in the absence of the prohibition using the potential outcome framework from Eq. 11.

The next step in our matching strategy is to adjust the underlying per capita GDP variance that could exhibit either unequal random error variance distribution or serial correlation of the spatial error term. Following Abadie and Imbens (2006), we use the treatment model variance-covariance matrix to compute the standard errors robust to unequal error variance distribution and serially correlated stochastic disturbances. This implies that the variance of both the effect of quota litis prohibition on the non-quota litis countries, and the effect of quota litis on the affected countries should be adjusted for the homoscedasticity and zero serial correlation assumption violation using a simple adjustment mechanism:

$$\hat{\sigma}^2_{\lambda,adj} = \hat{\sigma}^2_\tau + \hat{\mathbf{c}}'_\tau \hat{\mathbf{V}}_\gamma \hat{\mathbf{c}}'_\tau \tag{20}$$

$$\hat{\sigma}^2_{\delta,adj} = \hat{\sigma}^2_\tau + \hat{\mathbf{c}}'_\tau \hat{\mathbf{V}}_\gamma \hat{\mathbf{c}}'_\tau + \frac{\partial \hat{\delta}_1}{\partial \gamma'} \hat{V}_\gamma \frac{\partial \hat{\delta}_1}{\partial \gamma'} \tag{21}$$

where $\hat{\sigma}^2_{\lambda,adj}$ is the adjusted variance of λ, which captures the matched full effect of quota litis prohibition, and $\hat{\sigma}^2_{\delta,adj}$ is the adjusted variance of δ, which caputes the effect of quota litis prohibition on the affected countries only. The variance adjustment depends on the matched variance-covariance matrix from the treatment model, which is denoted by $\hat{V}$, and on the adjustment term for λ. More specifically, we use the paired covariance matrices between the full set of covariates and the two potential outcomes, $\hat{y}_{i1}$ and $\hat{y}_{i0}$, and weigh them using a pre-specified Gaussian probability distribution function, $f(\mathbf{x}'\hat{\gamma}) = dp(\mathbf{x}', 1, \hat{\gamma})/d(\mathbf{x}'\hat{\gamma})$ with the sequence of weights equally distributed between the estimated propensity scores, $\hat{p}_i(0)$ and $p_i(1)$. This leads to a more parsimonious computation of the adjustment term:

$$\hat{\mathbf{c}}_\tau = \frac{1}{\sum_{i=1}^n w_i} \sum_{i=1}^n w_i f(\mathbf{x}_i'\hat{\gamma}) \left(\frac{cov(\mathbf{x}_i, \hat{y}_{i1})}{\hat{p}_i(1)} + \frac{cov(\mathbf{x}_i, \hat{y}_{i0})}{\hat{p}_i(0)} \right) \tag{22}$$

For a given treatment status, the prohibition of quota litis, we assume a non-zero covariance between the per capita GDP and the full set of covariates, $cov(\mathbf{x}_i, \hat{y}_{ti}) \neq 0$ which allows us to generate the potential outcomes in the presence or absence of quota litis prohibition without changing the composition of covariates or the underlying model assumptions. This implies that covariances in the adjustment term should vary with the country-level treatment status:

$$cov(\mathbf{x}_i, \hat{y}_{ti}) = \begin{cases} \frac{\sum_{j\in\Theta_h(i)} w_j(x_j - \bar{\mathbf{x}}_{\Theta i})(y_j - \bar{\mathbf{y}}_{\Theta i})}{\sum_{j\in\Theta_h(i)} w_j - 1} & \text{if } t_{i=t} \\ \frac{\sum_{j\in\Phi_h(i)} w_j(x_j - \bar{\mathbf{x}}_{\Phi i})(y_j - \bar{\mathbf{y}}_{\Phi i})}{\sum_{j\in\Phi_h(i)} w_j - 1} & \text{otherwise} \end{cases} \tag{23}$$

where $cov(\mathbf{x}_i, \hat{y}_{ti})$ is a $p \times 1$ vector with $\bar{\mathbf{x}}_{\Theta i} = \sum_{j\in\Theta_h(i)} w_j \mathbf{x}_j / \sum_{j\in\Theta_h(i)} w_j$ denoting the weighted set of covariates from the nearest neighbor indices, $\bar{\mathbf{x}}_{\Phi i} = \sum_{j\in\Phi_h(i)} w_j \mathbf{x}_j / \sum_{j\in\Phi_h(i)} w_j$ is the weighted set of covariates predicting the treatment through the propensity score, and $\bar{\mathbf{y}}_{\Phi i} = \sum_{j\in\Phi_h(i)} w_j \mathbf{y}_j / \sum_{j\in\Phi_h(i)} w_j$ denotes the potential outcome in the absence of quota litis prohibition. The reliance on propensity scores to generate the potential outcome may invoke the within-treatment and opposite treatment clusters used to compute the adjusted variances of the quota litis effect, $\hat{\sigma}^2_{\tau,adj}$ and $\hat{\delta}^2_{\tau,adj}$. These may be based on the desired number of treatment-related matches, h, instead of the cluster $\Phi^p_m(i)$ which is used to compute $\hat{\lambda}_1$ and $\hat{\delta}_1$ although in practice, $h = m$ might be more desirable. In either case, we use the Mahalonobis scaling matrix and perform the $h = 5$ matches given the caliper limit to ensure that the potential outcomes are matched with the sufficient number of cross-observation ties to facilitate a broad cross-covariate matching between the i-th and j-th country for the given set of propensity scores, $\hat{p}_i(t_i)$ and $\hat{p}_i(t_i)$ where $t \in \{0, 1\}$.

$$\mathbf{c}_{\delta,1} = \frac{1}{\sum_{i=1}^n t_i w_i} \sum_{i=1}^n w_i \mathbf{x}_i f(\mathbf{x}_i', \hat{\gamma})(\tilde{y}_{1i} - \tilde{y}_{0i} - \hat{\delta}_1) \tag{24}$$

$$\mathbf{c}_{\delta,2} = \frac{1}{\sum_{i=1}^n t_i w_i} \sum_{i=1}^n w_i f(\mathbf{x}_i', \hat{\gamma}) \left(cov(\mathbf{x}_i, \hat{y}_{1,i}) + \frac{\hat{p}_i(1)}{\hat{p}_i(0)} cov(\mathbf{x}_i, \hat{y}_{0,i}) \right) \tag{25}$$

And the within-treatment matching sets $\Phi_h(-i) = \Phi^p_h(-i)$ are similar to $\Phi^p_h(i)$ but exclude observation i:

$$\Phi^p_h(-i) = \{j_1, j_2, \ldots, j_{h_i} \mid j_k \neq i, t_{j_k} = t_i, \|\hat{p}_i - \hat{p}_{j_k}\| < \|\hat{p}_i - \hat{p}_l\|, t_l = t_i, l \notin \{i, j_k\}\} \tag{26}$$

We compute the partial derivative in the variance adjustment term by matching on the opposite treatment by using covariate set $\mathbf{x}_i = (x_{i,1}, x_{i,2}, \ldots, x'_{i,p}$. Let $\Theta^X_m(i)$ denote the cluster set for $i = 1, 2, \ldots, n$. The estimator of the $p \times 1$ vector of $(\partial\delta_1)/(\partial\gamma')$ is computed as:

$$\frac{\partial\delta_1}{\partial\gamma'} = \frac{1}{\sum_i^n t_i w_i} \sum_{i=1}^n \mathbf{x}_i f(x', \hat{\gamma}) \left((2t_i - 1) \left(y_i - \bar{y}_{\Phi^X_{mi}} \right) - \hat{\delta}_1 \right) \tag{27}$$

where $\bar{y}_{\Phi^X_{mi}} = \sum_{j\in\Theta^X_m(1)} w_j y_j / \sum_{j\in\Theta^X_m(1)} w_j$ denotes the observed weighted per capita

GDP which corresponds to the matched counterpart, predicted from $\hat{p}_i(0)$ and $\hat{p}_i(1)$, using $\mathbf{w}_i = \{w_{i1}, w_{12}, \ldots, w_{ip}\}$ sequence of weights to seek the closest covariate-level counterpart based on within-treatment cluster matching set in Eq. 26. Equation 27 allows us to partially uncover the potential per capita GDP predicted by the presence or absence of quota litis using a restricted version of the covariate-level distance matching between the countries with and without the prohibition of quota litis sharing similar covariate-level characteristics to compute the missing counterfactual by simultaneously allowing for the endogeneity of quota litis.

3 Data

3.1 Outcomes

Our dependent variables comprise two measures of growth and long-run development. First, our key dependent variable is the per capita GDP, computed from the expenditure series and denoted in 1990 constant prices with Geary-Khamis adjustment. Second, we compute the annualized rate of growth for the period 1950-2014 using the expenditure-based per capita GDP series. Both variables are constructed using the Penn World Tables 9.0 (Feenstra et al., 2015).

3.2 Litigation Cost

The data on litigation cost is drawn from Doing Business database (World Bank, 2016). The level of litigation costs is computed using a standardized judicial dispute that can be easily compared across countries and over time. The dispute concerns a lawful transaction between two businesses both located in the country's largest city. The value of the claim is equal to 200 percent of the per capita income. The seller sells some custom-made goods to the buyer. After the seller delivers the goods to the buyer, the latter refuses to pay the contract price alleging that the goods are not of adequate quality. As a plaintiff, the seller sues the bayer (the defendant) to recover the amount under the contractual agreement. The dispute is brought before the court. The cost of the commercial dispute is measured as a percentage of the claim value. The litigation cost variable is constructed as a sum of disaggregated fee components: (i) court fee, (ii) enforcement fee, and (iii) attorney fee. Court fee includes all costs that the plaintiff must advance to the court, regardless of the final cost borne by the defendant, including the fees that must be paid to obtain an expert opinion. Enforcement costs are all costs that the plaintiff must advance to enforce the judgement through a public sale of the defendant's movable assets, regardless of the final cost borne by the plaintiff. The attorney cost comprises the full set of fees that the plaintiff must advance to the local attorney to represent the plaintiff in such standardized case regardless of the final reimbursement, excluding bribes and other under-the-table payments, which of course cannot be accounted for. We calculate the level of litigation cost as a percentage of the claim as the sum of attorney fee, court fee, and enforcement fee.

3.3 Instrumental Variables

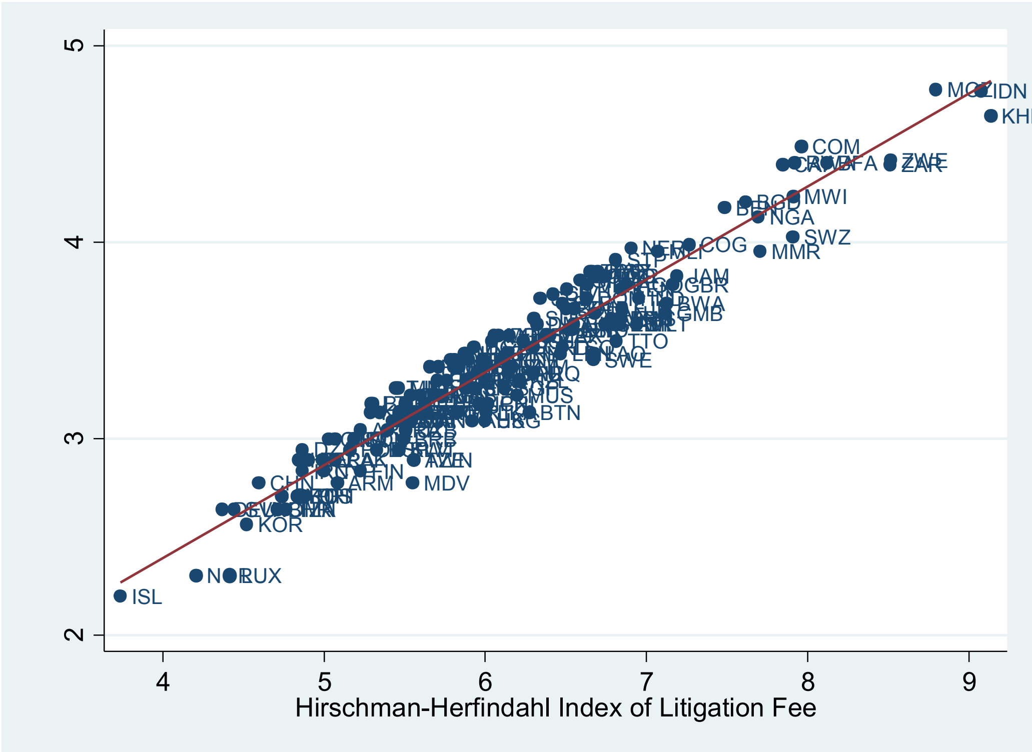
3.3.1 Pactum de Quota Litis

Our key instrumental variable (IV) to address the likely reverse causality between litigation cost and economic growth concerns the presence or absence of quota litis. Pactum quota litis is a contingency fee agreement by which a creditor of a sum difficult to recover in a judicial dispute, promises a portion to the person who will undertake to recover it. Our instrumental variables is a dummy variable which takes the value of 1 if pactum quota litis is prohibited, and 0 otherwise. The data on the prohibition of pactum quota litis is from Djankov et al. (2003) where the prohibition of quota litis is coded for 93 countries. We systematically scan the national acts on the practice of legal profession on country-to-country basis to expand the coding of quota litis prohibition to the remaining 78 countries from our sample. Our coding procedure confirms the prohibition of quota litis for the country-level sample from Djankov et al. (2003). We observe the prohibition of pactum quota litis in 40 countries, or roughly 23 percent of full sample.

3.3.2 Concentration of Fees

Our second instrumental variable to address the potential endogeneity of litigation cost in the long-run growth process is the variable reflecting the concentration of fee in the standardized judicial dispute between the attorney, court and the enforcement stage of litigation. The concentration of the fee reflects the relative disparity in the share of total litigation cost in the judicial dispute. Greater concentration of the fee clearly reflects the relative power and influence of either the attorney, court or the enforcement institution in the litigation process. By default, greater concentration of the fee inherently shapes the incentive of the dominant party to inflate the litigation cost. We compute the Hirschmann-Herfindahl index of the fee concentration following Eq. (2). Figure 1 unveils a first-stage relationship between the litigation cost and the HH index of fee concentration. The aggregate correlation substantiates our core argument and suggests that greater concentration of the fee tends to overwhelmingly expand the litigation cost. We observe the lowest concentration of the fee in Iceland, Norway, Ger-

Figure 1: Litigation Cost and Fee Concentration



many, Luxembourg and Slovenia while the highest concentration values are observed in Zimbabwe, Mozambique, Cambodia and Indonesia. The aggregate correlation between the litigation cost and the fee concentration is 0.96, and is statistically significant at 1%.

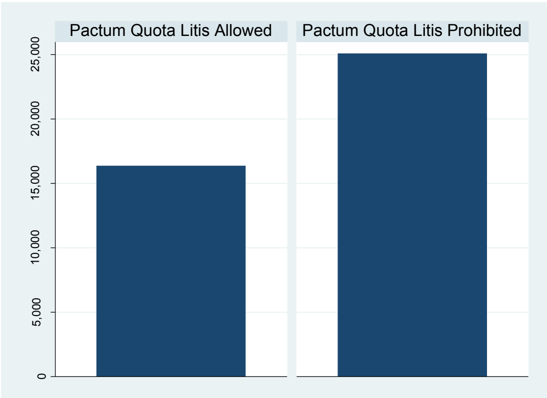
3.3.3 Timing of WTO Membership and GATT Agreement

Our final set of instrumental variable captures the timing of World Trade Organization (WTO) membership and General Agreement on Trade and Tariffs (GATT). We code the WTO membership and GATT agreement, and obtain the dates of agreement and membership. The underlying intuition behind both institutional arrangement is that earlier joining of WTO or the ratification of GATT agreement should foster low-cost litigation while the membership and agreement later could let the costly litigation persist. The coded years are translated in the set of dummy variables, which indicate the timing of membership and agreement. A simple linear regression of the litigation cost on the full set of WTO membership year and GATT agreement year dummy variables indicates a joint significance of WTO and GATT covariates in explaining the litigation cost with p-value $= 0.000$. The first-stage evidence indicates that WTO membership year dummy variables account for up to 9.5 percent of the cross-country variance in litigation cost while the GATT agreement years explain up to 27 percent of the underlying litigation cost variation across countries.

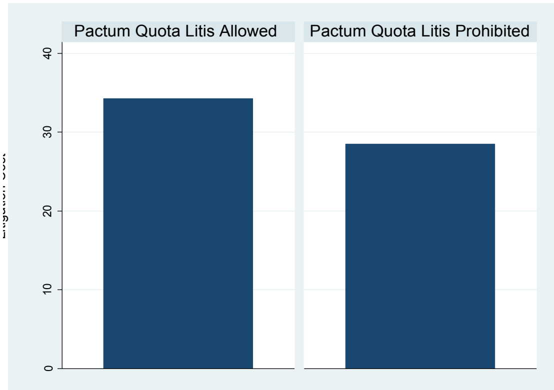
3.4 Covariates

In Table 1, we present the descriptive statistics for both outcomes and covariates included in the underlying long-run growth and development model. Excluding the structural covariates, our sample comprises 171 countries which exhibit a substantial variation in per capita GDP level and per capita GDP growth rates. The lowest per capita GDP levels are observed in Central African Republic, Liberia and Burundi. Excluding oil-rich countries such as Qatar and United Arab Emirates, the highest level of per capita GDP is observed in Luxembourg, Singapore, Norway, Switzerland, and the United States. Similarily, we observe sizeable variation in long-run growth rates. We show that levels of per capita GDP and growth rates differ substantially between countries with and without pactum quota litis. For per capita GDP level, we reject the two-side null hypothesis between quota and non-quota countries at 1% while, for growth rates, the corresponding two-sided null hypothesis is rejected at 10%.
For the full sample of 171 countries, the litigation cost ranges from 9 percent of the total claim in Iceland to 119 percent of the claim in Mozambique. The difference in litigation cost between quota and non-quota countries is substantial and, yet, statistically significant at 10%. On balance, countries with the prohibition of quota litis tend to have about 6 percentage points lower litigation cost (relative to the value of the claim) than non-quota countries, but do not seem to have markedly different concentration of the litigation fee. Our set of covariates consists of the variables with a previously identified growth linkage such as initial conditions, demographic and health covariates, intermediate macroeconomic covariates, institutional covariates, and physical geography covariates.
Following Barro (1991), we use the per capita GDP level and growth rate in the initial year to capture the set of initial conditions. Controlling for initial conditions also allows us to examine the conditional convergence effect of litigation cost on growth. Two institutional covariates are considered such as the rule of law and civil law indicator variable. Controlling for the rule of law ensures that our identification strategy does not confound the effect of litigation cost on growth with the effect of the rule of law on growth since a sizeable theoretical census agrees on the independent effect of the rule of law on long-run growth and development. In Figure 4, we present the reduced-form and first-stage relationship between the per capita GDP, litigation cost and litigation fee concentration where a strong negative relationship is indicated.

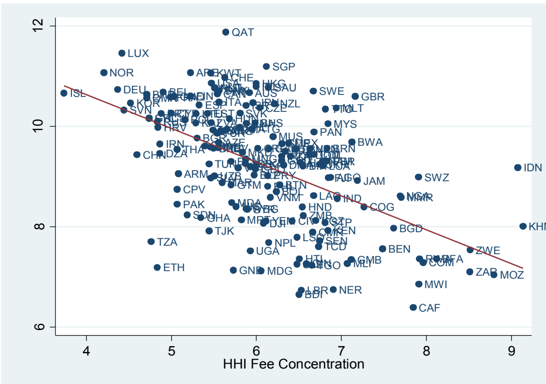
Figure 2: Litigation Cost, Fee Concentration and Long-Run Growth



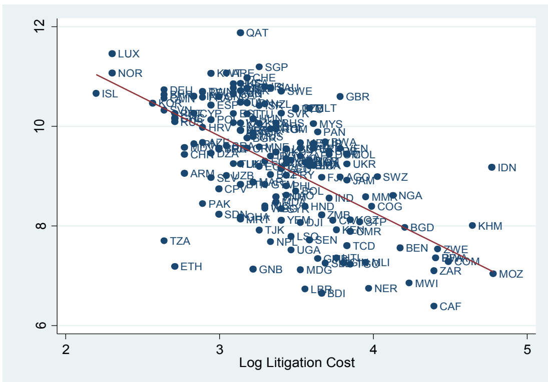
(a) Long-Run Growth and Quota Litis



(b) Litigation Cost and Quota Litis



(c) Reduced-Form: GDP Per Capita and Fee Concentration



(d) Structural Setup: GDP Per Capita and Litigation Cost

Table 1: Outcome-Level and Covariate-Level Descriptive Statistics

	Obs	Mean	StD	Min	Max	P25	P75	Treatment-Control Diff (p-value)
Panel A: Outcomes								
GDP Per Capita Level	171	18.401	19.72	594	133340	4.257	25.99	0.005
Growth Rate	171	.023	.022	-.030	.168	.012	.031	0.086
Panel B: Endogenous Variables								
Litigation Cost	171	32.91	18.53	9.00	119	22.00	38.00	0.085
Panel C: Instrumental Variables								
Quota Litis Prohibition	171	.233	.424	0	1	0	0	
HHI Fee Structure	171	6.07	.954	3.73	9.13	5.46	6.66	0.325
Panel D: Structural Covariates								
Initial GDP Per Capita	171	7.112	20.517	260.98	244.668	1.392	6.66	0.062
Population Growth	168	1.45	1.35	-1.76	8.09	.476	2.29	0.067
Life Expectancy	166	70.65	8.86	48.71	83.53	64.07	76.57	0.004
Infant Mortality	167	25.31	23.81	1.66	102.78	6.41	38.66	0.012
Labor Force Participation	140	62.21	9.93	38.40	86.80	55.69	68.32	0.071
Industry/GDP Ratio	154	12.85	6.33	1.46	35.89	7.64	16.85	0.016
Trade Openness	164	93.40	56.75	24.85	437.50	59.24	108.88	0.030
Investment/GDP Ratio	171	.228	.090	.026	.544	.170	.275	0.549
Average Years of Education	125	9,060	3,321	1.37	15.00	7.22	11.61	0.033
Rule of Law	171	-.017	.967	-2,178	2,043	-.747	.606	0.000
Civil Law Legal Origin	171	.719	.450	0	1	0	1	0.267
Tropical	171	.450	.498	0	1	0	1	0.003
Oil	171	.070	.256	0	1	0	0	0.892
Malaria Index	171	.432	.496	0	1	0	1	0.117
Ethnic Fractionalization	167	.442	.252	0	1	.204	.660	0.140

4 Results

4.1 Ordinary Least Squares

In Table 2, we present the effects of litigation costs on long-run growth and development. The evidence clearly suggests that greater litigation costs tends to hamper long-run growth in development. Columns (1) through (4) exhibit the effects of litigation costs on per capita GDP level using a full country-level sample. In quantitative terms, the point estimate in column (1) suggests that a 1 percent increase in the litigation cost tends to depress long-run per capita GDP by 0.33 percent. Neglecting the simultaneous influence of covariates, litigation cost alone explains up to 36 percent of the variation in per capita GDP across countries. Controlling for macroeconomic covariates which could confound the effect of litigation on long-run growth in column (2) indicates a notable rise in the underlying point estimate to - .652 (with country-clustered S.E. = .133), and suggests a discernable non-zero influence of litigation cost on per capita income, beyond the impact of macroeconomic fundamentals on per capita income.

The parameter estimate in column (2) clearly suggests that each 1 percent increase in the litigation cost tends to decrease the per capita income in the long run by 0.65

percent, respectively. In column (3), two institutional covariates are added to the underlying model, and the evidence overwhelmingly rejects the notion that the litigation costs does not seem to affect per capita income independently of the effect of rule law or legal origin. Column (4) adds the physical geography covariates, which might disproportionately influence the magnitude and significance of litigation in explaining growth and development since the countries with the lowest long-run growth and income levels are clustered in the poorest regions in our sample such as Sub-Saharan Africa and South Asia. On the contrary, the evidence highlights a strong and robust effect of litigation cost on per capita GDP, taking into account the influence of adverse geographic conditions on long-run development. Controlling for the physical geography covariates brings the point estimate on litigation cost back to the baseline estimate in column (1).

In columns (5) through (8), we uncover the effect of litigation cost on economic growth. Compared to columns (1) through (4), our dependent variable is the growth residual for the post-1950 period. The residual approach ensures that all the previously identified growth factors are appropriately controlled for and netted out of the model to partially address the simultaneity bias, and the likely influence of confounders on long-run growth. The full set of covariates from column (1) and (4) is used to compute the residual in the stepwise fashion. This implies that the residual effect of litigation cost is equivalent to the effect of litigation cost on the unexplained between-country growth variance, i.e. TFP. The evidence suggests that greater litigation cost tends to strongly dampen the growth residual. In particular, each percent increase in the level of litigation cost is associated with 0.05 percent drop in growth residual.

Once the institutional and macroeconomic covariates are factored in the underlying model, the relationship between the litigation cost and growth residual disappears. As a check on the plausibility of the estimates, in columns (9) through (12), we replace the post-1950 mean growth variable with the 2003-2016 mean growth rate from World Economic Outlook (International Monetary Fund, 2017). Replicating the growth residual using 2003-2016 growth rate as the outcome of interest renders the relationship between the litigation cost and economic growth almost non-existent. The OLS estimates from Panel A clearly indicate that long-run effects of litigation costs (on pern capita GDP) trump the short-run effects (on growth rate) which suggests that the effect of rising litigation costs is set to materialize in the long-run perspective while the short-run effects are clearly weak.

In Panel B, we re-examine the effects of litigation costs on long-run growth and development in the quantile regression framework. Such framework allows us to partially decompose the distributional effect of litigation cost and allow it to differ between countries depending on their respective income level. And second, the quantile framework also facilitates a steady, albeit imperfect, unbundling of the litigation cost effect across various tails of the distribution. Quantile point-specific estimates in Panel B suggest that the effect of litigation cost on growth and development might not be evenly distributed across income level- and growth residual quantiles of the global distribution. In columns (1) through (4), we show that the effect of litigation costs on long-run development is particularly strong in the 90th percentile. This implies that the level of litigation costs predicts the country-level per capita income in the upper 10% of the distribution reasonably well. On the contrary, columns (5) through (8) indicate a reasonably strong and significant effect of litigation cost on growth residual only in the 25th percentile of the global residual distribution whereas the effect slowly dissipates in the upper percentiles of the distribution. The evidence clearly implies that the effect of litigation cost is particularly strong with respect to the long-run per capita income level but somewhat less strong compared to the growth rates in the short run. In Appendix A, we break down the quantile step estimator into 1/1000 decimated percentile-level points, replicate the effects on per capita income and growth rates, and graphically present the estimates.

In Panel C, we display the reduced-form relationship between the key outcomes of interest and the set of IVs used to address the reverse causality between the litigation cost and the key economic outcomes. In columns (1) through (4), the dependent variable is the log per capita GDP. The reduced-form estimates confirm a strong relationship between the set of proposed IVs and per capita income. Concurrent with the prior descriptive evidence in Table 2 and Figure 4, the prohibition of pactum quota litis is associated with 59 percent higher per capita income level, and is statistically significant at 1%, whereas in column (5) and column (9) we find no discernable evidence of reduced-form relationship between the pactum quota litis and post-1950 growth rates, and post-2003 growth rates. Column (6) confirms a strong negative relationship between the concentration of the litigation fee and per capita income. At face value, 1 basis point increase in the fee concentration is associated with 6.73 percent decrease in per capita income, which warrants further disentangling of cause-and-effect relationship by addressing the reverse causality through the endogenous litigation channel.

Moreover, the reduced-form estimates in Panel C also indicates a persistent relationship between the timing of WTO membership and GATT agreement, and the per capita GDP. In the reduced form, we find the evidence of a jointly significant effect of WTO membership and GATT agreement dummy variables on the per capita GDP. On the contrary, the point estimates fail to indicate a robust reduced-form relationship between the prohibition of pactum quota litis and the post-1950 growth residual, as indicated in the columns (5) through (8). In a similar vein, there appears to be no discernable reduced-form relationship between the post-2003 growth residual and both the prohibition of pactum quota litis and the litigation fee concentration. The absence of the reduced-form relationship in growth residual regressions indicates that the room for a causal effect of litigation cost on growth outcomes might be non-existent which leads us to focus on the income level as the underlying outcome variable used in the IV-2 stage analysis of income level-litigation cost relationship, which explicitly allows us to address the endogeneity of litigation cost with the set of prorposed IVs to mitigate the reverse causality as much as possible.

Table 2: Litigation Cost, Economic Growth, and Development: Ordinary Least Squares Relationship

	Long-Run Effects				Short-Run Effects							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
	Log Real GDP Per Capita (PWT, 2014)				Mean Growth Residual (PWT, 1950-2014)				Mean Growth Residual (IMF/WEO, 2003-2016)			
	Full Sample				Excluding Outliers							
Panel A: Basic OLS Setup												
Litigation Cost	-.334***	-.652***	-.855***	-.967***	-.005***	-.002	-.005***	-.0007	-.019	-.205	-.113	-.121
	(.127)	(.133)	(.157)	(.171)	(.001)	(.003)	(.001)	(.003)	(.395)	(.385)	(.400)	(.385)
Demographic Covariates	Y	N	N	N	Y	Y	Y	Y	Y	Y	Y	Y
Macroeconomic Covariates	N	Y	N	N	N	Y	Y	Y	N	Y	Y	Y
Institutional Covariates	N	N	Y	N	N	Y	Y	Y	N	N	Y	Y
Geography Covariates	N	N	N	Y	N	N	N	Y	N	N	N	Y
Initial Income Level	N	N	N	N	Y	Y	Y	Y	Y	Y	Y	Y
# Countries	140	114	171	171	137	127	129	127	140	129	129	129
Full R2	0.74	0.76	0.64	0.56	0.19	0.25	0.26	0.31	0.12	0.20	0.16	0.23
Partial R2	0.36	0.36	0.36	0.36	0.04	0.01	0.04	0.00	0.00	0.00	0.00	0.00
Panel B: Basic OLS Effects by Quantiles												
	Q(.25)	Q(.50)	Q(.75)	Q(.90)	Q(.25)	Q(.50)	Q(.75)	Q(.90)	Q(.25)	Q(.50)	Q(.75)	Q(.90)
Litigation Cost	-.212	-.148	-.125	-.243***	-.005**	-.001	-.0006	.003	-.058	.477	.252	-.082
	(.195)	(.144)	(.107)	(.008)	(.003)	(.002)	(.002)	(.006)	(.374)	(.391)	(.692)	(.754)
Structural Covariates	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Panel C: Reduced Form Relationship												
Quota Litis Prohibited	.595***				.004				.163			
	(.199)				(.005)				(.322)			
HHI Fee Structure		-.673***				.001				-.032		
		(.078)				(.001)				(.190)		
WTO Membership (p-value)			[0.000]				[0.000]				[0.000]	
GATT Membership (p-value)				[0.000]				[0.000]				[0.000]

Notes: the table presents the effects of litigation costs on per capita GDP and growth residuals. The dependent variables are the log GDP per capita, 1950-2014 growth residual, and 2003-2016 growth residual. The standard errors are adjusted for arbitrary unequal error variance distribution and serially correlated stochastic disturbances using the Huber-Eicker-White sandwich estimator for finite-sample adjustment of the empirical distribution function using the nested variance-covariance matrix estimator with the country-level clusters. Asterisks denote statistically significant parameter estimates at 10% (*), 5% (**), and 1% (***), respectively.

4.2 Instrumental Variable Estimates

In Table 3, we present the IV-estimated effects of litigation cost on long-run growth and development. Columns (1) and (2) present the baseline structural effects of litigation cost using the prohibition of pactum de quota litis and the HHI litigation fee as the IVs only. Column (1) presents the full-sample estimates. The parameter estimates evidently suggest an ample and sizeable effect of litigation cost on long-run growth and development. In particular, the estimate in column (1) implies that a 1 percent increase in the litigation cost is associated with 0.26 percent decrease in per capita GDP, ceteris paribus. The underlying coefficient is robust to the potential mis-specification bias since the full battery of potential confounders and covariates is included in the baseline specification. In the first stage, the OLS estimates confirm our theoretical notion. The prohibition of quota litis tends to decrease the litigation cost by 3.6 percentage points, respectively, and is statistically significant at 10%. On the other hand, the concentration of litigation fee tends to expand the litigation cost substantially. In particular, 1 basis point increase in HHI of litigation fee is set to increase the litigation cost by 4.6 percent, respectively, and is statistically significant at 1%. Our identification strategy does not seem to suffer from invalid overidentifying restrictions, and neither the IVs seem to be blurred by weak identification properties. In the first stage, we overwhelmingly reject the null hypothesis on the instrument weakness for the prohibition of quota litis and HHI fee structure alike at 1% significance level using the Angrist and Pischke (2009) test for both excluded instruments. Following Cragg and Donald (1993) framework, we test the identifiability of litigation cost using the prohibition of quota litis and HHI fee structure, and easily reject the null hypotheis of weak identification properties that could be inherent in the quota litis and fee concentration IVs with p-value = 0.000. By the same token, the absence of weak identification properties of IVs does not preclude the validity of exclusion restrictions that can potentially render the underlying IVs invalid. We simultaneously subject the prohibition of pactum quota litis and litigation fee concentration to the Hansen (1982) test of overidentifying restrictions and cannot reject the null hypothesis of stable overidentifying restrictions even at artificially high acceptance rate, with the p-value = 0.645. In addition, we also test whether the prohibition of pactum quota litis and litigation fee concentration lead to the potential underidentification of the structural relationship between litigation cost and long-run development. Using Kleibergen and Paap (2006); Kleibergen (2007) framework, we easily reject the null hypothesis of underidentification with p-value = 0.000, and conclude that both IVs do not seem to backlash our key identification assumption.

Columns (3) and (4) add the WTO membership year and GATT agreement date dummy variables to the set of IVs. In the first stage, the coefficients on WTO membership year dummy appear to be jointly significantly different from zero with the p-value = 0.000. Adding the WTO membership year variables to the set of excluded instruments does not seem to render the effect of quota litis and litigation fee concentration weak, under-identifiable or unvalid. In the first stage, the prohibition of pactum quota litis is associated with 3.6 percentage points drop in the litigation cost, compared to the non-quota litis reference group. The first-stage estimate on HHI fee structure does not appear to be sensitive to the WTO membership year- and GATT agreement year-level IVs both in terms of the effect direction, size and statistical significance.

In columns (5) and (6), the lower 10% tier of countries with the highest litigation costs are split off the full sample to check for the disproportionate influence of outliers on the stability of parameter estimates. The evidence confirms a sizeable negative impact of rising litigation costs on per capita income level which does not seem to driven or overhauled by the set of structural confounders and covariates that may systematically shape income levels independently of the litigation cost. Excluding the bottom 10% tier of least litigant countries, tends to raise the underlying structural effect of litigation cost on per capita income level to - .544 (with country-clustered S.E = .220), and confirms a sizeable effect of litigation cost on per capita income which appears to be statistically significant at 1%. In the first stage, the prohibition of pactum de quota litis tends to backdrop the litigation cost in the range between 4.4 percentage points and 5 percentage points, while the expanding the litigation fee concentration by 1 basis points tends to foster the litigation cost in the range between 4.2 percentage points and 4.3 percentage points, respectively, with both first-stage parameters being statistically significant at 10%, and 1%, accordingly.

In a similar vein, columns (7) and (8) exclude the upper 10% tier of countries with the highest litigation cost, mainly from Sub-Saharan Africa, to prevent the excessive influence of the outlying observations from affecting the causal inference on the litigation cost. Splitting the most litigious countries off the full sample does not refute the baseline structural estimates from columns (1) and (2). In particular, each 1 percent increase in the litigation cost tends to drop per capita income level in the range between 0.29 and 0.30 percent, respectively, with country-clustered S.E. = .171. The first-stage parameters do not seem to be affected either by removing the upper-tier outliers from the full sample. The coefficient on the prohibition of pactum quota litis is in the range between -.051 and -.056, and statistically significant at 1% and 10% level, while the coefficient on the concentration of litigation fee lies in the range between -.452 and -.462, and is statistically significant at 1%, respectively. In addition, excluding the outlying observations from the upper tier and lower tier of the full sample does not seem to vindicate the relevance of WTO membership year- and GATT agreement date dummy variables in further isolation of the litigation cost impact on per capita income from the confounding influence of observable and unobservable determinants of long-run growth and development. In columns (9) through (12), we match our country-level observation with the Djankov et al. (2003) sample to check whether the sample selection might yield a substantially differential or implausible effect of quota litis on litigation cost and long-run growth. The evidence does not seem to suggest that sample selection appears to be the source of either confounding bias or measurement error. The underlying estimates of litigation cost on long-run growth appear to be in the expected range of the baseline estimates in columns (1) and (2) while the first-stage set of relationships appear to be left largely intact, which confirm our underlying notion that the effect of litigation on growth appears to be causal.

4.3 Potential Mechanisms

In Table 4, we further explore the potential mechanisms behind the effect of litigation cost on growth and development to distinguish between the set of direct and indirect effects behind the structural relationship shown in Table 2. In this respect, our strategy is similar to the one proposed by Acemoglu et al. (2018). Such a setup allows us to determine through which covariates litigation causes growth. The intermediating variables we used are judicial quality, the number of judicial procedures, rule of law, TFP, investment/GDP ratio, share of industry in GDP, share of services in GDP, trade/GDP ratio, infant mortality and human capital formation. The exploration of potential mechanism hinges on the baseline IV-2SLS model replication from columns (1) and (2) in Table 2, with the shifting composition of the set of IVs.

Panel A reports the relationships between litigation cost and the set of intermediating variables behind the litigation cost-growth link, using the prohibition of pactum quota litis and HHI of litigation fee as a set of IVs only. The evidence suggests that the effect of litigation cost on growth is not created equal across the set of intermediating variables. At face value, the evidence seems to suggest that higher litigation cost affects growth through lower judicial quality, weaker rule of law, but not through greater number of judicial procedures. On the other hand, no evidence is found to support the notion that litigation may cause growth through the set of macroeconomic fundamentals with the exception of trade/GDP ratio. This implies that increasing litigation costs may hamper growth through the dampening effect on international trade. In addition, our evidence also substantiates the claim that litigation cost may cause growth through higher infant mortality and lower return to human capital, which appears to be both reasonable and consistent with the existing literature. In Panel B, we replace the pactum quota litis and HHI of litigation fee IVs with WTO membership year and GATT agreement year dummy variables. The evidence is broadly aligned with the potential mechanism estimates in Panel A. In addition, expanding litigation cost may cause growth through a notable increase in the number of judicial procedures and through lower share of manufacturing in the GDP. In Panel C, the full set of IVs is used, and the results confirm the baseline mechanisms from Panel A.

Table 3: IV-Estimated Effects of Litigation Cost on Long-Run Growth

	Full Sample								Djanjov et. al. (2003) Sample			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
	All Countries	Without Oil Producers	All Countries	All Countries	Excluding Bottom 10%		Excluding Top 10%		All Countries	All Countries	All Countries	All Countries
Panel A: Structural Setup with Endogenous Litigation Costs												
Litigation Cost	-.263***	-.279***	-.238**	-.238**	-.544***	-.568***	-.295*	-.301*	-.238**	-.238**	-.260***	-.269**
	(.106)	(.106)	(.108)	(.108)	(.220)	(.207)	(.178)	(.171)	(.108)	(.108)	(.113)	(.110)
Demographic Covariates	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Macroeconomic Covariates	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Institutional Covariates	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Geography Covariates	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
# of countries	113	108	113	113	131	131	130	130	80	77	80	80
R2	0.90	0.90	0.90	0.90	0.85	0.85	0.82	0.82	0.90	0.90	0.90	0.90
Panel B: First Stage OLS Relationship												
Quota Litis Prohibited	-.036*	-.043*	-.036*	-.029	-.044*	-.050*	-.056***	-.051*	-.032	-.043*	-.031	-.006
	(.022)	(.023)	(.026)	(.037)	(.026)	(.034)	(.021)	(.032)	(.026)	(.031)	(.030)	(.054)
HHI Fee Structure	.460***	.460***	.467***	.463***	.434***	.424***	.462***	.452***	.450***	.450***	.443***	.429***
	(.013)	(.013)	(.015)	(.101)	(.269)	(.020)	(.013)	(.021)	(.016)	(.016)	(.018)	(.277)
WTO Membership (p-value)			[0.000]	[0.000]		[0.000]		[0.000]			[0.000]	[0.000]
GATT Agreement (p-value)				[0.000]		[0.000]		[0.000]				[0.000]
Angrist-Pischke First-Stage F-Test on Excluded Instruments (p-value)	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]
Cragg-Donald Weak ID Test	696.83	674.91	83.48	27.11	536.86	21.48	541.63	20.98	385.06	380.27	63.59	18.79
(p-value)	[0.000]	[0.000]	[0.000]	[0.025]	[0.000]	[0.049]	[0.000]	[0.062]	[0.000]	[0.000]	[0.000]	[0.074]
Hansen J-Test (p-value)	[0.645]	[0.531]	[0.149]	[0.442]	[0.861]	[0.559]	[0.731]	[0.451]	[0.550]	[0.805]	[0.187]	[0.343]
Kleibergen-Paap Underidentification Test (p-value)	[0.000]	[0.000]	[0.000]	[0.140]	[0.000]	[0.036]	[0.000]	[0.017]	[0.000]	[0.000]	[0.003]	[0.053]

Notes: the table presents the IV effects of litigation costs on per capita GDP. The dependent variables is the log GDP per capita, 1950-2014. The standard errors are adjusted for arbitrary unequal error variance distribution and serially correlated stochastic disturbances using the Huber-Eicker-White sandwich estimator for finite-sample adjustment of the empirical distribution function using the nested variance-covariance matrix estimator with the country-level clusters. Asterisks denote statistically significant parameter estimates at 10% (*), 5% (**), and 1% (***), respectively.

Table 4: Effects of Litigation on Potential Mechanisms

	Dependent Variable:									
	Judicial Quality	Judicial Procedures	Rule of Law	TFP	Inv/GDP	Share of Industry	Share of Services	Trade/GDP	Infant Mortality	Human Capital
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Panel A: Litigation Cost Instrumented by Quota Litis and HHI Fee Structure										
Litigation Cost	-1.720***	1,509	-.884***	-.004	-.008	-.125	-.824***	-.125*	1.175***	-.681***
	(.465)	(1,064)	(.122)	(.018)	(.019)	(.123)	(.194)	(.081)	(.125)	(.100)
# of countries	171	171	171	116	171	154	160	164	167	143
R2	0.05	0.008	0.21	0.001	0.004	0.004	0.09	0.01	0.33	0.22
Panel B: Litigation Cost Instrumented by WTO Membership and GATT Agreement										
Litigation Cost	-2.713***	3.062*	-.977***	-.023	.027	-.395**	-1.261***	-.038	1.462***	-.979***
	(.800)	(1,698)	(.173)	(.019)	(.028)	(.154)	(.291)	(.129)	(.177)	(.139)
# of countries	171	171	171	116	171	154	160	164	167	143
R2	0.03	0.008	0.22	0.02	0.03	0.03	0.08	0.009	0.32	0.17
Panel C: Litigation Cost Instrumented by the Full Set of IVs										
Litigation Cost	-1.720***	1,503	-.916***	-.002	-.007	-.110	-.878***	-.118*	1.186***	-.686***
	(.465)	(1,084)	(.123)	(.018)	(.018)	(.119)	(.188)	(.082)	(.123)	(.097)
# of countries	171	171	171	116	171	154	160	164	167	143
R2	0.05	0.008	0.21	0.001	0.003	0.001	0.09	0.01	0.33	0.22

Notes: the table presents the effects of litigation cost on the different channels that may cause growth specified in column labels. Panel A reports the potential mechanisms using the prohibition of pactum quota litis and HHI of litigation fee as IVs only. Panel B reports the potential mechanisms using the WTO membership year and GATT agreement date as IVs only while Panel C reports the potential mechanisms using the full set of IVs. The standard errors are adjusted for arbitrary unequal error variance distribution and serially correlated stochastic disturbances using the Huber-Eicker-White sandwich estimator for finite-sample adjustment of the empirical distribution function using the nested variance-covariance matrix estimator with the country-level clusters. Asterisks denote statistically significant parameter estimates at 10% (*), 5% (**), and 1% (***), respectively.

4.4 Matching on Nearest Neighbors and Propensity Scores

In Table 5, we show the effects of the prohibition of pactum de quota litis on per capita income using the nearest neighbor and propensity score matching framework. Columns (1) through (4) display the effect the prohibition of quota litis on per capita income using the propensity score matching estimator. The evidence suggests that the prohibition of pactum quota litis is associated with marked and substantial gains in per capita income in the long run. With a single country-level covariate match, the prohibition of quota litis predicts a 36 percent increase in per capita income relative to the countries where the pactum is not prohibited. When we expand the matching set up to five country-level covariate match-ups, the beneficial effect of the prohibition does not disappear, and tends to be stable in the range between 25 percent, and 34 percent, respectively.

In column (2), we replace the logit estimator with the probit estimator to check for the potential mis-specification bias driven by the logistic distribution function. The covariate-level predicted effect of the prohibition of quota litis does not appear to be sensitive to the choice of estimator, but appears to be stable, and in the range between 26 percent, and 40 percent, respectively. In columns (3), and (4), we the the heteroskedasticity-and- autocorrelation consistent (HAC) probit estimator by adjusting the random error variance at two key covariates predicting the prohibition of quota litis. In column (3), using HAC propensity score estimator, the random error variance is adjusted using the litigation cost covariate only. The propensity score estimate tends to mitigate the underlying effect by from 40 percent in column (2) down to 28 percent. Expanding the matching set with two covariate-level matches does not yield a discernable difference in the estimated propensity score, which arguably implies that, in the long run, the prohibition of pactum quota litis tends to raise per capita income by 31 percent, respectively. When the matching comprises five covariate-level matches, the effect of the prohibition drops to 26 percent, respectively. In column (4), HAC propensity score estimates contain the random error variance adjustment at the litigation cost and HHI litigation fee as two key covariates predicting the prohibition. The underlying propensity score estimates appear to be stable and within the prior range from column (3), namely between 29.5 percent and 38 percent, where the effect tends to drop slightly as a result of a greater number of covariate-level matches in obtaining the average effect of the prohibition of quota litis on per capita income level.

In columns (5) through (8), we present the matched effects of the prohibition of quota litis based on nearest-country covariate-level comparison of quota and non-quota countries. The estimate in column (5) is matched on the civil law indicator from La Porta et al. (1998), and suggests that civil-law countries with the prohibition of quota litis

Table 5: Matching on Propensity Scores and Nearest Neighbors/Quota Litis

	Matching on:							
	Propensity Scores				Nearest Neighbors			
# Matches	Probit	Logit	HAC Probit		Exact Matching using:			
	Panel A: Full Effect (Treatment + Control Samples)							
			Litigation Cost	Litigation Cost+ HHI Fee Structure	Civil Law	Djankov et al. Sample Indicator Covariate	Tropical	Malaria Index
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
1	.368**	.405**	.289*	.389*	.440**	.289*	.348*	.332*
	(.172)	(.200)	(.166)	(.220)	(.210)	(.178)	(.205)	(.188)
2	.347**	.368*	.314**	.300*	.420**	.222	.268	.255*
	(.162)	(.210)	(.161)	(.184)	(.197)	(.162)	(.197)	(.173)
3	.261*	.307*	.282*	.332**	.400**	.276*	.190	.220
	(.157)	(.191)	(.151)	(.175)	(.193)	(.149)	(.194)	(.170)
4	.251*	.266	.276*	.325**	.417**	.284**	.181	.278*
	(.161)	(.199)	(.151)	(.171)	(.183)	(.146)	(.192)	(.162)
5	.334**	.331*	.268*	.295*	.428***	.314**	.195	.298*
	(.175)	(.205)	(.148)	(.167)	(.177)	(.144)	(.189)	(.160)
	Panel B: Matching with Endogenous Quota Litis							
	Maximum Likelihood				Two-Step Consistency			
	Demographic	Macroeconomic	Demographic+ Macroeconomic	Full Set	Demographic	Macroeconomic	Demographic+ Macroeconomic	Full Set
Full Treatment Effect of Quota Litis	1.281***	2.076***	1.051***	1.075***	2.274***	4.431***	1.339*	1.247***
	(.253)	(.305)	(.214)	(.349)	(1,000)	(1,852)	(.759)	(.727)
# of post-iteration clusters	166	152	150	150	166	152	150	150

Notes: the table presents the quasi-experimental treatment effects of the prohibition of pactum quota litis on per capita income. The dependent variable is country-level per capita GDP. The set of quasi-treatment effects is estimated using Rosenbaum and Rubin (1983) propensity score framework and Abadie and Imbens (2006) nearest-neighbor matching estimator by comparing the outcome affected by the prohibition of pactum quota litis with the outcome not affected by the prohibition of pactum quota litis. Potential outcomes are constructed using the neighborhood-level covariate-specific mean of the countries without the prohibition of quota litis using the full covariate set. The full treatment effect of pactum quota lists is computed by taking the difference between the observed and potential outcomes for non-treated countries. Asymptotically consistent and valid standard errors are computed using the Abadie and Imbens (2006) analytical asymptotic variance-covariance matrix estimator, based on the normal approximation of the matching estimator to its asymptotic distribution.

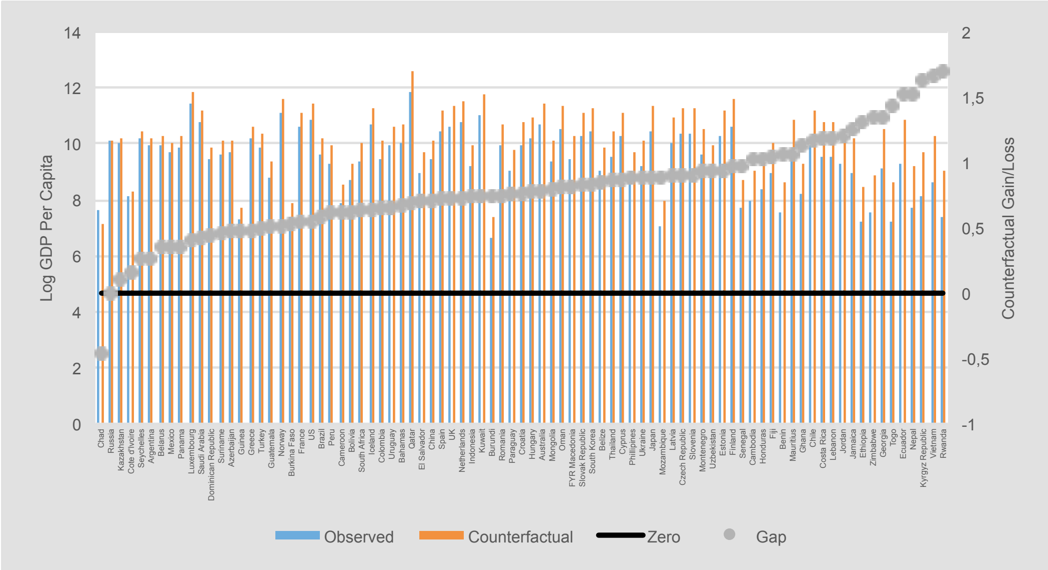
tend to have 44 percent higher per capita income than civil-law countries without the prohibition. Furthermore, column (6) uses an exact match of Djankov et al. (2008) and our sample, to determine the full-treatment effect, and indicates 28 percent increase in the long-run per capita income following the prohibition of pactum quota litis. Columns (7) and (8) present the effects using the match-up on plausibly exogenous country-level characteristics such as malaria index and the tropical geography indicator. The evidence confirms prior obtained parameter estimates, and indicates the gain in per capita income following the prohibition of quota litis in the range between 33 percent and 34 percent, respectively.

In Panel B, we match the country-level observations under the assumption of endogenous prohibition of pactum quota litis. In the piecewise fashion, we use various combinations of covariate sets to match the observations on similar covariate characteristics to obtain the average treatment effect of quota litis. The evidence confirms overwhelmingly large and discernable effects of the prohibition of pactum quota litis on per capita income. The maximum likelihood estimates in column (4) with 150 post-interation clusters suggest that the potential gain from the prohibition of quota litis is about 107 percent with the covariate-level and country-level match-up on similar characteristics. In column (8), we use a more parsimonious two-step matching estimation allowing for the endogenity of quota litis, and obtain a similar estimate which indicates 124 percent gain in the per capita income in the long run from the prohibition of pactum quota litis.

4.5 Counterfactual Outcomes

The most obvious question pertaining to the set of estimated IV effects and matched effects of litigation cost on economic growth concerns the counterfactual scenario. Namely, how would per capita income levels evolve in the long term in the presence of the prohibition of pactum quota litis? Our counterfactual scenario proceeds in two steps. In the first step, we use the structural IV-estimated effects of litigation cost on per capita income from our baseline specification in column (1) in Table 3, and compute the potential per capita income level assuming the prohibition of pactum quota litis hypothetically would be in place in the set of non-treated countries. This particular type of counterfactual scenario hinges on the absence of the prohibition of pactum quota litis, and can only be performed on the set of countries where the prohibition is not in place. In the second step, we predict the potential per capita income level by projecting a hypothetical drop in the litigation cost from a high to a low threshold, more specifically, from the 75th percentile of global litigation cost distribution, to the 25th percentile of the distribution. Such a scenario obviously excludes the countries

Figure 3: Counterfactual Per Capita Income Level with the Prohibition of Quota Litis



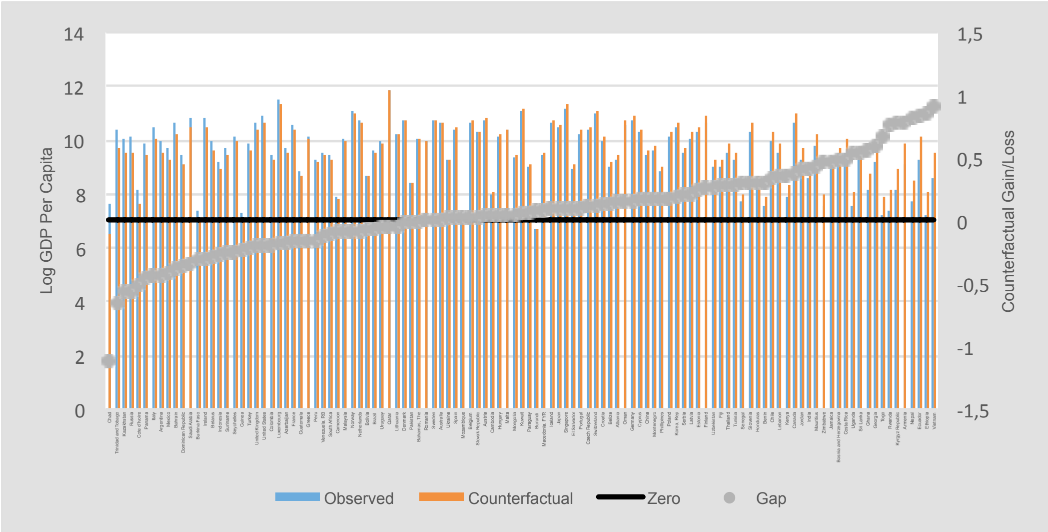
where the observed litigation cost lies within the 25th percentile range.

In Figure 3, we present the counterfactual scenario for the hypothetical prohibition of pactum quota litis. The counterfactual scenario unveils large and persistent gains in per capita income across the entire distribution. With the sole exception of Chad and Russia, the prohibition of pactum quota litis is associated with substantially large gains in per capita income. The gains tend to correlate strongly with the country-specific income level. Countries with the largest gain from prohibiting pactum quota litis appear to be in the low-income range, geographically located either in Sub-Saharan Africa, Latin America, or Central Asia. Specifically, we observe the largest gain for Rwanda, Vietnam, Kyrgyz Republic, Nepal and Ecuador, where per capita income would increase by more than 3-fold following the prohibition of pactum quota litis. For the rest of the global distribution, the gains in per capita income are in the range between 16% (Cote d'Ivoire), and 224% (Togo). The estimated gain from prohibiting pactum quota litis gradually decreases with the rising observed income level. More broadly, the counterfactual patterns suggest the gains are somewhat lower in civil law countries, but tend to be substantially stronger in the countries with a greater stock of human capital, greater and more robust rule of law. On the contrary, the gains do not seem to differ markedly across countries with respect to initial income level, judicial quality, the number of judicial procedures, and other covariate-level characteristics. At the general level, the counterfactual estimates invariably suggest that the litigation cost might be one of the binding constraints on long-run growth, to a much greater degree than previously recognized.

In Figure 4, we present a generalized counterfactual scenario whereupon pactum quota litis is not prohibited but the litigation cost drops to the 25th percentile of the global distribution, which roughly corresponds to the observed litigation cost in Australia. By default, such counterfactual scenario excludes the subset of countries in which the observation litigation cost lies within the 25th percentile of the distribution. At face value, the counterfactual scenario suggests invariably large and substantial per capita income gains from decreased litigation costs.

For 43 countries, the counterfactual scenario unveils no gains in per capita income from a drop in litigation costs while the for the remaining 70 countries, per capita income gains are substantially large. The most sizeable gain in per capita income is observed for Vietnam, Ethiopia, Ecuador and Nepal. In the set of high-income countries, the largest gains from lower litigation costs are observed for Canada, Slovenia, and Finland while the lowest gain magnitude is detected for Sweden, Spain, and Belgium. Excluding the outlying observations, such as Chad, the losses observed for a selected few countries such as Italy, Argentina, and the Netherlands are not the result of neglecting the non-linear relationship between litigation cost and growth but rather the result of the pre-counterfactual proximity to the 25th percentile of the litigation cost distribution where the underlying per capita income shifts may be attributable to non-litigation factors. The gains from a drop in the litigation cost tend to be higher in high-cost litigation countries. The estimated gains are also substantially less sizeable in terms of its magnitude in countries enjoying higher initial per capita income level, whereas civil law countries tend to have quantitatively lower gains from a drop in the litigation cost than non-civil law countries. In addition, countries with greater trade openness tend to gain disproportionately more from lower litigation costs than less open countries. On the contrary, the gains tend to increase alongside a greater rule of law while judicial quality does not seem to correlate with the observed gains in per capita income whilst countries with more complex judicial procedures tend to gain more from lower litigation costs. At the surface level, the counterfactual estimations confirm the beneficial effects of decreasing litigation cost on per capita income level. From a more substantive perspective, the evidence also suggests that decreasing litigation costs may not always translate into rising per capita income. The response of per capita income to the change in litigation costs depends on many crucial and non-trivial factors such as the country-level distance of litigation costs from a plausible frontier or target level. By default, greater distance between high-litigation and low-litigation country inevitably implies that the estimated gains from lower litigation costs are much greater than in the setup where the cost gap between both countries is either small or negligible.

Figure 4: Counterfactual Per Capita Income at the 25^{th} Percentile of Litigation Cost Distribution



5 Conclusions

In this paper, we examine the contribution of litigation cost to long-run growth and development. To this end, we exploit the variation in the prohibition of pactum quota litis, litigation fee concentration and the timing of WTO membership and GATT agreement, as plausibly exogenous sources of variation in long-run growth and development in a cross- section of 140 countries for the period 2003-2015. Our key identifying assumption is that pactum quota litis, litigation fee concentration, and WTO/GATT membership timing affect long-run growth and development only through their respective influence on the litigation cost. Using the battery of modern identification tests, we show that the proposed IVs are unlikely to be contaminated by the weak identification of the litigation-growth relationship, are not likely to lead to the underidentification of the underlying structural relationship, and are highly likely to substantiate the validity of our exclusion restriction.

The bulk of OLS and IV results suggest that greater litigation costs tends to strongly suppress country-level growth and development paths. In our preferred OLS specification, 1 percentage point increase in litigation cost is associated with a drop in per capita income by two thirds of one percent, respectively, holding everything else constant. In the more generalized setup, the IV estimates confirm the negative impact of rising litigation cost on per capita income. In the first stage, the OLS evidence confirms the non-violation of the relevance and exogeneity assumptions for our key exclusion restriction. Countries with the prohibition of pactum quota litis and those with substantially less concentrated litigation fee in the attorney-court- enforcement network tend to have between 3.6 percentage points and 4.6 percentage points lower litigation cost, relative to the total claim, which appears to be statistically significant at conventional 5% and 1% level, respectively. The transmission channel between the increasing litigation cost and lower per capita income is most likely to operate across a weaker rule of law, low-quality judiciary, lower rate of return on human capital investment, higher infant mortality, but not through the macroeconomic fundamentals. The IV estimates arguably suggest that the effect of litigation on growth and development appear to be causal. We further unbundle the relationship between litigation, growth and development by focusing on the variation in the prohibition of pactum quota litis. Specifically, we match the country-level per capita income on the full battery of covariate- level charateristics to obtain the full treatment effect of the quota litis prohibition on per capita. Our matching strategy uses both propensity scores and matching on nearest neighbors to unbundle the effect of litigation cost on growth and development.

Controlling for the potential violation of the exogeneity assumption on the quota litis, the evidence suggest that countries with the prohibition of pactum quota litis are substantially more likely to have higher per capita income. We compute the potential outcomes using the matching on propensity score and covariate-level characteristics of quota litis vs. non-quota litis countries. Our results show that conditional on the covariate characteristics between the treated and non-treated countries, the prohibition of pactum quota litis is associated with large-scale long-run growth and development gains controlling for the potential specification bias, sample selection and structural confounders.

In the counterfactual scenario, we compute the potential levels of per capita alongside two plausible contours: (i) the prohibition of pactum quota litis in the non-treated countries, and (ii) a drop in the litigation cost from the observed level to the 25th percentile of the global distribution. The evidence unveils large-scale long-run growth and development gains from the prohibition of pactum quota litis, especially for the countries in the low-income tier of world income distribution. The estimated gains from a drop in the litigation cost hinge on the continuation of pactum quota litis, and indicate substantial smaller, yet still non-trivial, increases in per capita income. Our results contribute to the existing literature on the role of institutions in long-run development by focusing on effects of litigation. Specifically, we show that contingency fee arrangements, such as pactum quota litis, together with an uneven distribution of litigation fee tend to persist high-cost litigation, which turns out to be very costly in terms of lost growth and lower per capita income level. Whilst the contingency fee arrangement tends to foster unproductive and costly rent-seeking, unevenly concentrated litigation fee might nurture to costly litigation in response to the monetary incentives of the party reaping a disproportionate share of benefits from the litigation costs. Our evidence shows that high litigation costs lead to social and economic losses resulting in lost growth and lower income levels across the board. However, it remains less clear whether different types of contingency fee arrangements are equally detrimental to growth. Moreover, the heterogeneity of the litigation fee concentration depending on whether the attorney, court and enforcement bears the major share is empirically less known. These two areas comprise fruitful avenues for future research.

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A Counterfactual Outcomes

Table 6: Counterfactual Outcomes

Country	Observed Log GDP Per Capita	Counterfactual Scenario #1 Prohibiting the Quota Litis	Gain/Loss (%)	Country	Observed Log GDP Per Capita	Counterfactual Scenario #2 Litigation Cost at 25th Percentile	Gain/Loss (%)
Rwanda	7.36	9.06	449	Ethiopia	7.19	8.05	12
Kyrgyz Republic	8.12	9.74	406	Vietnam	8.59	9.50	11
Nepal	7.68	9.21	359	Nepal	7.68	8.50	11
Togo	7.23	8.66	316	Rwanda	7.36	8.12	10
Vietnam	8.59	10.24	424	Kyrgyz Republic	8.12	8.90	10
Ethiopia	7.19	8.49	267	Togo	7.23	7.90	9
Zimbabwe	7.53	8.87	282	Ecuador	9.30	10.15	9
Ecuador	9.30	10.82	356	Armenia	9.06	9.84	9
Armenia	9.06	10.48	313	Uganda	7.52	8.06	7
Uganda	7.52	8.69	223	Ghana	8.18	8.73	7
Georgia	9.14	10.49	283	Georgia	9.14	9.74	7
Benin	7.56	8.62	190	Zimbabwe	7.53	8.00	6
Jamaica	8.92	10.17	249	Sri Lanka	9.24	9.79	6
Kenya	7.93	9.03	203	Jamaica	8.92	9.39	5
Ghana	8.18	9.31	209	Bosnia and Herzegovina	9.21	9.69	5
Bosnia and Herzegovina	9.21	10.48	255	Costa Rica	9.56	10.05	5
India	8.56	9.74	224	India	8.56	8.98	5
Sri Lanka	9.24	10.47	242	Kenya	7.93	8.29	5
Jordan	9.25	10.45	231	Jordan	9.25	9.67	4
Cambodia	8.00	9.03	180	Mauritius	9.79	10.23	4
Mozambique	7.04	7.93	144	Benin	7.56	7.86	4
Senegal	7.72	8.69	165	Senegal	7.72	8.01	4
Lebanon	9.55	10.74	228	Lebanon	9.55	9.91	4
Costa Rica	9.56	10.74	226	Honduras	8.39	8.69	4
Honduras	8.39	9.43	180	Canada	10.65	11.03	4
Chile	9.98	11.16	224	Chile	9.98	10.32	3
Fiji	8.98	10.02	184	Tunisia	9.25	9.54	3
Burundi	6.65	7.39	109	Fiji	8.98	9.26	3
Serbia	9.51	10.56	186	Uzbekistan	9.01	9.28	3
Mauritius	9.79	10.86	190	Thailand	9.54	9.83	3
Canada	10.65	11.79	211	Slovenia	10.33	10.62	3
Tunisia	9.25	10.22	164	Finland	10.61	10.87	2
Uzbekistan	9.01	9.94	153	Estonia	10.26	10.51	2
Albania	9.27	10.22	158	Serbia	9.51	9.71	2
Phillipines	8.80	9.68	140	Latvia	10.07	10.29	2
Montenegro	9.59	10.52	153	Phillipines	8.80	8.98	2
Ukraine	9.24	10.12	141	Korea, Rep	10.47	10.66	2
Belize	9.04	9.88	134	Montenegro	9.59	9.76	2
Finland	10.61	11.57	163	China	9.43	9.60	2
Estonia	10.26	11.19	154	Poland	10.13	10.31	2
Thailand	9.54	10.41	137	Cyprus	10.26	10.43	2
Latvia	10.07	10.98	148	Belize	9.04	9.18	2
Malta	10.36	11.28	150	Albania	9.27	9.42	2
Slovenia	10.33	11.23	148	Germany	10.74	10.89	1
Czech Republic	10.37	11.28	148	Oman	10.56	10.71	1
Macedonia, FYR	9.48	10.30	126	Croatia	9.98	10.12	1
Poland	10.13	11.00	137	Burundi	6.65	6.73	1
Cyprus	10.26	11.13	139	El Salvador	8.97	9.07	1
Paraguay	9.02	9.79	114	Switzerland	10.98	11.10	1

Country	Observed Log GDP Per Capita	Counterfactual Scenario #1 Prohibiting the Quota Litis	Gain/Loss (%)	Country	Observed Log GDP Per Capita	Counterfactual Scenario #2 Litigation Cost at 25th Percentile	Gain/Loss (%)
Mongolia	9.35	10.14	120	Czech Republic	10.37	10.48	1
Japan	10.47	11.36	142	Portugal	10.26	10.36	1
Switzerland	10.98	11.90	152	Singapore	11.19	11.30	1
Sweden	10.71	11.57	137	Japan	10.47	10.57	1
Slovak Republic	10.26	11.08	128	Macedonia, FYR	9.48	9.57	1
Indonesia	9.18	9.91	108	Iceland	10.67	10.76	1
Korea, Rep	10.47	11.30	130	Paraguay	9.02	9.09	1
El Salvador	8.97	9.67	102	Cambodia	8.00	8.05	1
Cameroon	7.89	8.51	85	Mongolia	9.35	9.40	1
Oman	10.56	11.37	125	Kuwait	11.06	11.12	1
Croatia	9.98	10.75	115	Malta	10.36	10.41	0
Hungary	10.16	10.93	116	Hungary	10.16	10.20	0
Romania	9.94	10.69	111	Austria	10.77	10.81	0
China	9.43	10.14	102	Slovak Republic	10.26	10.30	0
Austria	10.77	11.58	124	Belgium	10.68	10.72	0
Germany	10.74	11.53	121	Mozambique	7.04	7.06	0
Portugal	10.26	11.01	113	Spain	10.43	10.45	0
Australia	10.67	11.46	119	Ukraine	9.24	9.26	0
Singapore	11.19	12.01	128	Australia	10.67	10.68	0
Denmark	10.71	11.49	118	Sweden	10.71	10.71	0
Burkina Faso	7.36	7.89	70	Romania	9.94	9.94	0
Pakistan	8.44	9.05	83	Bahamas, The	10.06	10.06	0
Bolivia	8.70	9.33	87	Pakistan	8.44	8.44	0
Spain	10.43	11.16	107	Denmark	10.71	10.71	0
Colombia	9.44	10.09	92	Qatar	11.88	11.84	0
United Kingdom	10.60	11.33	107	Lithuania	10.25	10.21	0
Netherlands	10.76	11.49	108	Uruguay	9.92	9.87	-1
Malaysia	10.05	10.73	98	Brazil	9.61	9.54	-1
Belgium	10.68	11.41	106	Netherlands	10.76	10.69	-1
South Africa	9.40	10.03	88	Norway	11.07	10.99	-1
Uruguay	9.92	10.58	94	Bolivia	8.70	8.63	-1
Venezuela, RB	9.56	10.19	89	Malaysia	10.05	9.96	-1
Bahamas, The	10.06	10.73	95	South Africa	9.40	9.30	-1
Kuwait	11.06	11.80	109	Cameroon	7.89	7.80	-1
Lithuania	10.25	10.92	97	Venezuela, RB	9.56	9.43	-1
Guinea	7.26	7.74	61	Luxembourg	11.46	11.29	-1
Peru	9.31	9.91	84	France	10.58	10.42	-2
Brazil	9.61	10.18	78	Greece	10.17	10.01	-2
Iceland	10.67	11.31	90	Peru	9.31	9.15	-2
Qatar	11.88	12.57	99	Azerbaijan	9.67	9.50	-2
Guatemala	8.83	9.34	66	Guatemala	8.83	8.67	-2
France	10.58	11.13	73	United States	10.86	10.67	-2
United States	10.86	11.42	74	United Kingdom	10.60	10.40	-2
Turkey	9.86	10.36	65	Colombia	9.44	9.25	-2
Azerbaijan	9.67	10.15	61	Turkey	9.86	9.65	-2
Suriname	9.66	10.12	59	Seychelles	10.16	9.92	-2
Dominican Republic	9.43	9.88	57	Suriname	9.66	9.40	-3
Greece	10.17	10.65	62	Ireland	10.79	10.49	-3
Norway	11.07	11.58	67	Belarus	9.92	9.64	-3
Ireland	10.79	11.25	58	Indonesia	9.18	8.90	-3
Saudi Arabia	10.78	11.20	53	Saudi Arabia	10.78	10.44	-3
Mexico	9.67	10.03	43	Guinea	7.26	7.04	-3
Panama	9.89	10.25	43	Bahrain	10.64	10.25	-4
Luxembourg	11.46	11.87	50	Dominican Republic	9.43	9.08	-4
Belarus	9.92	10.26	41	Italy	10.49	10.06	-4
Italy	10.49	10.80	37	Burkina Faso	7.36	7.05	-4
Argentina	9.91	10.18	31	Mexico	9.67	9.26	-4
Seychelles	10.16	10.42	30	Argentina	9.91	9.49	-4
Cote d'Ivoire	8.12	8.27	17	Panama	9.89	9.44	-5
Bahrain	10.64	10.83	22	Russian Federation	10.09	9.52	-6
Kazakhstan	10.06	10.17	12	Kazakhstan	10.06	9.49	-6
Trinidad and Tobago	10.35	10.39	4	Cote d'Ivoire	8.12	7.62	-6
Russian Federation	10.09	10.08	-1	Trinidad and Tobago	10.35	9.69	-6
Chad	7.61	7.15	-36	Chad	7.61	6.50	-15