Judicial quality, input customisation, and trade margins: the role of product quality

Judicial quality, trade, and product quality

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Abstract: We study how the contracting environment affects the quality of trade. A better contracting environment not only induces specialisations in industries intensively using customised inputs, but also causes quality upgrading of domestic varieties and tougher competition in these industries. We incorporate these effects into a Ricardian model with customised input and product quality. Our model predicts that better judicial quality raises a country's import prices and quality more in contract-intensive products, but has no impacts on its export prices or quality. We empirically confirm these predictions, and find that rising judicial quality is associated with increasing specialisations in contract-intensive industries.

Keywords: judicial quality, contracts, customised input, quality, trade margins

Classification: F14, D23, L15

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1 Introduction

The contracting environment matters for certain industries that rely on customised inputs that require relationship-specific investments.[1] A good contracting environment and judicial quality in a country alleviate under-investment in making customised inputs, constituting a comparative advantage in contract-intensive industries. The Heckscher-Ohlin effect of judicial quality has been extensively investigated by existing studies (e.g., Nunn, 2007; Levchenko, 2007). We complement the existing work by showing that a country's judicial quality also affects its quality of trade: lower customised input cost induces quality upgrading of a country's existing varieties, increases its exports of low-quality varieties, and intensifies its domestic competition, which eliminates low-quality imported varieties. We analyse how these forces alter various trade margins in additional to a country's export specialisation patterns.

We begin by building the role of judicial quality into a model with input-output quality linkages. Due to relationship-specificity, it is costly for a local court to verify the quality of customised inputs and enforce contracts (Williamson, 1979; Grossman and Hart, 1986; Nunn, 2007; Levchenko, 2007). A customised input supplier thus suffers from hold-up and under-invests in input quality production. Better judicial quality reduces contract enforcement cost, mitigates hold-up, and improves the provision of customised input quality. Because output quality depends on input quality (Kugler and Verhoogen, 2012; Manova and Zhang, 2012; Bastos *et al.*, 2018; Fieler *et al.*, 2018), better judicial quality encourages quality upgrading and increases the price of a final good. Our modelling of how output quality choice depends on input cost and other production-related service costs follows Mandel (2010), Johnson

[1] Hereafter, we refer to industries that intensively use customised inputs as 'contract-intensive' industries and an industry's intensity of customised input usage as 'contract intensity.'

(2012), Feenstra and Romalis (2014), and Fan *et al.* (2020). A variety's price and quality are also predicted to increase with its efficiency of producing output quality, which we refer to as 'productivity.'

We then integrate the quality choice model into a Ricardian trade model à la Eaton and Kortum (2002) and show that judicial quality affects a country's pattern, price, and quality of trade in a tractable manner. The sizes of these effects vary in contract intensity. While better judicial quality induces export specialisation in contract-intensive industries, it also increases domestic competition and decreases import demand relatively more in contract-intensive industries. These theoretical results on the pattern of trade are consistent with the work of Levchenko (2007) and Nunn (2007).

Our model offers novel implications about how judicial quality affects trade price and quality across products. Better judicial quality causes a *within-variety effect* that facilitates quality upgrading of exported varieties at the intensive margin, and a *composition effect* that allows more low-quality exported varieties at the extensive margin. In our model, these two opposite effects cancel each other out, leading to the seemingly unexpected result that judicial quality has no explicit impact on export prices or the quality of contract-intensive products. Meanwhile, increased domestic competition due to better judicial quality wipes out low-quality imported varieties and raises import prices and quality relatively more for contract-intensive products, a *composition effect* on the import side. This is because the low-quality imported varieties that are wiped out are also those with low prices. The prediction about import price thus distinguishes our quality model from a model without endogenous quality, which predicts that better judicial quality lowers import prices relatively more for contract-intensive products. So our analysis also relates to Baldwin and Harrigan (2011) and

Johnson (2012) who highlight the role of quality composition across heterogeneous producers as well.

Using the United Nations Comtrade (UN Comtrade) data covering a large number of countries and economies, we leverage the cross-country difference in judicial quality and cross-industry difference in contract intensity to test the theoretical predictions. Using legal origin as the instrument for judicial quality, we find that a country with better judicial quality exports relatively more and imports relatively less in contract-intensive industries. These results provide further support to the finding of Nunn (2007), who documents that better judicial quality causes export specialisation in contract-intensive industries.

We also document new and robust findings on how judicial quality affects trade price and quality. Using unit value data and quality indexes developed by Feenstra and Romalis (2014) and Khandelwal *et al.* (2013), we find that a country's judicial quality does not have any explicit impact on its export prices or quality, but it increases the country's import prices and quality relatively more for contract-intensive products. These results are consistent with the predictions of our theoretical model. Hence, embedding the quality decision into the theory is essential for understanding the empirical results for trade price and quality.

Finally, we provide suggestive evidence of the quasi-Rybczynski effect of judicial quality by examining whether rising judicial quality over time is associated with increasing export specialisation in contract-intensive industries. Such an effect seems to exist when we visualise the evolution of export structures for certain fast-growing economies.

We contribute to the literature by studying the impacts of judicial quality on trade price and quality, while previous studies mostly emphasise the impact of institutional quality on the pattern of export specialisation (e.g., Nunn, 2007; Levchenko, 2007; Ma *et al.*, 2010; Yu, 2010; Feenstra *et al.*, 2013; Wang *et al.*, 2014; Azomahou *et al.*, 2021).[2] Recent studies also reveal that institutional quality matters for input sourcing decisions.[3] We contribute to this literature by showing that judicial quality not only shapes a country's export specialisation pattern, but also alters the quality compositions of its exports and imports (and its import pattern). Thus, our findings also speak to the broader literature on factor abundance and trade patterns (e.g., Rajan and Zingales, 1998; Schott, 2003; Romalis, 2004; Bernard *et al.*, 2007; Nunn, 2007; Manova, 2013).

We also provide a new perspective for interpreting the variations in trade prices. Existing studies highlight the roles of trade costs (Hummels and Skiba, 2004), sizes and incomes of trading partners (Schott, 2004; Hummels and Klenow, 2005; Hallak, 2006; Fajgelbaum *et al.*, 2011; Eaton and Fieler, 2019), firm heterogeneity (Johnson, 2012; Manova and Zhang, 2012; Fan *et al.*, 2018), and trade shocks (Martin and Mejean, 2014; Fan *et al.*, 2015). We relate these variations to trading partners' judicial quality and a product's dependence on the contracting environment. Therefore, our findings also connect to those of Essaji and Fujiwara (2012) and Crinò and Ogliari (2017), who study the impacts of judicial quality and financial development on export quality, respectively.[4] Moreover, we propose a novel empirical strategy, which controls for any demand-side or supply-side confounding factors that vary across industries or products, by including more refined fixed effects, mitigating omitted variable bias. Thus, our empirical strategy is reminiscent of the one used by Chor (2010), who studies sources of export specialisation.

[2] An exception is Berkowitz *et al.* (2006), in which the authors estimate the differential impacts of institutional quality on imports of complex products and simple products based on Rauch's (1999) classification.
[3] For example, recent empirical evidence shows that contracting friction affects input-output structure (Boehm, 2018), intermediate input usage and vertical integration (Boehm and Oberfield, 2020), and global sourcing choice between arm's-length trade and intra-firm trade (Chor and Ma, 2021).
[4] While we use bilateral trade information across all countries from UN Comtrade to study how judicial quality affects the prices and quality of exports and imports, Essaji and Fujiwara (2012) use data on US imports to test whether the judicial quality-based comparative advantage is reflected in export quality.

The rest of the paper is structured as follows. Section 2 presents the model and several testable predictions. Section 3 lays out the empirical strategy. Section 4 describes the data. Section 5 reports empirical findings and robustness analysis. Section 6 concludes.

2 Theory: contracting environment, quality, and trade

We introduce the role of the contracting environment into the determination of product quality with international trade in final goods. Judicial quality not only drives differences in comparative advantage, but also results in differences in domestic competition, quality upgrading of domestic existing varieties, and the quality composition of trade. These forces interact to affect trade patterns, prices, and quality across countries and products.

The representative consumer in a country maximises a CES (constant elasticity of substitution) utility function, $U = \left[\int_0^1 Q(\omega)^{(\sigma-1)/\sigma} d\omega\right]^{\sigma/(\sigma-1)}$, where $Q(\omega)$ is the effective consumption of variety ω within a continuum $[0,1]$, and $\sigma > 1$ is the elasticity of substitution across varieties. The effective consumption of variety ω, $Q(\omega)$, depends on the quantity $q(\omega)$ and the quality $z(\omega)$ of the variety, with $Q(\omega) = q(\omega) \cdot z(\omega)$.[5]

The budget constraint is $X \geq \int_0^1 p(\omega) \cdot q(\omega) d\omega$, where $p(\omega)$ is the price *per quantity unit* of variety ω and X is the total expenditure. So the price *per quality unit* of variety ω is $P(\omega) = p(\omega)/z(\omega)$. The demand for effective consumption of variety ω is

$$Q(\omega) = P(\omega)^{-\sigma} \cdot \Psi^{\sigma-1} \cdot X,$$

[5] This assumption of how quality enters preference appears in Hallak (2006), Hallak and Schott (2011), Khandelwal *et al.* (2013), and Fan *et al.* (2015, 2018).

where Ψ is the exact price index.[6] The quantity demand for variety ω is

$$q(\omega) = p(\omega)^{-\sigma} \cdot \Psi^{\sigma-1} \cdot X \cdot z(\omega)^{\sigma-1}. \tag{1}$$

Conditional on price, a variety with higher quality should generate greater sales.

2.1 Contracting environment and quality production

There are three types of producers in each country: final goods producers, suppliers of customised input, and suppliers of standardised input. A final goods producer buys customised and standardised inputs from suppliers. Only producing customised inputs requires *ex ante* relationship-specific investments by the supplier.

Input sourcing, hold-up, and the contracting environment

A final goods producer offers a *take-or-leave* contract $\{\lambda^c, q^c, T^c\}$ to a customised input supplier, stating its requirements about input quality λ^c, quantity q^c, and payment to the supplier T^c. Producing the customised input requires labor, and the cost of producing one unit of customised input is $w \cdot \lambda^c$, where w is the wage rate.[7] The marginal cost of the input supplier increases as the final goods producer raises input quality demand.

Because making the customised input entails relationship-specific investments by the input supplier, the quality of the input, λ^c, is much more valued within the contract than outside it.[8] Relationship-specificity arises from specific requirements about the input, such

[6]We formulate $Q(\omega)$ as consumer demand for simplicity, but it can also represent the sum of consumption demand and intermediate input demand as in Caliendo and Parro (2015).
[7]One can always redefine w to include other factor and goods prices. We assume that w is the wage rate for simplicity, but our main theoretical results do not hinge on the definition of w.
[8]Equivalently, any third parties outside the contract do not recognise or value the quality λ^c, i.e., the option of reselling to other final goods producers is less valuable than that of legal remedies.

as size, shape, and material, and thus gives the customised input supplier extremely few options of selling to other final goods producers.[9] As a result, the final goods producer always has the incentive to renegotiate and lower the amount of pre-specified T^c. An *ex post* hold-up problem hence occurs.

The input supplier can turn to a local court to have the contract enforced. Once the court verifies that q^c and λ^c meet the contract requirements, the supplier recoups the full amount of T^c paid by the final goods producer and the contract is enforced. However, because the customised input is relationship-specific, verifying its quality λ^c usually incurs extra costs for the supplier. The extent to which these effects can be alleviated hinges on the quality of the judicial system.[10] The linkage between the contracting environment and the hold-up follows Williamson (1979), Grossman and Hart (1986), Nunn (2007), and Levchenko (2007). If the supplier enforces the contracts via the court, the final goods producer pays back the full amount T^c, of which the supplier recoups the fraction $0 < \delta < 1$.

The incentive-compatible constraint for a supplier to take the contract is $\delta \cdot T^c \geq w \cdot \lambda^c \cdot q^c$, where $0 < \delta < 1$. Better judicial quality raises δ and the supplier's outside option value of legal remedies $\delta \cdot T^c$. Given T^c and q^c, δ reflects the supplier's under-provision of quality to protect itself from hold-up. Hold-up is also costly to the final goods producer because the customised input cost is inflated by $1/\delta$ given q^c and λ^c.

Similarly, the final goods producer offers a *take-or-leave* contract $\{\lambda^s, q^s, T^s\}$ to a standardised input supplier, stating its requirements about input quality λ^s, quantity q^s, and

[9] For example, touch screens made for the *iPhone* are not compatible with *Huawei*, *Samsung*, or other cellphones, so the value of these touch screens would be much lower were they not sold to *iPhone* producers.
[10] First, the costs of hiring experts to verify λ^c and legal professionals for the lawsuit can be substantial. Second, the costs of delayed payments can be enormous, especially when the supplier is subject to financial frictions and relies on liquidity to finance its working capital. Third, if the court fails to verify λ^c, the contract is not even enforced, so the supplier risks losing all the payment.

payment to the supplier T^s. The unit cost of the standardised input is $w \cdot \lambda^s$.[11] Because the input is standardised, quality λ^s is equally valued within and outside the contract. If the final goods producer attempts to breach the contract and renegotiate T^s, the input supplier can resell the input to other final goods producers without any discounts. Therefore, the incentive-compatible constraint for a supplier to enter the contract is $T^s \geq w \cdot \lambda^s \cdot q^s$. So the provision of standardised inputs is not affected by the contracting environment.[12]

It follows that a good contracting environment benefits a final goods producer by lowering its cost of the customised input.[13]

$$T^c + T^s = (w \cdot \lambda^c \cdot q^c)/\delta + w \cdot \lambda^s \cdot q^s. \tag{2}$$

Input quality and contract intensity

High-quality output requires high-quality inputs (Kugler and Verhoogen, 2012; Bastos *et al.*, 2018; Fieler *et al.*, 2018). We assume that the quality of final goods of variety ω, $z(\omega)$, is increasing in the quality of the input bundle $\lambda(\omega)$: $z(\omega) = [\varphi(\omega) \cdot \lambda(\omega)]^{1/\alpha}$, where $\varphi(\omega)$ is the efficiency of transforming input quality to output quality, referred to as 'productivity.' We assume $\alpha > 1$, so quality upgrading is subject to diminishing returns.

Both customised inputs and standardised inputs are used to produce final goods. The quality of the input bundle, $\lambda(\omega)$, depends on the quality of both inputs:

$$\lambda(\omega) = [\lambda^c(\omega)]^\eta \cdot [\lambda^s(\omega)]^{1-\eta}, \quad 0 < \eta < 1, \tag{3}$$

[11] To simplify the analysis, we assume that factors used to produce customised inputs and standardised inputs are the same. Relaxing this assumption does not affect any of our theoretical results.
[12] More generally, as long as the option of reselling to other final goods producers is more valuable than that of legal remedies, T^s is not subject to hold-up and thus not affected by the contracting environment.
[13] Both T^c and T^s are also affected by wage rate w, which is endogenously determined in the equilibrium.

where η is the elasticity of input bundle quality with respect to customised input quality, measuring the importance of $\lambda^c(\omega)$.[14] The input bundle quantity production function is

$$q = \min\{q^c, q^s\}. \tag{4}$$

So, the customised input and the standardised input are perfect complements in terms of quantity.[15] Intuitively, one must need four tires (relatively standardised) and one engine (relatively customised) to produce a car. A final goods producer minimises the total input cost in (2), subject to the constraints of production technologies (3) and (4):

$$\min_{\lambda^c,\lambda^s,q^c,q^s} [(w \cdot \lambda^c \cdot q^c)/\delta + w \cdot \lambda^s \cdot q^s] \text{ s.t. } z = [\varphi \cdot (\lambda^c)^\eta \cdot (\lambda^s)^{1-\eta}]^{1/\alpha} \text{ and } q = \min\{q^s, q^c\}.$$

The problem boils down to choosing λ^s and λ^c to minimise the *per-unit* cost of input bundle quality. The final goods producer chooses a high level of quality for the customised input relative to the standardised input under a good contracting environment:

$$\lambda^c/\lambda^s = (\eta \cdot \delta)/(1-\eta).$$

We follow Nunn (2007) to refer to η as 'contract intensity,' because η is also the cost share of the customised input. The resulting *per-unit* input cost, given output quality z, is

$$(w \cdot \lambda^c)/\delta + w \cdot \lambda^s = (b \cdot z^\alpha \cdot \delta^{-\eta})/\varphi, \text{ where } b = (\eta-1)^{\eta-1} \cdot \eta^{-\eta} \cdot w.$$

[14]We assume (3) so the empirical measure of contract intensity is also grounded by the theory.
[15]Adopting a more general CES form of producing q does not change our results (see Appendix A 1.8).

The input cost increases with z, as higher output quality requires higher input quality. Better judicial quality lowers the input cost relatively more if η is high.

Determination of final goods quality

For a final goods producer, *per-unit* input cost, given quality z and productivity φ, is

$$(b \cdot z^{\alpha} \cdot \delta^{-\eta})/\varphi, \quad \alpha > 1, \tag{5}$$

where $\alpha > 1$ suggests that the *per-unit* input cost is convex in z.[16]

The final goods producer also bears costs of production-related services, such as quality control and transportation. We refer to these costs as 'service cost.' Following Mandel (2010) and Johnson (2012), we assume that the *per-unit* service cost is:

$$t \cdot z^{\chi}, \quad 0 < \chi < 1,$$

where t is a cost parameter. The service cost is concave in quality, so an increase in z leads to a less-than-proportional increase in the service cost.[17] In reality, several types of costs feature concavity in quality and can be viewed as per-unit service costs. For instance, the provision of quality involves an inspection process to reduce flaws and defects, which entails extra costs (e.g., hiring personnel and purchasing necessary equipment) to perform these tasks. Such quality control costs grow at a decreasing rate as quality increases.[18]

[16]This is a common assumption used in the literature of quality determination. See, for example, Khandelwal (2010), Kugler and Verhoogen (2012), and Feenstra and Romalis (2014).

[17]Quality z is well-defined as long as $\chi < 1$. We impose $\chi > 0$ because it is the empirically relevant case.

[18]As argued by Mandel (2010), '*adding a supervisor to inspect the tennis racquets for visible flaws decreases the incidence of defects (i.e., increases quality), though his or her cost is no greater for a graphite racquet than a wooden one.*' (Mandel, 2010, p.9) So we consider the quality monitoring/control cost to be concave in quality.

Another example is transportation cost, including the costs of packaging, handling, storage, and shipping, which are also perceived to grow at a decreasing rate as quality improves.[19] So the service cost captures important and realistic costs of quality provision.

With the specified preference, a producer maximises its profit only by minimising its costs in a perfectly competitive market.[20] Given $Q(\omega)$, the final goods producer of ω solves the following cost minimisation problem:

$$\min_{z(\omega),q(\omega)} [(b \cdot z(\omega)^{\alpha} \cdot \delta^{-\eta})/\varphi(\omega) + t \cdot z(\omega)^{\chi}] \cdot q(\omega), \text{ s.t. } Q(\omega) = q(\omega) \cdot z(\omega)$$

$$\Rightarrow \min_{z(\omega)} [(b \cdot z(\omega)^{\alpha-1} \cdot \delta^{-\eta})/\varphi(\omega) + t \cdot z(\omega)^{\chi-1}] \cdot Q(\omega).$$

The optimal quality $z(\omega)$ essentially minimises the average cost *per quality unit.* To see the trade-off, notice that the average input cost *per quality unit* $(b \cdot z(\omega)^{\alpha-1} \cdot \delta^{-\eta})/\varphi$ increases with output quality, while the average service cost *per quality unit* $t \cdot z(\omega)^{\chi-1}$ decreases with output quality.[21] The quality choice, after balancing these two costs, is

$$z(\omega) = \Big([(1-\chi) \cdot t \cdot \varphi(\omega) \cdot \delta^{\eta}]/[(\alpha-1)b]\Big)^{1/(\alpha-\chi)}. \tag{6}$$

Since $\alpha > 1$ and $\chi < 1$, (6) is well-defined. A final goods producer chooses high quality $z(\omega)$ if productivity $\varphi(\omega)$ is high or input cost b is low. When the service cost parameter

[19] As discussed by Hummels (2007), '*the \$1000 watch will typically require higher quality transportation services such as more insurance, greater care in handling, and more rapid delivery, but these services are not 100 times more expensive than those demanded for the \$10 watch.*' (Hummels, 2007, p.137) So, an increase in the quality of goods usually raises the per-unit transportation cost, but such a rise is less than proportional to the quality increase itself.

[20] Appendix A 1.6 shows that under the CES utility function that recognises the impact of quality on demand, a producer's profit maximisation problem is equivalent to its cost minimisation problem of choosing z, which gives rise to the same solution to $z(\omega)$.

[21] To illustrate the trade-off in an alternative way, note that an increase in $z(\omega)$ not only raises the cost *per quantity unit*, but also deflates the cost *per quality unit* by increasing the consumers' valuation of each quantity unit, so they are more willing to bear the higher cost per quantity unit.

t is high, $z(\omega)$ is also high because it is cheaper to embed more quality units in a quantity unit, which is a *per-unit* scale effect similar to the 'Washington apples' effect. The trade-off between convex input cost and concave service cost for quality determination appears in the current literature. Mandel (2010) and Johnson (2012) use a highly similar setup and obtain output quality almost identical to (6). Feenstra and Romalis (2014) and Fan *et al.* (2020) derive very similar solutions to z by assuming $\chi = 0$.

As indicated by (6), a good contracting environment decreases contract enforcement costs and customised input cost, leading to an increase in output quality. Such an effect is stronger when contract intensity is higher.

Average cost *per quality unit* is the sum of average input cost and service cost:

$$C(\omega) = [(b \cdot \delta^{-\eta})/(\phi \cdot \varphi(\omega))]^{\phi} \cdot [t/(1-\phi)]^{1-\phi}, \text{ where } \phi = (1-\chi)/(\alpha-\chi), \tag{7}$$

where ϕ is the share of input cost in total cost. Better judicial quality lowers $C(\omega)$ relatively more if η is high. The cost of ω *per quantity unit* is

$$c(\omega) = C(\omega) \cdot z(\omega) = [(\phi \cdot \varphi(\omega) \cdot \delta^{\eta})/b]^{\chi/(\alpha-\chi)} \cdot [t/(1-\phi)]^{\alpha/(\alpha-\chi)}.$$

Since $\chi > 0$, high productivity and a good contracting environment both increase $c(\omega)$. On the one hand, according to (6), higher $\varphi(\omega)$ and δ always lead to a higher $z(\omega)$, which raises $c(\omega)$. On the other hand, given the same level of $z(\omega)$, higher $\varphi(\omega)$ and δ reduce $c(\omega)$ as in (5). The former effect dominates the latter under $\chi > 0$.[22] Furthermore, the effect of δ on $c(\omega)$ is stronger for a higher value of η.

[22] If $\chi = 0$ as in Feenstra and Romalis (2014) and Fan *et al.* (2020), the two effects cancel each other out and $c(\omega)$ does not vary with $\varphi(\omega)$ or δ.

The result that $c(\omega)$ increases with $\varphi(\omega)$ is a key implication that distinguishes our quality model from a model without quality.[23] To see this, note that when $\chi \to -\infty$, quality differentiation disappears and $c(\omega) = b \cdot \delta^{-\eta}/\varphi(\omega)$, which decreases with $\varphi(\omega)$.[24]

2.2 Trade pattern, trade price, and quality: a Ricardian approach

We embed the quality choice model in a Ricardian model à la Eaton and Kortum (2002).[25] For each variety ω within the continuum $[0, 1]$, there is perfect competition among final goods producers from different countries. Producers in the same country produce variety ω at the same cost. We use d to denote importer and o to denote exporter. Selling goods from o to d entails an *ad valorem* cost τ_{do}.[26] For simplicity, we assume that service cost is paid by labor so $t_o = w_o$. Under perfect competition, the price *per quality unit* of ω sold from o to d is: $P_{do}(\omega) = \tau_{do} C_o(\omega) = \tau_{do} B_o \delta_o^{-\eta\phi} \varphi_o(\omega)^{-\phi}$, where $B_o \equiv \Big((\eta-1)^{\eta-1} \cdot \eta^{-\eta}/\phi\Big)^{\phi} \Big(1/(1-\phi)\Big)^{1-\phi} w_o$. Following Eaton and Kortum (2002), we assume that for an exporter o, productivity $\varphi_o(\omega)$ is drawn from a Fréchet distribution:

$$\Pr[\varphi_o(\omega) \le \varphi] = G_o(\varphi) = \exp\left(-T_o \cdot \varphi^{-\theta}\right), \tag{8}$$

where T_o governs the location of the distribution and θ is the dispersion parameter.

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[23] Mandel (2010) and Johnson (2012) find the same implication. Kugler and Verhoogen (2012) derive a similar result based on a different micro-foundation of quality decision. Baldwin and Harrigan (2011) and Crozet *et al.* (2012) directly assume this positive relationship between cost and productivity.

[24] $\chi \to -\infty$ indicates that the average service cost goes to infinity (zero) due to an infinitesimal decrease (increase) in quality from $z = 1$ for all producers, but the associated changes in average input cost are always finite. So producers differing in $\varphi(\omega)$ end up choosing a uniform $z = 1$ to minimise their costs.

[25] The model describes trade margins for a given industry (product), so we abstract from the superscript for industry (product) for the rest of Section 2 to keep the notations simple. We bring back the industry (product) superscript in Section 3 when industry (product) heterogeneity matters for the empirical analysis.

[26] Bilateral trade cost τ_{do} includes physical barriers such as distance and time zone differences, policy barriers such as tariff and currency differences, and cultural barriers such as language and taste differences.

An importer d decides where to buy each $\omega \in [0,1]$. Because the consumer's utility depends on effective consumption $Q_d(\omega)$, the relevant price for the consumer's decision is $P_{do}(\omega)$, the price *per quality unit* offered by o to d. We refer to $P_{do}(\omega)$ as the *effective price*. Perfect competition suggests that importer d buys ω from the o that offers the lowest $P_{do}(\omega)$, so $P_d(\omega) = \min_o \{P_{do}(\omega);\ \forall\ o\}$. Lemma 1 characterises the trade pattern:

LEMMA 1. *When $\varphi_o(\omega)$ follows Fréchet in (8), the probability that importer d buys a particular variety ω from exporter o, π_{do}, is*

$$\pi_{do} = T_o \cdot \delta_o^{\eta\theta} \cdot (B_o \cdot \tau_{do})^{-\theta/\phi} / \Phi_d, \tag{9}$$

where $\Phi_d = \sum_s T_s \cdot \delta_s^{\eta\theta} \cdot (B_s \cdot \tau_{ds})^{-\theta/\phi}$. π_{do} is also the fraction of varieties that d buys from o.[27]

The trade equation in Lemma 1 resembles the one in Eaton and Kortum (2002). The bilateral trade fraction/probability follows a gravity form, and judicial quality affects bilateral trade. Intuitively, judicial quality matters more for trade in contract-intensive industries, so countries with good judicial quality tend to specialise in high-η industries.[28]

PROPOSITION 1. *The probability distribution of $P_d(\omega)$ is*

$$G_d(P) = 1 - \exp\left[-\Phi_d \cdot P^{\theta/\phi}\right], \tag{10}$$

which is also the effective price distribution of varieties that d actually buys from o, $\tilde{G}_{do}(P)$.

[27] See Appendix A 1.1 for the proof of Lemma 1.

[28] Such a specialisation pattern is reminiscent of specialisation across 'types' in Fieler (2011), where 'types' vary in productivity dispersion parameter θ. We thank the referee for highlighting this connection.

The exact price index in d, Ψ_d, is

$$\Psi_d = \Phi_d^{-\phi/\theta} \cdot \Gamma[1 + \phi(1-\sigma)/\theta]^{1/(1-\sigma)}; \;\; \theta > \phi(\sigma - 1), \tag{11}$$

where $\Gamma[\cdot]$ is the gamma function.[29]

Proposition 1 shows that price index Ψ_d is inversely related to Φ_d. So, better judicial quality in one country benefits all countries through trade by increasing Φ_d. The effective price distribution of varieties that d actually buys from o, $\tilde{G}_{do}(P)$, coincides with $G_d(P)$. Intuitively, d would increase its purchases from an exporter offering lower price until no difference in the price distributions across exporters can be exploited, so $\tilde{G}_{do}(P) = G_d(P)$ must hold as a no-arbitrage condition. Because $\tilde{G}_{do}(P) = G_d(P)$, π_{do} is also the share of expenditure that d spends on varieties produced by o. The value of trade from o to d is $X_{do} = \pi_{do} \cdot X_d$. Therefore, we can define the bilateral trade price from o to d:

LEMMA 2. *The price of trade from o to d is*

$$\begin{aligned} p_{do} \equiv X_{do}/q_{do} = & \underbrace{\tau_{do} \cdot [w_o/(1-\phi)]^{1/(1-\chi)} \cdot B_o^{-\chi/(1-\chi)} \cdot \delta_o^{\eta\chi/(\alpha-\chi)}}_{\textit{Within-variety effect}} \\ & \times \underbrace{E[\varphi_o(\omega)^{\phi(\sigma-1)} \mid \omega \in \Omega_{do}]/E[\varphi_o(\omega)^{\phi\sigma-1/(\alpha-\chi)} \mid \omega \in \Omega_{do}]}_{\textit{Composition effect}}, \end{aligned} \tag{12}$$

where Ω_{do} is the set of varieties that d buys from o. When $\varphi_o(\omega)$ follows Fréchet in (8),

$$p_{do} = [\tau_{do} \cdot w_o/(1-\phi)]^{1/(1-\chi)} \cdot \Phi_d^{\chi/(\theta(\alpha-\chi))} \cdot \Gamma^p, \tag{13}$$

[29]See Appendix A 1.2 for the proof of Proposition 1.

where Γ^p *is a constant. The average quality of trade from* o *to* d*,* z_{do}*, is*

$$z_{do} \equiv p_{do}/P_{do} = [\tau_{do} \cdot w_o/(1-\phi)]^{1/(1-\chi)} \cdot \Phi_d^{1/(\theta(\alpha-\chi))} \cdot \Gamma^z, \tag{14}$$

where P_{do} *is the average effective price of trade from* o *to* d *and* Γ^z *is a constant.*[30]

Lemma 2 decomposes the price of trade into two margins: a *within-variety effect* capturing the intensive margin, and a *composition effect* capturing the extensive margin. The within-variety effect indicates that for each variety sold from o to d, a good contracting environment in o increases quality and price *per quantity unit.* The composition effect suggests that a good contracting environment admits more low-productivity, low-quality, and thus low-priced varieties to be sold from o to d, decreasing the aggregate trade price. Under Fréchet, these two effects offset each other. Therefore, there is no direct impact of judicial quality and contracting environment in o on the aggregate trade price p_{do} in (13). Importantly, trade price p_{do} is increasing in Φ_d, because only high-quality varieties with higher prices can enter a more competitive market with a lower price index.[31]

One can define a general equilibrium by combining gravity equation (9) with additional assumptions about a country's spending (on different industries) and factor market clearing. To illustrate, we describe the conditions of an equilibrium with multiple industries and one factor input (labor) in Appendix A 1.9.

[30]See Appendix A 1.3 for the proof of Lemma 2.
[31]The price-increasing effect of higher Φ_d disappears under $\chi = 0$, and becomes a price-decreasing effect under $\chi \to -\infty$ in which there is no quality difference.

2.3 Judicial quality, contract intensity, and margins of trade

We now study how cross-country differences in judicial quality affect trade margins across industries and products that differ in their contract intensities. We first show how judicial quality in one country affects competition in other countries through trade:

$$\partial \ln \Phi_d / \partial \ln \delta_o = \eta\theta \times [T_o \cdot \delta_o^{\eta\theta} \cdot (B_o \cdot \tau_{do})^{-\theta/\phi} / \Phi_d] = \eta\theta \cdot \pi_{do}.$$

Better judicial quality in o increases competition in d. The effect increases with contract intensity η and the market share of o in d. Intuitively, if o is a major supplier of d, a change of δ_o would yield a large effect on the competitive environment in d.

Trade is bilateral. When examining the effect of judicial quality on exports, we compare exporters with different δ_o conditional on the same importer to eliminate demand-specific confounding factors. Comparison conditional on an importer d is denoted $|_d$. For similar reasons, we compare importers with different δ_d conditional on the same exporter ($|_o$). Proposition 2 summarises the effects of judicial quality on the pattern of trade.

Proposition 2. *Conditional on an importer d, a country with better judicial quality exports relatively more to d in contract-intensive industries:*

$$\partial^2 \ln \pi_{do} / (\partial \ln \delta_o \partial \eta) \mid_d = \theta > 0. \qquad (15)$$

Conditional on an exporter o, a country with better judicial quality imports relatively less from o in contract-intensive industries[32]*:*

$$\partial^2 \ln \pi_{do}/(\partial \ln \delta_d \partial \eta) \mid_o = -\theta \cdot \pi_{dd}(1 + \partial \ln \pi_{dd}/\partial \ln \eta) < 0. \quad (16)$$

Equation (15) indicates that judicial quality constitutes a comparative advantage in high-η industries, consistent with the empirical findings summarised by Nunn and Trefler (2014). Such a Heckscher-Ohlin prediction holds in a multi-country environment.

Equation (16) reveals another intuitive result: better judicial quality generates relatively more domestic competition and less import demand in high-η industries. In an importer country with higher δ_d, domestic producers in high-η industries have comparative advantage and relatively higher quality, making it tougher for foreign varieties to survive in these industries. The competitive environment is reflected by a high Φ_d.

Proposition 3 makes novel predictions about the effects on trade price and quality.

PROPOSITION 3. *Conditional on an importer d, a country's judicial quality has no explicit impacts on its export prices or quality offered to d in contract-intensive products:*

$$\partial^2 \ln p_{do}/(\partial \ln \delta_o \partial \eta \mid_d = 0; \quad \partial^2 \ln z_{do}/(\partial \ln \delta_o \partial \eta) \mid_d = 0. \quad (17)$$

[32] See Appendix A 1.4 for the proof of Proposition 2. To complete the proof, we need to impose a restriction (R.1) such that $\partial \ln \pi_{dd}/\partial \ln \eta > -1$. Appendix A 1.4 shows that such a restriction holds in our data.

Conditional on an exporter o, a country with better judicial quality imports at relatively higher prices and quality from o in contract-intensive products:[33]

$$
\begin{aligned}
&\partial^2 \ln p_{do}/(\partial \ln \delta_d \partial \eta) \mid_o = \chi \cdot \pi_{dd} \cdot (1 + \partial \ln \pi_{dd}/\partial \ln \eta)/(\alpha - \chi) > 0, \\
&\partial^2 \ln z_{do}/(\partial \ln \delta_d \partial \eta) \mid_o = \pi_{dd} \cdot (1 + \partial \ln \pi_{dd}/\partial \ln \eta)/(\alpha - \chi) > 0.
\end{aligned} \tag{18}
$$

Equation (17) shows a seemingly unexpected result: judicial quality does not have any explicit impacts on export prices or quality even for high-η products. The two opposite effects highlighted in (12) are responsible for this result. On the one hand, the within-variety effect suggests that a higher δ_o lowers customised input cost and raises the price and quality of a given variety. On the other hand, the composition effect indicates that a higher δ_o allows o to export more low-quality and low-priced varieties, reducing the aggregate price and quality of trade. These two effects offset each other under the Fréchet distribution and lead to an elasticity of zero that holds across products with different η.

Equation (18) suggests that better judicial quality increases import prices and quality relatively more in high-η products due to the composition effect in (12). A higher δ_d causes tougher competition in the domestic market, so only foreign varieties with higher quality and hence higher prices can enter that country, increasing aggregate import price and quality. Stronger composition effects occur in high-η products. The prediction about import price in (18) also distinguishes our model from a model without quality, in which judicial quality decreases import prices relatively more in high-η products.[34]

Therefore, our model generates testable predictions about the effects of judicial quality on a country's trade margins across industries (products) that differ in η. These predictions are

[33] See Appendix A 1.5 for the proof of Proposition 3.

[34] If $\chi = -\infty$, quality differentiation disappears and $\partial^2 \ln p_{do}/\partial \ln \delta_d \partial \eta \mid_o = -\pi_{dd}(1 + \partial \ln \pi_{dd}/\partial \ln \eta) < 0$.

robust to alternative model assumptions (see the discussion in Appendix A 1.7). In addition to the comparative advantage effect studied in the literature, we highlight the effects of domestic competition and the quality composition of trade.

3 Empirical strategy

In this section, we explain our empirical strategy to test Propositions 2 and 3, guided by our theoretical analysis. Following Romalis (2004), Nunn (2007), and Chor (2010), we exploit cross-country variation in judicial quality and cross-industry variation in contract intensity for identification.

3.1 Baseline specifications

We use the following specification of how judicial quality affects the export margins:

$$y_{do}^{g} = \beta_{E1} \cdot JQ_o \times \eta^g + \beta_{E2} \cdot H_o \times h^g + \beta_{E3} \cdot K_o \times k^g + \mathbf{a}_d^g + \mathbf{a}_o + \mathbf{x}_o^g + \mathbf{b}_{do}^g + \varepsilon_{Edo}^g, \quad (19)$$

where y_{do}^{g} denotes a bilateral trade outcome at the exporter(o)-importer(d)-industry(g) level. An exporter o's judicial quality is JQ_o, and the contract intensity of an industry or a product g is η^g. Exporter os skill and capital endowments are H_o and K_o, and the skill and capital intensities of industry or product g are h^g and k^g. We are interested in β_{E1}, the differential effects of judicial quality on export margins across industries or products with different η^g. Guided by the theory, we include importer-industry or importer-product fixed effects $\mathbf{a}_d^g$. Exporter fixed effects $\mathbf{a}_o$ absorb the effects of an exporter's characteristics, such as labor cost. Control variables at the exporter-industry or exporter-product level are $\mathbf{x}_o^g$. Variables capturing bilateral trade costs are $\mathbf{b}_{do}^g$.[35]

The current literature on institutional quality and comparative advantage (e.g., Nunn, 2007; Nunn and Trefler, 2014) usually abstracts from the bilateral feature of trade by using a country-industry-level specification. Compared with this common practice, we offer a cleaner identification by including the relevant fixed effects in (19), as suggested by Propositions 2 and 3. Because importer-industry or importer-product fixed effects $\mathbf{a}_d^g$ control for all industry- or product-specific demand-side confounding factors (e.g., preference, competitive environment), β_{E1}, β_{E2}, and β_{E3} are identified by the variations across exporters within an importer-industry or importer-product cell.[36] If the unit of analysis is instead at the country-industry level, as in Nunn (2007), a composite term of unobserved $\mathbf{a}_d^g$ across importers would enter the residual and bias the estimation.[37]

We use a similar specification to test the effect of judicial quality on imports:

$$y_{do}^g = \beta_{I1} \cdot JQ_d \times \eta^g + \beta_{I2} \cdot H_d \times h^g + \beta_{I3} \cdot K_d \times k^g + \mathbf{a}_o^g + \mathbf{a}_d + \mathbf{x}_d^g + \mathbf{b}_{do}^g + \varepsilon_{Ido}^g. \quad (20)$$

We focus on the importer's judicial quality interaction $JQ_d \times \eta^g$ and β_{I1}, the differential impacts of judicial quality on the import margins across industries or products with different η. For the same reasons highlighted above, we include exporter-industry or exporter-product fixed effects $\mathbf{a}_o^g$ to absorb supply-side confounding factors (e.g., production efficiency, input cost), so we identify β_{I1}, β_{I2}, and β_{I3} using the variations across importers within an

[35]The variables in $\mathbf{b}_{do}^g$ include bilateral tariff, log distance, and dummies indicating whether the trading partners share a border, share a common official language, have any colonial ties, are in a common currency union, and are in any common free trade agreement (FTA).

[36]This is especially relevant when investigating the effects on quality of trade, because one can only infer quality differences across exporters (importers) given the same market (supplier) in the data.

[37]Chor (2010) derives a specification similar to (19) to unpack the sources of comparative advantage.

exporter-industry or exporter-product cell. Importer fixed effects $\mathbf{a}_d$ absorb any effects of an importer's characteristics. Control variables $\mathbf{x}_d^g$ and $\mathbf{b}_{do}^g$ are also included.

The outcome variables of interest y_{do}^g in (19) and (20) are different bilateral trade outcomes: trade share, trade price, and quality of trade. When testing Proposition 2, we use the exporter-importer-industry-level trade share as the outcome variable.[38] When testing Proposition 3, we use the exporter-importer-product-level price and quality as the outcome variables because their differences are more informative at the product level.

Following Nunn (2007), we include a set of control variables as $\mathbf{x}_o^g$ and $\mathbf{x}_d^g$ in (19) and (20), respectively. These control variables are the interaction of country-level financial development with industry-level external financial dependence,[39] and the interactions of country-level log per capita income with several industry-level characteristics.[40]

3.2 Endogeneity: legal origin as the instrumental variable

Contracting institutions can be endogenous to economic growth and trade (Nunn and Trefler, 2014). A country may have a greater incentive to maintain a good contracting environment if it produces or consumes more contract-intensive goods. To identify the causal effects of JQ on trade, we follow Nunn (2007) to instrument a country's JQ using its legal origin. Legal origin was predetermined centuries ago and is unlikely to be affected by the current trade patterns. And legal origin affects the efficiency and consistency of a country's judicial system, generating the exogenous variation in JQ across countries (La Porta *et al.*, 1999;

[38]We investigate the outcomes of the pattern of trade at the industry level, mainly due to the difficulty of computing absorption and total import share at the product level. η^g also varies at the industry level.
[39]Manova (2013) finds that financial development matters more for financially vulnerable industries.
[40]These industry-level characteristics are value-added share, production fragmentation (measured by intra-industry trade), technological progress (measured by productivity growth over the previous 20 years), and product complexity (measured by the Herfindahl index of input concentration).

Acemoglu and Johnson, 2005). Finally, by including a large set of control variables and fixed effects, we control for other potential channels through which legal origin may affect a country's trade.

We instrument exporter o's $JQ_o \times \eta^g$ in (19) using $B_o \times \eta^g$, $G_o \times \eta^g$ and $S_o \times \eta^g$, where B_o, G_o, and S_o indicate whether o's legal origin is British common law, German civil law, or Scandinavian civil law, respectively.[41] Similarly, we use $B_d \times \eta^g$, $G_d \times \eta^g$ and $S_d \times \eta^g$ to instrument for importer d's $JQ_d \times \eta^g$ in (20).

4 Data and variables

Bilateral trade data for each 4-digit code of the Standard International Trade Classification (SITC) Revision 2 are drawn from the United Nations Comtrade data. Our sample contains 198 countries and $1,167$ unique combinations of SITC 4-digit codes and units of measurement. The trade data are also mapped to the U.S. Bureau of Economic Analysis (BEA) 1997 input-output (I-O) industry classification of 225 I-O industries. All the trade data are from 1997.[42]

We construct bilateral trade share π_{do}^g at the industry level (defined by the BEA I-O industry classification) based on trade value and number of traded varieties. Following the literature (e.g., Broda and Weinstein, 2006; Khandelwal, 2010), we define a variety as the import of a product from an exporter, where a product is a unique combination of the SITC

[41] There are in total five categories of legal origins: British common law, French civil law, German civil law, Scandinavian civil law, and Socialist law. All countries with Socialist law legal origin were dropped due to missing data on skill and capital interactions. The omitted category is French civil law.

[42] In one of the robustness checks, we also use trade data from 1997 to 2011.

4-digit code and unit of measurement as in Feenstra and Romalis (2014).[43] We compute price (unit value) at the product level for each bilateral trade relationship.

Our construction of the bilateral trade quality index at the product level follows Feenstra and Romalis (2014). Because product quality is unobserved in the trade data, previous studies usually rely on the 'demand-side' approach to infer quality (e.g., Khandelwal, 2010; Khandelwal *et al.*, 2013). With assumptions about the extensive margin of trade (e.g., number of varieties), the demand-side approach indicates that conditional on price, an import with a higher market share should be assigned a higher level of quality. To obtain more robust estimates of quality, Feenstra and Romalis (2014) develop a method that combines the demand-side insight with two additional supply-side insights about quality. First, goods of higher quality are related to longer shipping distances.[44] Second, higher demand in the destination market allows more low-quality varieties to be exported, so average quality can decrease with bilateral trade.[45] Therefore, the extensive margin of trade is endogenous and consistent with the observed trade patterns.

Our preferred measure of country-level judicial quality JQ is the 'rule of law' indicator from Kauffmann *et al.* (2004), which measures a country's efficiency and consistency in judicial procedures and practice, as well as its contract enforcement, during 1997–98.[46] Contract intensity η^g is from Nunn (2007), measured by the cost share of customised inputs in total

[43] We use the most straightforward measure of variety by counting the number of traded varieties within a BEA I-O industry. For the purpose of measuring import price indexes, Feenstra (1994) incorporates the role of new varieties into the conventional Sato-Vartia price index. For applications and extensions of Feenstra's (1994) method, see for example Hummels and Klenow (2005) and Broda and Weinstein (2006). We thank the referee for this remark.

[44] This is known as the 'Washington apples' effect. We can allow for this effect by making t depend on the distance between trade partners. Such a modification does not change our main theoretical results.

[45] The composition effect in (14) reflects a similar insight.

[46] Most of the variation in country-level judicial quality comes from the country-specific component that does not vary over time. For example, country fixed effects account for 95.3% of the total variation in the 'rule of law' indicator in the Worldwide Governance Indicators during 1996–2018.

inputs for each BEA I-O industry. For the analysis of the price and quality of trade, we map η^gs to the SITC 4-digit level.

Measures of skill intensity, capital intensity, value-added share, intra-industry trade share, productivity growth, and the Herfindahl index of input concentration are from Nunn (2007). The construction of the external finance dependence measure follows Rajan and Zingales (1998). These measures are all at the BEA I-O industry level, so we map them to the SITC 4-digit level when the outcome variables are the price and quality of trade. Country-level skill endowment, capital endowment, financial development, and per capita income are from Nunn (2007). Bilateral tariff data at the SITC 4-digit level are from Feenstra and Romalis (2014). Bilateral trade cost variables are from the CEPII database.[47]

We visualise the effects of judicial quality on the relative trade pattern and trade price between high-η and low-η industries. We first run the following regression:

$$\ln \pi_{do}^{g} = \mathbf{b}_{do}^{g} + \mathbf{z}_{o}^{g} + \mathbf{z}_{d}^{g} + \epsilon_{do}^{g}, \tag{21}$$

where $\mathbf{b}_{do}^{g}$ is the bilateral trade cost variables. The fixed effects, $\mathbf{z}_{o}^{g}$ and $\mathbf{z}_{d}^{g}$, capture the average trade shares at the exporter-industry and importer-industry levels, respectively, after controlling for bilateral trade frictions. We define an industry g as 'high-η' if η^g exceeds the median contract intensity across all industries, and as 'low-η' otherwise. For each exporter o, we calculate the mean $\mathbf{z}_{o}^{g}$ for high-η and low-η industries separately.[48] The ratio between the mean $\mathbf{z}_{o}^{g}$ of the high-η industries and that of the low-η industries is exporter o's 'export share

[47]Appendixes B 2.1 to B 2.3 describe the data and variables in detail. Table D.1 in Appendix D reports summary statistics of the key variables.

[48]We demean $\mathbf{z}_{o}^{g}$ within each g before taking the averages to ensure that $\mathbf{z}_{o}^{g}$s are comparable across g.

premium' in contract-intensive industries. We calculate a similar measure for $\mathbf{z}_d^g$, importer d's 'import share premium' in contract-intensive industries.

[Figure 1 here]

In Figure 1, we plot a country's log export share premium (left panel) and log import share premium (right panel) in high-η industries against its JQ measure from Kauffmann *et al.* (2004) on the horizontal axis. Consistent with Proposition 2, a country's export (import) share premium in high-η industries increases (decreases) with its judicial quality. Regressing the log export (import) share premium on JQ yields a coefficient of 1.576 (-0.369) with a robust standard error of 0.261 (0.092).

Repeating the procedures above by replacing π_{do}^g with p_{do}^g, we obtain the country-level export price premium and import price premium in high-η products. According to Figure 2, a country's export price premium in high-η products does not vary significantly with judicial quality. A regression of the log export price premium on JQ gives a coefficient of 0.063 with a standard error of 0.092. Meanwhile, a country's import price premium in high-η products increases with its judicial quality. Regressing the log import price premium on JQ generates a coefficient of 0.166 with a standard error of 0.039.[49]

[Figure 2 here]

5 Empirical analysis

Our empirical analysis proceeds as follows. First, we use bilateral trade share at the BEA I-O industry level to test Proposition 2. Second, we use bilateral trade price and quality

[49]To ensure robustness, we re-classify industries into either 'high-η' if η^g is higher than the 75% percentile of contract intensity across all industries, or 'low-η' if η^g is lower than the 25% percentile. Figures E.1 and E.2 in Appendix E report the alternative figures, which give the same results.

at the SITC 4-digit-unit level to test Proposition 3. Third, we report the results of various robustness tests. Finally, we offer suggestive evidence of a quasi-Rybczynski effect triggered by improving judicial quality over time. Following Nunn (2007), we standardise all the explanatory variables to compare their relative importance.

5.1 Effects of judicial quality on the pattern of trade

We begin by testing whether a country with better judicial quality specialises in the exports of contract-intensive industries. Columns (1) to (3) in Table 1 report the ordinary least squares (OLS) estimation results of (19). In columns (1) and (2), our outcome variables are bilateral trade shares π^g_{do} at the BEA I-O industry level based on FOB and CIF trade values, respectively. In column (3), we use the variety-based bilateral trade share as the outcome variable. In addition to the exporter's judicial quality interaction $\eta^g \times JQ_o$, we include skill interaction and capital interaction of the exporter to control for skill-based and capital-based comparative advantages, and bilateral variables $\mathbf{b}^g_{do}$ to capture bilateral trade barriers. The coefficients of the judicial quality, skill, and capital interactions are all positive and statistically significant at the 1% level. Columns (4) to (6) in Table 1 test whether a country with better judicial quality imports relatively less in contract-intensive industries by estimating (20). The outcome variables are value-based and variety-based bilateral trade shares, respectively. We include factor endowment interactions of the importer and $\mathbf{b}^g_{do}$. The OLS estimates of the coefficients are all negative and statistically significant.

[Table 1 here]

Judicial quality may be endogenous to international trade. To isolate the causal effects of judicial quality on trade patterns, we re-estimate all the columns in Table 1 using legal origin as the instrument for a country's judicial quality. We also include the interaction of country-level financial development with industry-level external finance dependence, and the interactions of country-level log per capita income with several industry-level characteristics as additional controls.[50] The instrumental variable (IV) estimates in Table 2 are highly aligned with and larger than the OLS ones.[51] First, the effects of $\eta^g \times JQ_o$ on trade shares remain significantly positive. A one standard deviation increase in $\eta^g \times JQ_o$ increases the value- and variety-based trade shares by about 1.12 log points and 0.29 log points, respectively. These IV estimates are close to those obtained by Nunn (2007).[52] Second, the effects of $\eta^g \times JQ_d$ on trade shares are negative and statistically significant. A one standard deviation increase in $\eta^g \times JQ_d$ decreases both the value- and variety-based trade shares by about 0.25 log points.

Turning to the statistical tests of the legal origin instrument, we find that the Kleibergen-Paap (K-P) LM statistics are all statistically significant at the 1% level and the K-P F statistics are all larger than 10. Thus, under-identification or a weak instrument does not seem to be a first-order concern. Meanwhile, most of the Hansen J values are statistically insignificant in Table 2. The only significant one is in column (6). As discussed by Angrist and Pischke (2008), rejection in the over-identification test need not suggest an identification failure; instead, it may be a symptom of treatment effect heterogeneity. Since our estimated IV

[50]The reduced form estimates and the first-stage results are reported in Tables D.2 to D.5 in Appendix D. In particular, the reduced form estimates imply that countries with a specific legal system (i.e., German civil law, British common law, and Scandinavian civil law) export relatively more, import relatively less, and import at relatively higher prices and quality in contract-intensive industries (products). We argue that these relationships to a large extent indicate that the law provides better protection of relationship-specific investment. We thank the referee for this remark.
[51]The IV estimates are larger than the OLS estimates, possibly because the measurement errors in JQ tend to bias the OLS estimates toward zero. Measurement errors can arise as the JQ from Kauffmann *et al.* (2004) is based on individuals' perceptions of the judiciary environment.
[52]In columns (1) and (2) in Table 2, the standardised beta coefficients of $\eta^g \times JQ_o$ are 0.504 and 0.507. In column (6) in Table VII in Nunn (2007), the standardised beta coefficient is 0.520.

coefficients are average effects across heterogeneous countries and industries, the statistically significant Hansen J values are plausibly due to heterogeneity in the underlying coefficients. Overall, legal origin appears to be a valid instrument that predicts judicial quality well in our exporter-importer-industry specifications.

[Table 2 here]

To sum up, Tables 1 and 2 validate the predictions of Proposition 2. A country with better judicial quality exports relatively more and imports relatively less in contract-intensive industries; thus, this is a Heckscher-Ohlin effect of the contracting environment. The import-reducing effect indicates tougher domestic competition in contract-intensive industries due to better judicial quality. The effects of comparative advantage and domestic competition also apply to the other two factor endowments: a skill- or capital-abundant country exports (imports) relatively more (less) in skill- or capital-intensive industries.

5.2 Effects of judicial quality on trade price and quality

Next, we discuss the new findings of how judicial quality affects trade prices and quality. First, we test whether a country with better judicial quality exports at relatively higher prices or quality in contract-intensive products. In columns (1) and (2) in Table 3, we report the OLS estimates of (19) using bilateral FOB and CIF prices as outcome variables. In column (3), the outcome variable is the export quality index developed by Feenstra and Romalis (2014). We include other factor endowment interactions and bilateral trade cost variables. The coefficient of $\eta^g \times JQ_o$ is estimated to be positive but statistically insignificant at the 10% level. These results are aligned with the prediction of Proposition 3. Second, we test whether a country with better judicial quality imports at relatively higher prices and quality in contract-intensive products. We estimate (20) using bilateral FOB and CIF prices and the import quality index from Feenstra and Romalis (2014) as outcome variables. In columns (4) to (6) in Table 3, the coefficient of $\eta^g \times JQ_d$ is estimated to be positive and significant at the 1% level. Better judicial quality is correlated with relatively higher import prices and quality in contract-intensive industries.

[Table 3 here]

To identify the causal effects, we estimate all the columns in Table 3 using legal origin as the instrument for judicial quality, with additional control variables. The IV estimates are reported in Table 4 and are highly consistent with the OLS estimates in Table 3. First, the effects of $\eta^g \times JQ_o$ on price and quality are statistically insignificant. All the t-values are between 0.8 to 0.9, so the estimates are not significantly different from 0 by any conventional standard. Moreover, the standard errors are relatively small, so the insignificant results are not due to imprecise estimates.[53] Second, the effects of $\eta^g \times JQ_d$ on price and quality are positive and statistically significant, at least at the 10% level. A one standard deviation increase in $\eta^g \times JQ_d$ increases the import price and import quality index by about 0.12 log points and 0.06 log points, respectively. Meanwhile, all the columns include the K-P LM statistics, which are significant at the 1% level and K-P F statistics that are greater than 10, alleviating the concern about under-identification and weak instruments. The Hansen J values are marginally significant at the 10% level in columns (1), (2), (3), and (6), and statistically insignificant in columns (4) and (5). We again interpret the marginally significant Hansen J values as a symptom of heterogeneity in the underlying coefficients.

[53]The standard errors of the judicial quality interaction range from 0.137 to 0.154, while those in columns (1) to (3) in Table 2 range from 0.127 to 0.433.

[Table 4 here]

The skill and capital interactions do not yield similar effects on price and quality as the judicial quality interaction. In particular, in columns (1) to (3) in Table 4, the capital interaction significantly reduces the export price and quality. While an overall increase in capital endowment is not always accompanied by capital input upgrading, it can replace unskilled labor and tasks not directly related to quality production and reduce the associated costs, thus lowering prices.[54]

The results in Tables 3 and 4 support Proposition 3 and highlight the importance of incorporating the role of quality to understand how judicial quality affects trade prices and quality. A country's judicial quality does not have explicit impacts on its export prices and quality in contract-intensive industries due to two offsetting effects: the *within-variety effect*, which induces quality upgrading of individual varieties, and the *composition effect*, which admits more low-quality domestic varieties for export. In contrast, a country with better judicial quality imports at relatively higher prices and quality. Combined with the domestic competition effect indicated in Table 2, the results suggest that imported varieties that survive tougher domestic competition have higher prices and quality.

5.3 Alternative measures of quality: demand-side approach

We can also use the demand-side approach to infer the quality of trade from data following Khandelwal (2010) and Khandelwal *et al.* (2013). The idea is that conditional on price, a variety with higher sales should be assigned to higher quality. Specifically, we can invert (1) to obtain the expression for quality: $\ln z_d(\omega) = \ln q_d(\omega)/(\sigma - 1) + \sigma \ln p_d(\omega)/(\sigma - 1) -$

[54]For example, if an increase in capital endowment decreases the service cost t_o, it actually decreases both p_{do} and z_{do} in (13) and (14).

$\ln \Phi_d - \ln X_d/(\sigma - 1)$. Price $p_d(\omega)$ and quantity $q_d(\omega)$ are directly available in the trade data, while $-\ln \Phi_d - \ln X_d/(\sigma - 1)$ is captured by the importer and product fixed effects. A key parameter that is needed is the elasticity of substitution σ. We construct three quality measures by using different estimates of σ. $Quality_1$ assumes that $\sigma = 5$ for all products (Anderson and Van Wincoop, 2004). $Quality_2$ uses Feenstra and Romalis's (2014) estimates at the SITC 4-digit-unit level, σ^{FR}. $Quality_3$ uses Broda and Weinstein's (2006) estimates at the SITC 4-digit level, σ^{BW}.[55]

We estimate specifications (19) and (20) using these different quality measures as outcome variables. Columns (1) to (3) in Table 5 show that the estimated coefficients of $\eta^g \times JQ_o$ are all statistically not different from 0, while columns (4) to (6) show that the estimated coefficients of $\eta^g \times JQ_d$ are all significantly positive at least at the 5% level.[56] Our results in Table 4 are robust to the quality index inferred by the demand-side approach.

[Table 5 here]

5.4 Panel data results: 1997–2011

Due to the data features of judicial quality and contract intensity,[57] we focus on the cross section of 1997 in the baseline analysis. In this section, we construct a panel from 1997 to 2011 to test the robustness of our empirical findings. The specifications and data construction follow Sections 3 and 4, except that subscript t reflects variations across years. We continue

[55] σ^{FR} and σ^{BW} are weakly correlated (correlation = -0.014) and are both highly dispersed across products. The correlation between the ensuing quality measures is 0.437. See Appendix C 3.5 for details.

[56] The results in columns (4) to (6) in Table 5 now capture the difference in import quality premium (import quality relative to the importer mean and the product mean) across different importers, rather than the import quality difference across importers, since the demand-side approach can only be used to infer relative quality among products sold in the same market.

[57] First, most of the variation in country-level judicial quality comes from the time-invariant country-specific component. Second, a large amount of measurement error appears in the year-to-year changes in the 'rule of law' indicator. Third, it is difficult to extend the contract intensity measure η^g to more recent years, because Rauch's (1999) classification of customised products may not apply to later periods.

to instrument for a country's judicial quality using its legal origin and introduce the year dimension into the fixed effects when necessary. Since legal origin is constant across years, our identification still hinges on variations across countries for any given year. Appendix B 2.4 reports the details of the empirical strategy and data construction for the panel data analysis.

The top panel in Table 6 reports the IV estimates for trade pattern. Consistent with the findings in Table 2, the coefficients of $\eta^g \times JQ_{o,t}$ are positive and those of $\eta^g \times JQ_{d,t}$ are negative, all statistically significant at the 1% level.[58] The bottom panel reports the effects on trade price and quality. Consistent with the findings in Table 4, the coefficients of $\eta^g \times JQ_{o,t}$ are statistically insignificant, while those of $\eta^g \times JQ_{d,t}$ are positive and statistically significant at the 1% level. So, our results hold for more recent years.[59]

[Table 6 here]

Our findings are also robust to alternative measures of judicial quality and contract intensity (Appendix C 3.1), an alternative price measure at the Harmonized System 6-digit classification (Appendix C 3.2), an alternative specification at the country-industry level (Appendix C 3.3), and controlling for output customisation (Appendix C 3.4).

[58]Because the measure of η^g is not available in more recent years, we fix η^g to its value in 1997 and interact it with $JQ_{o,t}$ and $JQ_{d,t}$. Using such a time-invariant measure of η^g might also benefit our estimation by avoiding potential endogenous responses of contract intensity to changes in JQ across years.

[59]The results are robust to quality measures inferred with alternative values of σ, as reported in Appendix C 3.5. We only report the results for the quality index based on the demand-side approach in Table 6, since the results for the Feenstra and Romalis quality index are often highly aligned with those for prices.

5.5 Quasi-Rybczynski effect of judicial quality: suggestive evidence

So far, we have tested the Heckscher-Ohlin predictions of judicial quality. A natural follow-up question is whether fast-growing economies have also developed a comparative advantage in contract-intensive industries.[60] We offer suggestive evidence by examining whether rising judicial quality over time is associated with increasing export specialisation in high-η industries. The 'rule of law" indicator from the Worldwide Governance Indicators data indicates that 121 of 214 economies grew positively in judicial quality during 1996–2018.[61] In particular, the 'East Asia miracles,' Singapore, South Korea, Hong Kong SAR, and Chinese Taipei, saw significant growth in judicial quality.[62]

Figure 3 follows Romalis (2004) to visualise the Rybczynski effect of judicial quality. With gradual improvement in judicial quality, the East Asian miracle economies have seen their export structures shift toward more contract-intensive industries, as shown by their export shares in world trade for commodities with different contract intensities in 1978, 1997, and 2018. The regression results of a first-difference specification in Appendix C 3.6 further support the quasi-Rybczynski effect.[63]

[Figure 3 here]

[60] We thank the referee for this insight.

[61] According to the Worldwide Governance Indicators (WGI) data, '*..., over longer periods of time such as a decade, the WGI data do show significant trends in governance in a number of countries.*'

[62] The average annual growth rates of the 'rule of law' indicator (1996–2018) for Singapore, South Korea, Hong Kong SAR, and Chinese Taipei are 1.9%, 2.4%, 4.5%, and 2.1%, respectively.

[63] We interpret the results of the 'Rybczynski' regression as merely suggestive because we lack a credible time-varying instrument for judicial quality. Finding such an instrument is beyond the scope of this paper.

6 Concluding remarks

Previous studies have extensively documented the impacts of the contracting environment on the pattern of export specialisation. In this paper, we contribute to the existing work by studying how the contracting environment affects a country's different trade margins via the mechanism of product quality. To do so, we incorporate relationship-specific customised input and product quality choices into a Ricardian trade model. In particular, the relationship-specificity of customised inputs generates hold-up and leads to under-provision of customised input quality. Our analysis shows that better judicial quality not only constitutes a comparative advantage in contract-intensive industries, but also induces quality upgrading of domestic varieties and increases domestic competition. Incorporating these effects, our model generates the following novel predictions: better judicial quality increases a country's import prices and quality relatively more in contract-intensive products, but has no explicit impacts on its export prices and quality. Our model also predicts that better judicial quality increases a country's exports and decreases its imports relatively more in contract-intensive industries. Using legal origin as the instrument for country-level judicial quality and an empirical strategy that better mitigates omitted variable bias, we empirically confirm our predictions about the impacts of judicial quality on different trade margins. We also provide suggestive evidence for the quasi-Rybczynski effect of judicial quality: rising judicial quality over time is associated with its increasing specialisations in contract-intensive industries. Our findings indicate that the input quality and output quality of customised products are important production decisions that are sensitive to the contracting environment. We plan to extend our research along this line in the future.

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Tables and Figures

Table 1. *The effects of judicial quality on trade patterns, OLS*

	(1)	(2)	(3)	(4)	(5)	(6)
Dependent variable (log):	FOB share	CIF share	Variety	FOB share	CIF share	Variety
Interactions, exporter:						
Judicial quality: $\eta^g \times JQ_o$	0.689***	0.688***	0.058***			
	(0.074)	(0.074)	(0.022)			
Skill: $h^g \times H_o$	0.268***	0.266***	0.052***			
	(0.038)	(0.038)	(0.011)			
Capital: $k^g \times K_o$	0.227***	0.234***	0.139***			
	(0.073)	(0.073)	(0.022)			
Interactions, importer:						
Judicial quality: $\eta^g \times JQ_d$				-0.056*	-0.058**	-0.133***
				(0.030)	(0.030)	(0.019)
Skill: $h^g \times H_d$				-0.136***	-0.136***	-0.102***
				(0.023)	(0.023)	(0.016)
Capital: $k^g \times K_d$				-0.156***	-0.155***	-0.038*
				(0.031)	(0.031)	(0.021)
Bilateral controls	Yes	Yes	Yes	Yes	Yes	Yes
Fixed effects	Importer-industry, Exporter			Exporter-industry, Importer		
Within R-squared	0.182	0.180	0.084	0.250	0.248	0.075
Number of Obs.	250,444	250,444	250,444	201,519	201,519	201,519

Note: This table reports the effect of country-level judicial quality on the trade pattern across industries with different contract intensities. Columns (1) to (3) present the effects on exports. Columns (4) to (6) present the effects on imports. Bilateral controls include tariff, bilateral distance, shared border, common official language, colonial tie, common currency union, and common FTA. Standard errors (clustered at the exporter-industry level in columns (1) to (3); clustered at the importer-industry level in columns (4) to (6)) are shown in parentheses. *, **, and *** indicate significance at the 10 percent, 5 percent, and 1 percent levels.

Table 2. *The effects of judicial quality on trade patterns, IV*

	(1)	(2)	(3)	(4)	(5)	(6)
Dependent variable (log):	FOB share	CIF share	Variety	FOB share	CIF share	Variety
Interactions, exporter:						
Judicial quality: $\eta^g \times JQ_o$	1.121**	1.126**	0.293**			
	(0.433)	(0.433)	(0.127)			
Skill: $h^g \times H_o$	0.172**	0.170**	0.032**			
	(0.080)	(0.081)	(0.016)			
Capital: $k^g \times K_o$	0.344*	0.356*	0.181***			
	(0.192)	(0.193)	(0.059)			
Interactions, importer:						
Judicial quality: $\eta^g \times JQ_d$				-0.254**	-0.248**	-0.249***
				(0.102)	(0.101)	(0.093)
Skill: $h^g \times H_d$				-0.099***	-0.100***	-0.066**
				(0.034)	(0.033)	(0.029)
Capital: $k^g \times K_d$				-0.268***	-0.263***	-0.139***
				(0.064)	(0.063)	(0.045)
Bilateral controls	Yes	Yes	Yes	Yes	Yes	Yes
Additional controls	Yes	Yes	Yes	Yes	Yes	Yes
Fixed effects	Importer-industry, Exporter			Exporter-industry, Importer		
Kleibergen-Paap LM stat.	14.109***	14.109***	14.109***	17.453***	17.453***	17.453***
Kleibergen-Paap F stat.	11.805	11.805	11.805	25.229	25.229	25.229
Hansen J stat. (p-value)	0.342	0.342	0.903	0.665	0.590	0.017
Number of Obs.	227,055	227,055	227,055	181,462	181,462	181,462

Note: This table reports the effect of country-level judicial quality on the trade pattern across industries with different contract intensities, using legal origin to instrument for country-level judicial quality. Columns (1) to (3) present the second stage results of exports. Columns (4) to (6) present the second stage results of imports. Bilateral controls include tariff, bilateral distance, shared border, common official language, colonial tie, common currency union, and common FTA. Additional controls include the financial interaction, the interactions of log per capita income with value-added share, intra-industry trade share, production complexity, and TFP growth. Standard errors (clustered at the exporter level in columns (1) to (3); clustered at the importer level in columns (4) to (6)) are shown in parentheses. *, **, and *** indicate significance at the 10 percent, 5 percent, and 1 percent levels.

Table 3. *The effects of judicial quality on trade prices and quality, OLS*

	(1)	(2)	(3)	(4)	(5)	(6)
Dependent variable (log):	FOB price	CIF price	Quality	FOB price	CIF price	Quality
Interactions, exporter:						
Judicial quality: $\eta^g \times JQ_o$	0.025	0.025	0.025			
	(0.025)	(0.025)	(0.023)			
Skill: $h^g \times H_o$	0.020	0.018	0.020			
	(0.019)	(0.019)	(0.017)			
Capital: $k^g \times K_o$	-0.220***	-0.222***	-0.204***			
	(0.037)	(0.037)	(0.033)			
Interactions, importer:						
Judicial quality: $\eta^g \times JQ_d$				0.076***	0.083***	0.030***
				(0.012)	(0.011)	(0.007)
Skill: $h^g \times H_d$				0.010	0.011	0.019***
				(0.010)	(0.010)	(0.006)
Capital: $k^g \times K_d$				-0.085***	-0.068***	-0.049***
				(0.013)	(0.012)	(0.008)
Bilateral controls	Yes	Yes	Yes	Yes	Yes	Yes
Fixed effects	Importer-product, Exporter			Exporter-product, Importer		
Within R-squared	0.020	0.022	0.028	0.027	0.030	0.057
Number of Obs.	507,591	507,591	507,591	424,118	424,118	424,118

Note: This table reports the effect of country-level judicial quality on the trade price and quality across products with different contract intensities. Columns (1) to (3) present the effects on exports. Columns (4) to (6) present the effects on imports. Bilateral controls include tariff, bilateral distance, shared border, common official language, colonial tie, common currency union, and common FTA. Standard errors (clustered at the exporter-industry level in columns (1) to (3); clustered at the importer-industry level in columns (4) to (6)) are shown in parentheses. *, **, and *** indicate significance at the 10 percent, 5 percent, and 1 percent levels.

Table 4. *The effects of judicial quality on trade prices and quality, IV*

	(1)	(2)	(3)	(4)	(5)	(6)
Dependent variable (log):	FOB price	CIF price	Quality	FOB price	CIF price	Quality
Interactions, exporter:						
Judicial quality: $\eta^g \times JQ_o$	-0.122	-0.138	-0.111			
	(0.150)	(0.154)	(0.137)			
Skill: $h^g \times H_o$	0.009	0.009	0.009			
	(0.020)	(0.020)	(0.018)			
Capital: $k^g \times K_o$	-0.218***	-0.223***	-0.200***			
	(0.064)	(0.065)	(0.059)			
Interactions, importer:						
Judicial quality: $\eta^g \times JQ_d$				0.118**	0.124**	0.057*
				(0.052)	(0.051)	(0.034)
Skill: $h^g \times H_d$				0.004	0.005	0.011
				(0.011)	(0.011)	(0.007)
Capital: $k^g \times K_d$				-0.041	-0.027	-0.018
				(0.036)	(0.036)	(0.024)
Bilateral controls	Yes	Yes	Yes	Yes	Yes	Yes
Additional controls	Yes	Yes	Yes	Yes	Yes	Yes
Fixed effects	Importer-product, Exporter			Exporter-product, Importer		
Kleibergen-Paap LM stat.	13.447***	13.447***	13.447***	18.008***	18.008***	18.008***
Kleibergen-Paap F stat.	10.373	10.373	10.373	22.673	22.673	22.673
Hansen J stat. (p-value)	0.067	0.058	0.062	0.102	0.127	0.070
Number of Obs.	452,663	452,663	452,663	376,431	376,431	376,431

Note: This table reports the effect of country-level judicial quality on the trade price and quality across products with different contract intensities, using legal origin to instrument for country-level judicial quality. Columns (1) to (3) present the second stage results of exports. Columns (4) to (6) present the second stage results of imports. Bilateral controls include tariff, bilateral distance, shared border, common official language, colonial tie, common currency union, and common FTA. Additional controls include the financial interaction, the interactions of log per capita income with value-added share, intra-industry trade share, production complexity, and TFP growth. Standard errors (clustered at the exporter level in columns (1) to (3); clustered at the importer level in columns (4) to (6)) are shown in parentheses. *, **, and *** indicate significance at the 10 percent, 5 percent, and 1 percent levels.

Table 5. *Alternative measure of quality: demand-side approach*

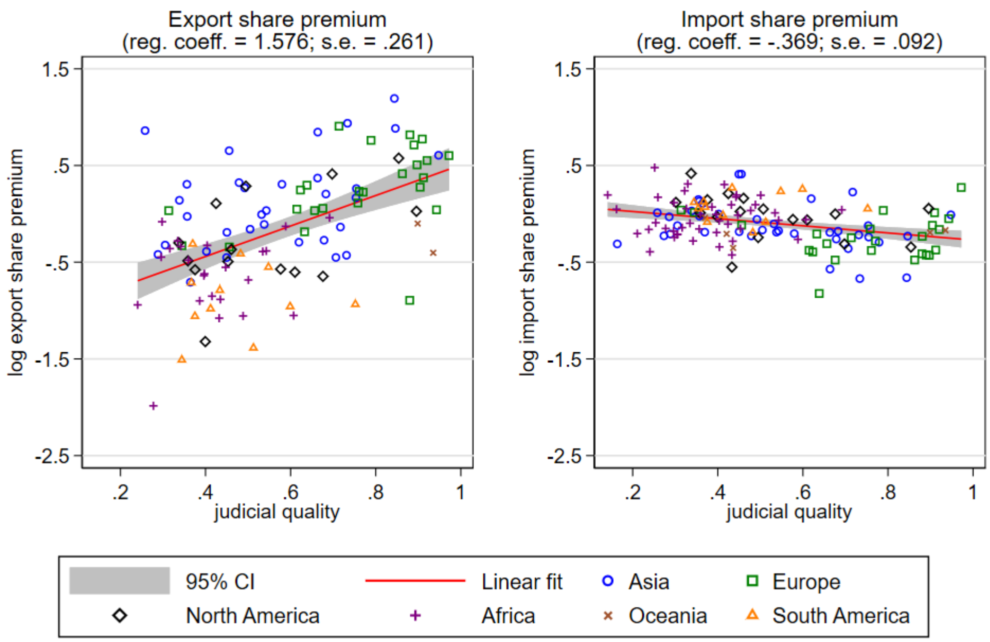
Dependent variable (log):	(1) $Quality_1$ $\sigma = 5$	(2) $Quality_2$ σ^{FR}	(3) $Quality_3$ σ^{BW}	(4) $Quality_1$ $\sigma = 5$	(5) $Quality_2$ σ^{FR}	(6) $Quality_3$ σ^{BW}
Interactions, exporter:						
Judicial quality: $\eta^g \times JQ_o$	0.046	0.018	0.481			
	(0.109)	(0.126)	(0.380)			
Skill: $h^g \times H_o$	0.052	0.045*	0.333**			
	(0.033)	(0.024)	(0.130)			
Capital: $k^g \times K_o$	-0.143**	-0.135**	0.014			
	(0.059)	(0.061)	(0.172)			
Interactions, importer:						
Judicial quality: $\eta^g \times JQ_d$				0.194***	0.153***	0.406**
				(0.039)	(0.037)	(0.183)
Skill: $h^g \times H_d$				0.013	0.008	0.170***
				(0.014)	(0.013)	(0.056)
Capital: $k^g \times K_d$				-0.039	0.017	-0.421***
				(0.025)	(0.024)	(0.092)
Bilateral controls	Yes	Yes	Yes	Yes	Yes	Yes
Additional controls	Yes	Yes	Yes	Yes	Yes	Yes
Fixed effects	Importer-product, Exporter			Exporter-product, Importer		
Kleibergen-Paap LM stat.	13.447***	13.447***	13.386***	18.008***	18.008***	18.135***
Kleibergen-Paap F stat.	10.373	10.373	10.721	22.673	22.673	23.578
Hansen J stat. (p-value)	0.039	0.027	0.257	0.067	0.707	0.275
Number of Obs.	452,663	452,663	416,252	376,431	376,431	347,157

Note: This table reports the effect of country-level judicial quality on trade quality across products with different contract intensities, using legal origin to instrument for country-level judicial quality. Trade quality is inferred from a CES preference. $Quality_1$, $Quality_2$ and $Quality_3$ are quality indexes inferred using different estimates of σ, including a common $\sigma = 5$ for all products (Anderson and Van Wincoop, 2004), Feenstra and Romalis's (2014) estimates at the SITC 4-digit-unit level, σ^{FR}, and Broda and Weinstein's (2006) estimates at the SITC 4-digit level, σ^{BW}. Columns (1) to (3) present the second stage results of exports. Columns (4) to (6) present the second stage results of imports. Bilateral controls include tariff, bilateral distance, shared border, common official language, colonial tie, common currency union, and common FTA. Additional controls include the financial interaction, the interactions of log per capita income with value-added share, intra-industry trade share, production complexity, and TFP growth. Standard errors (clustered at the exporter level in columns (1) to (3); clustered at the importer level in columns (4) to (6)) are shown in parentheses. *, **, and *** indicate significance at the 10 percent, 5 percent, and 1 percent levels.

Table 6. *The effects of judicial quality on trade margins, IV, 1997–2011 panel data*

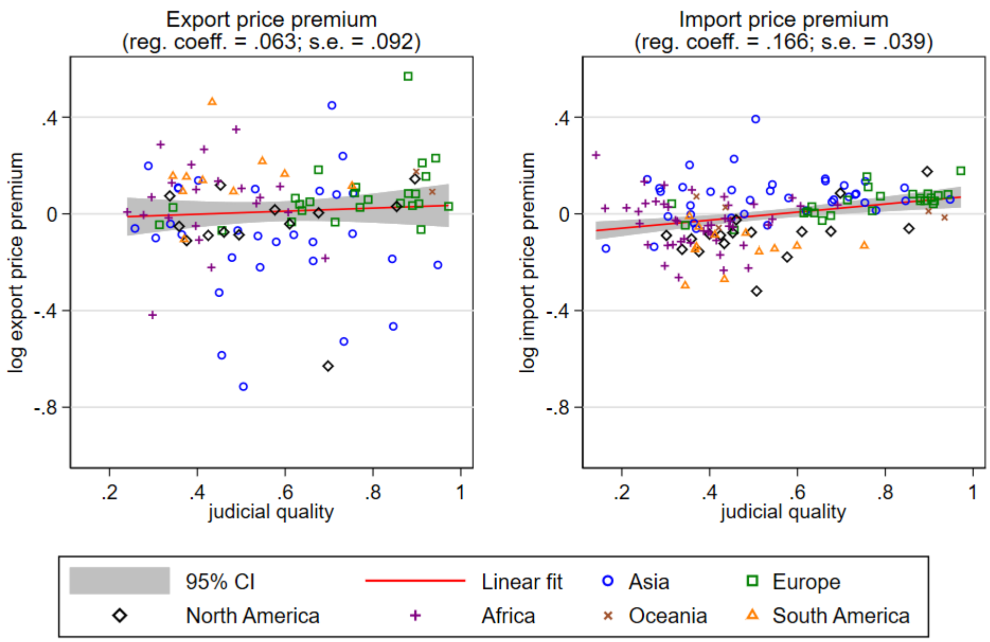
	(1)	(2)	(3)	(4)	(5)	(6)
Dependent variable (log):	FOB share	CIF share	Variety	FOB share	CIF share	Variety
Interactions, exporter:						
Judicial quality: $\eta^g \times JQ_{o,t}$	0.418***	0.421***	0.075***			
	(0.044)	(0.047)	(0.008)			
Skill: $h_t^g \times H_{o,t}$	0.542***	0.484***	0.119***			
	(0.042)	(0.043)	(0.008)			
Capital: $k_t^g \times K_{o,t}$	0.558***	0.558***	0.174***			
	(0.067)	(0.072)	(0.020)			
Interactions, importer:						
Judicial quality: $\eta^g \times JQ_{d,t}$				-0.135***	-0.142***	-0.155***
				(0.012)	(0.012)	(0.014)
Skill: $h_t^g \times H_{d,t}$				-0.080***	-0.095***	-0.084***
				(0.010)	(0.009)	(0.009)
Capital: $k_t^g \times K_{d,t}$				-0.023	-0.045**	-0.019
				(0.023)	(0.022)	(0.014)
Fixed effects	Importer-industry-year Exporter-year			Exporter-industry-year Importer-year		
Kleibergen-Paap LM stat.	217.032***	217.032***	217.032***	222.454***	222.454***	222.454***
Kleibergen-Paap F stat.	364.036	364.036	364.036	786.685	786.685	786.685
Number of Obs.	4,344,223	4,344,223	4,344,223	4,018,196	4,018,196	4,018,196
	(1)	(2)	(3)	(4)	(5)	(6)
Dependent variable (log):	FOB price	CIF price	Quality	FOB price	CIF price	Quality
Interactions, exporter:						
Judicial quality: $\eta^g \times JQ_{o,t}$	-0.001	-0.013	0.029			
	(0.021)	(0.021)	(0.019)			
Skill: $h_t^g \times H_{o,t}$	0.045***	0.008	0.093***			
	(0.016)	(0.015)	(0.014)			
Capital: $k_t^g \times K_{o,t}$	-0.274***	-0.320***	-0.277***			
	(0.046)	(0.040)	(0.034)			
Interactions, importer:						
Judicial quality: $\eta^g \times JQ_{d,t}$				0.032***	0.033***	0.036***
				(0.007)	(0.008)	(0.008)
Skill: $h_t^g \times H_{d,t}$				-0.008**	-0.007	0.007
				(0.004)	(0.005)	(0.005)
Capital: $k_t^g \times K_{d,t}$				-0.017	-0.026*	0.006
				(0.011)	(0.014)	(0.014)
Fixed effects	Importer-product-year Exporter-year			Exporter-product-year Importer-year		
Kleibergen-Paap LM stat.	205.434***	205.434***	205.434***	233.622***	233.622***	233.622***
Kleibergen-Paap F stat.	294.913	294.913	294.913	626.087	626.087	626.087
Number of Obs.	8,387,937	8,387,937	8,387,937	7,815,418	7,815,418	7,815,418

Note: This table estimates Tables 2 and 4, using panel data during 1997–2011 and legal origins to instrument for country-level judicial quality. The top panel presents the second stage results of trade patterns. The bottom panel presents the second stage results of trade price and quality. In columns (3) and (6) of the bottom panel, we use the quality index based on the demand-side approach and Feenstra and Romalis (2014)'s estimates of σ. η^g is fixed in its 1997 value because this measure is not available in more recent years. All regressions control for bilateral variables (including tariff, bilateral distance, shared border, common official language, colonial tie, common currency union, and common FTA), and additional variables (including the financial interaction, the interactions of log per capita income with value-added share, intra-industry trade share, production complexity, and TFP growth). Standard errors (clustered at the exporter-year level in columns (1) to (3) of the top and the bottom panels; clustered at the importer-year level in columns (4) to (6) of the top and the bottom panels) are shown in parentheses. *, **, and *** indicate significance at the 10 percent, 5 percent, and 1 percent levels.



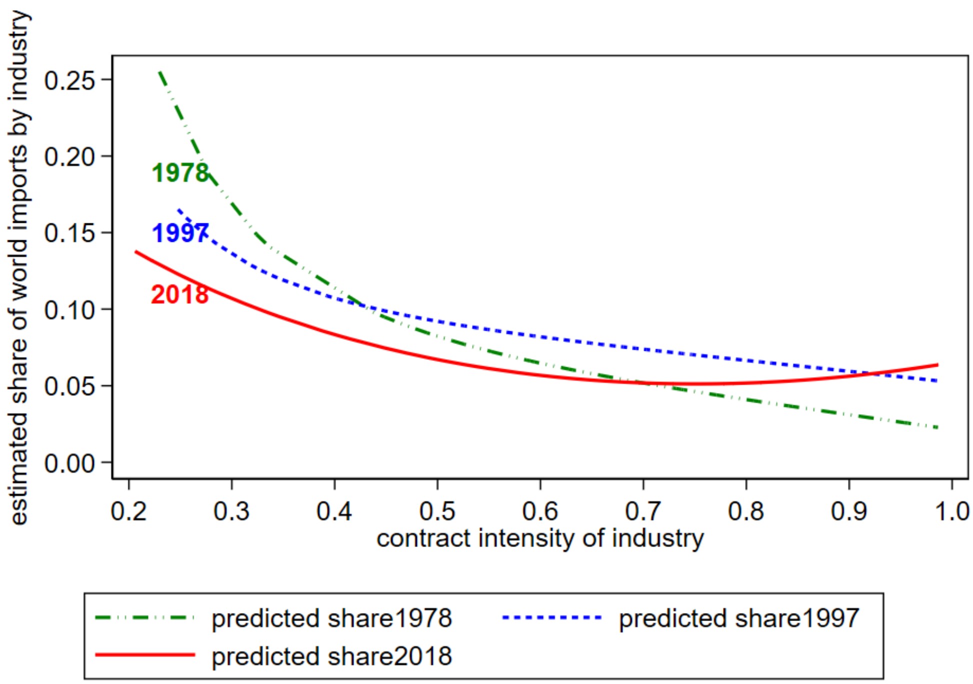
Note: Each dot is a country's export or import share premium in contract-intensive industries, calculated based on the top 50% and the bottom 50% contract-intensive industries. Different symbols represent different continents. Robust standard errors are used.

Figure 1. *Trade share premium and judicial quality*



Note: Each dot is a country's export or import price premium in contract-intensive products, calculated based on the top 50% and the bottom 50% contract-intensive industries. Different symbols represent different continents. Robust standard errors are used.

Figure 2. *Trade price premium and judicial quality*



Note: Each line is the estimated share of world imports by industry from Asian miracle economies in the corresponding year, with fractional-polynomial fit and outliers removed. Asian miracle economies are Singapore, Hong Kong SAR, Chinese Taipei, and South Korea.

Figure 3. *Rybczynski effect for the 'East Asian Miracle' economies: 1978–2018*