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Connect to trade

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ABSTRACT

A key foundation of Chinese-style institutions is that governments at different levels control resources and utilize their power to support businesses connected to them. We examine how this institutional feature affects firm exports. We first provide a simple model to demonstrate the underlying mechanisms. In our model, politically connected firms gain a comparative advantage in contract-intensive and financially-dependent sectors. But political connections also have an adverse effect on firm exports because of managerial inefficiency. The overall effect is thus ambiguous and differs across sectors. Employing merged Chinese listed manufacturing firm data and Chinese custom data for the years 2004–2013, we find robust evidence consistent with our model's predictions.

1. Introduction

Recent studies in the trade literature identify domestic institutions as an important determinant of a country's comparative advantage (e.g., Berkowitz et al., 2006Ju and Wei, 2010Levchenko, 2007Manova, 2013Nunn, 2007Nunn and Trefler, 2013). Ju and Wei (2011) further argue that this point is particularly true for economies with low-quality institutions, where institutional factors can be more important than factor endowment in determining their comparative advantage. At first glance, it seems difficult to reconcile this argument with the experience of China, the largest export economy in the world. The quality of China's judicial and financial institutions is rather poor according to standard measures. For example, Kaufmann et al.'s (2003) rule of law index, a commonly used measure of judicial quality, ranks China's quality as 120th in the world in 2014. China's financial institutions are also known to be underdeveloped. For instance, China has below average scores and ranks lower than other emerging countries, such as Pakistan and South Africa, in both legal creditor rights and shareholder rights (e.g., La Porta et al., 1998, 1999).

Nonetheless, Chinese exports have thrived even in industries that heavily rely on external finance or contract enforcement over the last decade. Take as an example the plastic products industry, the industry that most relies on external finance according to Rajan and Zingales' (1998) measure of external finance dependence. Its export value in 2013 was >16 times its value in 2000. Similarly, the export value of the electric machinery industry, which is most dependent on contract enforcement based on Nunn's (2007) measure of contract intensity, grew >29 times during the same period.[1]

While the coexistence of poor formal institutions and fast export growth in industries heavily relying on contracting and financial institutions seems to be puzzling, the literature has also documented that where formal institutions are weak, alternative institutions often evolve to deal with contracting or financing issues. Existing work has explored the impacts of various alternative institutions on trade, including repeated interactions, culture, and networks (e.g., Araujo et al., 2016; Gould, 1994; Johnson et al., 2002; McMillan and Woodruff, 1999; Rauch, 1999, 2001; Rauch and Trindade, 2002; Chaney, 2014; Guiso et al., 2009).

This study aims to contribute to the literature by exploring the trade effects of a new form of informal institution that is of particular importance to China. A key foundation of Chinese-style institutions is that governments at different levels control allocations of resources and utilize their political and economic power to support businesses

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[1] As a matter of fact, the export value of the tobacco industry, which depends least on external finance, only increased about two times during the period of 2000–2013. The export value of the petroleum refineries industry, which relies least on contract enforcement, only increased 12.5 times during the same period.

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connected to them, with a particular biased concentration on exports (e.g., Bai et al., 2014). Although this Chinese-style institutional feature is not captured by standard measures of institutions, it plays a crucial role in determining resource allocations in China. As a result, connections with governments can have important consequences on firm performance, including exports.

To examine how political connections affect firm exports, we first present a simple model with heterogeneous firms to illustrate the underlying mechanisms and to provide testable hypotheses for our empirical analysis. In our model, a fraction of firms' material inputs is relationship-specific. This fraction varies across sectors for technological reasons, and sectors with a higher fraction of relationship-specific inputs rely more on contract enforcement (e.g., Levchenko, 2007). Also, to produce and to enter foreign markets, firms need borrow to finance a certain fraction of their total costs, which reflects their dependence on external finance and also varies across sectors for technological reasons. Based on existing empirical evidence documented in the political connections literature (e.g., Charumilind et al., 2006Claessens et al., 2008Faccio, 2006Fraser et al., 2006Johnson et al., 2002Khwaja and Mian, 2005Li et al., 2008Sapienza, 2004), we assume that politically connected firms have two key advantages over non-connected firms, namely, a better contracting legal environment and better access to external finance. As a result, connected firms gain a comparative advantage in contract-intensive and financially-dependent sectors.

Connected firms, however, are also at a disadvantage. Existing studies have shown that connected firms typically have lower managerial efficiency (e.g., Chaney et al., 2011Claessens et al., 2008Fan et al., 2007Leuz and Oberholzer-Gee, 2006), a fact that, according to the recent contribution of Bloom et al. (2016), can potentially have a negative impact on their exports. To capture this phenomenon, we assume in our model that firms' marginal cost of production increases with the degree of political connectedness. This negative effect associated with managerial inefficiency is general and does not vary across sectors. The overall effect of political connections on firms' exporting performance (including export revenue, export quantity, and number of varieties) thus is ambiguous and depends on the degree of reliance on external finance or contract enforcement.

We then put the predictions of our simple model into a test using merged Chinese listed manufacturing firm data and Chinese custom data for the years 2004 to 2013. We construct a unique measure of political connectedness for Chinese listed manufacturing firms and regress firm exports on this measure and its interactions with measures of dependence on contract enforcement and external finance at the sector level. The estimated coefficient on political connection per se is significantly negative, which is consistent with a managerial inefficiency channel. The two interaction terms, *Political connection* × *Contract intensity* and *Political connection* × *External finance dependence*, are significantly positive, suggesting that connected firms export more in contract-intensive and financially-dependent sectors. Quantitatively, our findings indicate that the effect of political connections on firm exports substantially vary across sectors and can be either positive or negative depending on sectors' dependence on external finance or contract enforcement.

Our results hold in a variety of robustness checks. Moreover, we also find that the beneficial effects of political connections on firm exports through the contract enforcement and external finance channels are significantly stronger for private firms. Besides export revenues, we also find similar effects of political connections on firm export quantity and number of export varieties.

The findings of our study offer new insights into the (informal) institutions and trade literature. In addition, it is also related to two other strands of literature. First, it is related to the recently-emerged literature on corporate governance and exports. Bloom et al. (2016) examine the role of management practices on firms' export performance. They provide a theoretical model and robust empirical evidence from both U.S. and Chinese firms and document that superior management practices lead to better export performances. Whereas they pay attention to firms' management competence, our focus here is on a specific feature of firms' top management team and directors, namely, their connections with different levels of governments. Nonetheless, the findings of both studies suggest that firm management and organization structures can be important for export performance and call for a better understanding of the consequences of a broader aspect of firm heterogeneity.

Second, our study also contributes to the literature related to political connections. Existing work in this literature examines the impacts of political connections on various aspects of firm performance, but studies that focus on the trade effects are rather limited. Two recent contributions by Rijkers et al. (2015) and Diwan et al. (2015) show that politically connected firms can benefit from tariff evasion and selective enforcement of non-tariff barriers. To the extent that producing exported goods requires imported inputs, evading tariff and non-tariff barriers can indirectly affect firm exports. There are, however, two key differences between our work and these two existing contributions. First, we aim to provide more direct evidence of the effects of political connections on firm exports. Second, we explore different channels. In our study, connected firms gain a comparative advantage in contract-intensive and financially-dependent sectors but also have a disadvantage due to managerial inefficiency.

The remainder of this paper is organized as follows. Section 2 presents a simple model to demonstrate the underlying mechanisms through which political connections influence firm exports. Section 3 introduces our empirical strategy and data, and Section 4 reports our empirical results. Section 5 offers concluding remarks.

2. The model

This section provides a simple partial equilibrium model to study how political connections affect firm exports. We incorporate political connections and the dependence on contract enforcement and external finance into a monopolistic competition model with heterogeneous firms.

2.1. Preference and market structure

We denote the source country by *i* and the destination country by *j*. A representative consumer in country *j* has access to a potentially different set of goods, Ω_j, and is assumed to have a constant-elasticity-of-substitution (CES) utility:

$$U_j = \left[\int_{\omega\in\Omega_j} x_{ij}(\omega)^{\frac{\sigma-1}{\sigma}} d\omega\right]^{\frac{\sigma}{\sigma-1}}, \tag{1}$$

where ω indexes the variety of exports in the product set, Ω_j, and $x_{ij}(\omega)$ is the quantity of variety ω exported by country *i*. $\sigma>1$ is the elasticity of substitution between varieties. Consumer optimization yields the following demand for variety ω:

$$x_{ij}(\omega) = \frac{p_{ij}(\omega)^{-\sigma}}{P_j^{1-\sigma}} Y_j \tag{2}$$

where $p_{ij}(\omega)$ is the price of variety ω. $P_j = [\int_{\omega\in\Omega_j} p_{ij}(\omega)^{1-\sigma} d\omega]^{\frac{1}{1-\sigma}}$ is an aggregate price index, and Y_j denotes the total expenditure of country *j*. To simplify the notation, the subscripts *i* and *j* and the index for the variety of exports are suppressed hereafter.

2.2. Producers

A firm with productivity (ϕ) produces a variety using the following technology:

$$Y = \phi\left(\frac{L}{\mu_L}\right)^{\mu_L}\left(\frac{K}{\mu_K}\right)^{\mu_K}\left(\frac{M}{\mu_M}\right)^{\mu_M} \tag{3}$$

where μ_L, μ_K, and μ_M are all positive and $\mu_L+\mu_K+\mu_M=1$. K and L are capital and labor inputs, respectively. Let r denote the rental rate of capital and w represent the wage payment for unit labor. r and w are exogenously determined. M denotes the intermediate inputs bundle. It is assembled by combining one bundle of continuum intermediate inputs, G, whose production requires relationship-specific investment, and one bundle of continuum intermediate inputs, N, whose production needs no relationship-specific investment according to the following CES aggregator

$$M=\left(G^{\frac{\varsigma-1}{\varsigma}}+N^{\frac{\varsigma-1}{\varsigma}}\right)^{\frac{\varsigma}{\varsigma-1}} \tag{4}$$

where $\varsigma>1$ is the elasticity of substitution. The component input bundles themselves are CES aggregates as well

$$G=\left(\int_{l\in\Omega_g} g(l)^{\frac{\eta-1}{\eta}}dl\right)^{\frac{\eta}{\eta-1}} \tag{5}$$

$$N=\left(\int_{h\in\Omega_n} n(h)^{\frac{\eta-1}{\eta}}dh\right)^{\frac{\eta}{\eta-1}} \tag{6}$$

where $\eta>1$ is the elasticity of substitution. Ω_g denotes the set of inputs whose production needs relationship-specific investments, and Ω_n denotes the set of inputs whose production does not need relationship-specific investment.

Producing one unit of intermediate input g or n requires x units of L and y units of K. Relationship-specific investment occurs in producing g but does not occur in producing n. Specifically, we assume that a fraction $1-\rho$ of capital investment in the production of g is relationship-specific, so that an investor can recover only a fraction, ρ, of the investment after the production unit is formed. ρ depends on the quality of contract enforcement, and better contracting institutions are associated with a higher value of ρ (e.g., Levchenko, 2007). To form the production unit, investors must be compensated with a share of the surplus, which is given by the revenue minus the ex post opportunity costs of the factors, $p_g-wx-r\rho y$. Assuming a Nash bargaining solution in which each party receives one half of the surplus, K will only enter the g-good production if the individual rationality constraint, $1/2(p_g-wx-r\rho y)\geq r(1-\rho)y$, holds. This implies that the price of g satisfies $p_g=wx+r(2-\rho)y$. We assume that ρ is an increasing function of the degree of political connectedness, $\rho'(\kappa)>0$, to reflect the notion that political connections improve firms' contracting environment. As a result, the material cost of the intermediate inputs, p_g, is lower for firms with a higher degree of political connectedness.

Since relationship-specific investment does not occur in the production of n, investors can recover the whole investment. The material cost of the intermediate inputs, n, satisfies $p_n=wx+ry$. A firm chooses labor, capital, and intermediate inputs $g(l)$ and $n(h)$, given the wage rate w, the rental rate r, and the prices of intermediate inputs $p_g(l)$ and $p_n(\mathrm{h})$. Given the production function, the marginal cost of inputs when producing the final variety satisfies:

$$c(\phi)=\frac{1}{\phi}r^{\mu_K}w^{\mu_L}P_M^{\mu_M} \tag{7}$$

where $P_M\equiv(P_G^{1-\varsigma}+P_N^{1-\varsigma})^{\frac{1}{1-\varsigma}}$ is the price index for the intermediate inputs bundle, M. $P_G=(\int_{l\in\Omega_g}p_g(l)^{1-\eta}dl)^{\frac{1}{1-\eta}}$ and $P_N=(\int_{h\in\Omega_n}p_n(h)^{1-\eta}dh)^{\frac{1}{1-\eta}}$ are the price indices for the bundles of the intermediate inputs with and without relationship-specific investments, respectively.

To export, firms incur an iceberg trade cost, $\tau\geq1$. They also need to raise external funds for a fraction $d\in(0,1)$ of the production costs. d captures firms' need for external finance and varies across sectors for technological reasons. A larger d corresponds to a higher degree of external finance dependence. Constrained by the level of financial development, firms in our model can only borrow a fraction, $\theta\in(0,1)$, of their expected cash flow from exporting. Based on the well-documented fact that connected firms have better access to external finance, we assume that θ is an increasing function of the degree of political connectedness, $\theta'(\kappa)>0$.

Connected firms, however, are also at a disadvantage. Existing studies document that having politically connected managers or board members is typically associated with a lower level of managerial efficiency (e.g., Chaney et al., 2011Claessens et al., 2008Fan et al., 2007Leuz and Oberholzer-Gee, 2006). To capture this phenomenon, we assume that production marginal costs increase with the degree of political connectedness, $b'(\kappa)>0$.

2.3. Market equilibrium

A firm in our model separately produces each variety and maximizes the profit of each variety according to the following equations:

$$\max_{p_{ij}}\left(p-\frac{\tau b(\kappa)r^{\mu_K}w^{\mu_L}P_M^{\mu_M}}{\phi}\right)\frac{p^{-\sigma}}{P^{1-\sigma}}Y \tag{8}$$

$$s.t.\theta(\kappa)\left(p-(1-d)\frac{\tau b(\kappa)r^{\mu_K}w^{\mu_L}P_M^{\mu_M}}{\phi}\right)\frac{p^{-\sigma}}{P^{1-\sigma}}Y\geq d\left(\frac{\tau b(\kappa)r^{\mu_K}w^{\mu_L}P_M^{\mu_M}}{\phi}\right)\frac{p^{-\sigma}}{P^{1-\sigma}}Y \tag{9}$$

The budget constraint (9) also can be viewed as a cash-flow constraint condition, in the same spirit as Manova (2013) and Fan et al. (2015). The Lagrange function for the optimization problem is

$$\left(p-\left(1+d\frac{(1-\theta)\lambda}{\theta(1+\lambda)}\right)\frac{\tau b(\kappa)r^{\mu_K}w^{\mu_L}P_M^{\mu_M}}{\phi}\right)\frac{p^{-\sigma}}{P^{1-\sigma}}Y \tag{10}$$

where λ is the Lagrange multiplier associated with the budget constraint condition (9). Solving this optimization problem by choosing price p yields

$$p=\frac{\sigma}{\sigma-1}\left(1+d\frac{(1-\theta)\lambda}{\theta(1+\lambda)}\right)\frac{\tau b(\kappa)r^{\mu_K}w^{\mu_L}P_M^{\mu_M}}{\phi} \tag{11}$$

The budget constraint (9), together with Eq. (11), imply

$$\frac{\sigma}{\sigma-1}\left(1+d\frac{(1-\theta)\lambda}{\theta(1+\lambda)}\right)\geq\left(1-d+\frac{d}{\theta}\right) \tag{12}$$

Given credit need, d, there exists a cutoff level of access to credit, θ_h, such that the budget constraint (9) is binding if and only if $\theta<\theta_h$.[2] In the rest of the model, we assume that Eq. (9) is always binding (i.e., $\theta<\theta_h$). Let $\Delta\equiv(1+d\frac{(1-\theta)\lambda}{\theta(1+\lambda)})$ to denote the price distortion in Eq. (11). From Eq. (12), we obtain the expression for Δ after eliminating λ: $\Delta=\frac{\sigma-1}{\sigma}(1-d+\frac{d}{\theta})$. The degree of price distortion thus depends on access to credit, θ, and the need for credit, d. A lower (higher) value of θ (d) is associated with a higher degree of price distortion. The intuition is straightforward. Firms facing tighter credit constraints produce less, leading to excess product demand, which, in turn, pushes up the price.

[2] Eq. (12) implies that the budget constraint Eq. (9) is binding if and only if $\theta<\theta_h$, where $\theta_h=\frac{(\sigma-1)d}{(\sigma-1)d+1}$.

The optimal pricing rule (11), together with (12), implies that the total export revenue, R, and export quantity, Q, satisfy the following two equations:

$$R = \frac{p^{1-\sigma}}{P^{1-\sigma}}Y = \left(\frac{\sigma}{\sigma-1}\Delta\frac{\tau b r^{\mu_K} w^{\mu_L} P_M^{\mu_M}}{\phi}\right)^{1-\sigma}\frac{Y}{P^{1-\sigma}} \tag{13}$$

$$Q = \frac{p^{-\sigma}}{P^{1-\sigma}}Y = \left(\frac{\sigma}{\sigma-1}\Delta\frac{\tau b r^{\mu_K} w^{\mu_L} P_M^{\mu_M}}{\phi}\right)^{-\sigma}\frac{Y}{P^{1-\sigma}} \tag{14}$$

Differentiating Eq. (13) with respect to the degree of political connectedness, κ, we obtain the effects of political connections on firm export revenue:

$$\frac{\partial lnR}{\partial\kappa} = \underbrace{-(\sigma-1)b'(\kappa)}_{\text{Negative effect due to managerial inefficiency}} + \underbrace{\frac{d(\sigma-1)}{(1-d)\theta+d}\frac{\theta'(\kappa)}{\theta}}_{\text{Positive effect depends on credit need}} + \underbrace{(\sigma-1)\mu_M\frac{P_G^{1-\varsigma}}{P_G^{1-\varsigma}+P_N^{1-\varsigma}}\frac{ryp'(\kappa)}{wx+r(2-\rho)y}}_{\text{Positive effect depends on contract intensity}} \tag{15}$$

The first term on the right-hand side of Eq. (15), $-(\sigma-1)b'(\kappa)$, captures the negative effect of political connections on export revenue due to managerial inefficiency. The second term, $\frac{d(\sigma-1)}{(1-d)\theta+d}\frac{\theta'(\kappa)}{\theta}$, reflects the positive effect of political connections through the external finance channel. Differentiating $\frac{\partial lnR}{\partial\kappa}$ with respect to the dependence on external finance, d, yields

$$\frac{\partial lnR}{\partial\kappa\partial d} = \frac{(\sigma-1)\theta'(\kappa)}{((1-d)\theta+d)^2} > 0 \tag{16}$$

This positive cross-partial suggests that the beneficial effect is stronger in more financially dependent sectors (i.e., a larger d).

Similarly, the third term on the right-hand side of Eq. (15) captures the contract enforcement channel. $\frac{P_G^{1-\varsigma}}{P_G^{1-\varsigma}+P_N^{1-\varsigma}}$ in the third term corresponds to the degree of contract intensity with a larger value indicating a higher degree of contract intensity.[3] Differentiating $\frac{\partial lnR}{\partial\kappa}$ with respect to the degree of contract intensity yields

$$\frac{\partial lnR}{\partial\kappa\partial\frac{P_G^{1-\varsigma}}{P_G^{1-\varsigma}+P_N^{1-\varsigma}}} = (\sigma-1)\mu_M\frac{ryp'(\kappa)}{wx+r(2-\rho)y} > 0 \tag{17}$$

This positive cross-partial implies that the positive effect of political connections is stronger in sectors relying more on contract enforcement (i.e., a larger value of $\frac{P_G^{1-\varsigma}}{P_G^{1-\varsigma}+P_N^{1-\varsigma}}$). Taken together, we reach the following proposition:

Proposition 1. Political connections negatively affect export revenue through a managerial inefficiency channel. They also positively affect export revenue by helping enforce contracts and obtaining external finance. The beneficial effects are larger in sectors with a higher dependence on contract enforcement or external finance.

Similarly, differentiating Eq. (14) with respect to κ, we obtain the effects of political connections on export quantity:

$$\frac{\partial lnQ}{\partial\kappa} = \underbrace{-\sigma b'(\kappa)}_{\text{Negative effect due to managerial inefficiency}} + \underbrace{\frac{d\sigma}{(1-d)\theta+d}\frac{\theta'(\kappa)}{\theta}}_{\text{Positive effect depends on credit need}} + \underbrace{\sigma\mu_M\frac{P_G^{1-\varsigma}}{P_G^{1-\varsigma}+P_N^{1-\varsigma}}\frac{ryp'(\kappa)}{wx+r(2-\rho)y}}_{\text{Positive effect depends on contract intensity}} \tag{18}$$

The three terms on the right-hand side of Eq. (18) suggest that the effects of political connections on export quantity are similar to those on export revenue.[4] Political connections can affect export quantity through the same three channels.[5]

To investigate further the influence of political connections on the extensive margins (number of export products), we extend our model to a multi-product firm case. We assume that firms can export more than one variety, and each firm has a key variety corresponding to its "core competency." This key variety is associated with a core productivity, ϕ, which is drawn from a common (and known) distribution. In addition to its core variety, a firm can introduce and export new varieties at some extra fixed cost (e.g., Dhingra, 2013Qiu and Zhou, 2013). We denote this fixed cost as $f_x v^\beta \geq 0$ for the v^{th} variety and assume $\beta \geq 0$.[6] We further assume that producing additional varieties may not be as efficient as producing the core product (e.g., Eckel and Neary, 2010Mayer et al., 2014). A firm's varieties are indexed with decreasing production efficiency such that the unit production cost of a firm's v^{th} variety is $c(\phi)v^\alpha = \frac{1}{\phi} r^{\mu_K} w^{\mu_L} P_M^{\mu_M} v^\alpha$, where $\alpha \geq 0$.[7]

In Appendix A, we show that our previous results regarding the effects of political connections on the intensive margins (export revenue and quantity) still hold in the multi-product case. Furthermore, Eq. (A17) and Proposition A1 in the appendix show that political connections also have similar effects on the extensive margins (number of export varieties).

3. Empirical strategy and data

Our theoretical model shows that political connections can influence firms' exporting performance through different channels and thus may not have a clearly defined unilateral effect. On the one hand, political connections adversely affect firms' exporting performance through a managerial inefficiency channel. On the other hand, connections also have beneficial effects on firms through a contract enforcement channel and an external finance channel. But the beneficial effects are heterogeneous and are stronger in sectors more heavily relying on external finance or contract enforcement. The overall effect on firm exports is thus ambiguous and varies across sectors. In the following subsection, we test the above key predictions of the model.

[3] This is consistent with Nunn's measure: $\frac{P_G^{1-\varsigma}}{P_G^{1-\varsigma}+P_N^{1-\varsigma}} = \frac{P_G^{1-\varsigma}}{P_G^{1-\varsigma}+P_N^{1-\varsigma}}\times 1 + \frac{P_N^{1-\varsigma}}{P_G^{1-\varsigma}+P_N^{1-\varsigma}}\times 0$, where $\frac{P_G^{1-\varsigma}}{P_G^{1-\varsigma}+P_N^{1-\varsigma}}$ denotes the expenditure share on the intermediates inputs whose production needs relationship-specific investments and $\frac{P_N^{1-\varsigma}}{P_G^{1-\varsigma}+P_N^{1-\varsigma}}$ reflects the expenditure share on the non-relationship-specific intermediates inputs whose production does not need relationship-specific investments.

[4] Similar to Eqs. (16) and (17), we have $\frac{\partial lnQ}{\partial\kappa\partial d} = \frac{\sigma\theta'(\kappa)}{((1-d)\theta+d)^2} > 0$ and $\frac{\partial lnQ}{\partial\kappa\partial\frac{P_G^{1-\varsigma}}{P_G^{1-\varsigma}+P_N^{1-\varsigma}}} = \sigma\mu_M\frac{ryp'(\kappa)}{wx+r(2-\rho)y} > 0$.

[5] Although our model focuses on the three main channels, there can be other potential indirect channels through which political connections affect firm exports, such as helping firms to sell to governments and state-owned firms and evading import tariffs for inputs used to produce exported goods. We thank an anonymous referee for this point.

[6] If $\beta = 0$, the fee for introducing and exporting a new variety is constant no matter how many varieties firms already have.

[7] If $\alpha = 0$, firms produce all their varieties with equal efficiency.

3.1. Empirical specifications

To empirically examine the effects of political connections on firm exports, we estimate the following benchmark specification:

$$logexports_{ijkt} = \beta_0 + \beta_1 \times connect_{it} + \beta_2 \times (connect_{it} \times contract_k) + \beta_3 \times (connect_{it} \times finance_k) + \delta X_{it} + \varphi_i + \varphi_{jkt} + \varepsilon_{ijkt} \quad (19)$$

where $logexports_{ijkt}$ represents firm i's log export value to destination country j in sector k in year t. $Connect_{it}$ is a measure of firm i's political connectedness. $Contract_k$ and $finance_k$ are measures of dependence on contract enforcement and external finance at the sector level, respectively. X_{it} is a set of firm-level control variables including total factor productivity (TFP), return on assets (ROA), leverage, log total assets, and log number of employees.[8] X_{it} also contains firm tax burden and domestic-sales-to-total-sales ratio to account for the impacts of taxes and domestic market on firm exports. To further separate the effects of political connections from those of other corporate governance variables, board size, board independence, and board leadership (Chief Executive Officer [CEO]-chairman duality) are included in X_{it} as well. Firm fixed effects, φ_i, and destination-sector-year fixed effects, φ_{jkt}, are also added to control for unobserved firm heterogeneity and country-sector level demand shifts.

With firm fixed effects, the coefficient (β_1) on the measure of political connectedness captures the difference in exports within firms due to variations in political connectedness over time for sectors with a zero value of external finance dependence and contract intensity. We are also interested in the coefficients (β_2 and β_3) on the interaction terms between political connections and the dependence on external finance and contract enforcement. We expect to find a negative β_1 but a positive β_2 and β_3.

In addition to the above specification, we also consider an alternative model specification that focuses on sector-level exports aggregated across destinations:

$$logexports_{ikt} = \beta_0 + \beta_1 \times connect_{it} + \beta_2 \times (connect_{it} \times contract_k) + \beta_3 \times (connect_{it} \times finance_k) + \delta X_{it} + \varphi_i + \varphi_{kt} + \varepsilon_{ikt} \quad (20)$$

The dependent variable is firm i's log export value in sector k (aggregated across destinations) in year t. Here, we also replace the destination-sector-year fixed effects in Eq. (19) with sector-year fixed effects, φ_{kt}. This alternative model enables us to examine the impact of political connections on aggregate exports by sector. We estimate this alternative model using firm-sector-year-level data.

3.2. Sample coverage and data sources

We combine two data sources to examine the effects of political connections on firm export performance. The first data source is the China Stock Market & Accounting Research (CSMAR) database, which contains detailed information about firm top management team and board members as well as accounting and financial statements for all Chinese listed firms. The second source is the Chinese custom data collected by the Chinese General Administration of Customs. The custom data cover the universe of Chinese imports and exports transactions at the HS 8-digit product level for the years 2000–2013. For each trade transaction, the data record import or export values, quantity, quantity units, products, source or destination countries, and some firm information (e.g., names, ownership types, and contact information). Since China changed HS-8 codes in years 2002, 2007, and 2012, and the concordance information is not available at the HS 8-digit level, to ensure the consistency of the product categorization over time, we choose to adopt HS-6 codes maintained by the World Customs Organization and use the conversion table from the UN Comtrade to convert all HS-8 codes into HS 1996 codes at the 6-digit level. Since our measures of sector-level external finance dependence and contract intensity are available at the ISIC 3-digit level, we further aggregate our data to the ISIC 3-digit level by using the concordance table offered by the World Integrated Trade Solution (WITS).[9]

We merge the above two databases by manually matching company names. Our matched sample includes 1205 manufacturing firms. The sample period covers the years 2004–2013 because information about firms' boards and executives (and thus political connectedness) is only available starting in 2004. Appendix B reports the variable definitions and data sources, and Table 1 reports the summary statistics.

Table 1
Summary statistics.

Variables	Mean	SD	Minimum	Maximum
log export value	10.527	3.034	0	20.264
Baseline connectedness measure	0.019	0.042	0	0.500
National connectedness measure	0.003	0.014	0	0.188
Local connectedness measure	0.016	0.038	0	0.500
Count connectedness measure	0.340	0.701	0	6
General connectedness measure	0.059	0.087	0	0.857
log of no. of employees	7.639	1.070	3.091	12.087
log of total assets	21.480	1.053	18.266	26.487
ROA	0.040	0.073	−1.251	1.207
TFP	0.116	0.720	−3.311	2.288
Leverage	0.430	0.218	0.008	2.911
Tax burden	0.023	0.028	−0.123	0.485
Domestic sales	0.886	0.175	0	1
log of board size	2.187	0.193	1.099	2.944
Board independence	0.363	0.051	0	0.667
CEO duality	0.257	0.437	0	1
Private	0.066	0.249	0	1

Notes: Summary statistics of log export value are obtained from the firm-destination-sector-year-level data and those of firm-level political connectedness measures and controls are obtained from the firm-year-level data.

3.3. Measure of political connectedness

To construct a measure of political connectedness at the firm level, we focus on all members of top management team (TMT), including CEO, Chief Financial Officer (CFO), and other top managers, as well as board members consisting of the chairman, executive board members, and independent board members. By manually tracking their curriculum vitae, we are able to identify if a TMT or a board member belongs to the Chinese People's Congress (CPC) or the Chinese People's Political Consultative Conference (CPPCC) at the national or the provincial level.[10] If a TMT or a board member is currently (or previously was) a member of either organization, he or she is identified as a politically connected member.

Among the 1205 firms in our sample, 473 firms have at least one connected TMT or board member in at least one year. In the connected-firm subsample that contains only firm-year observations with positive connected members, the average number of connected members is 1.41. Appendix Table A1 provides detailed information about the number of politically connected firms as a share of the total number of firms in each year during our sample period. The first column shows the share of firms with positive connected members at either the national or the local level in each year. These annual shares range from 0.194–0.27 with no obvious trend, and the average share across the years is 0.235. In the next three columns, we further break the total

[8] TFP is estimated using the ACF (Ackerberg et al., 2015) augmented L-P (Levinsohn and Petrin, 2003) method.

[9] he concordance can be found using the following link: http://wits.worldbank.org/product_concordance.html

[10] Curriculum vitae of TMT/board members are obtained from the "Profile of Directors and Senior Managers" in the CSMAR database.

Appendix Table A1
Share of politically connected firms by year.

Year	Total share	National only	Local only	Both
2004	0.244	0.037	0.186	0.020
2005	0.228	0.040	0.161	0.026
2006	0.194	0.040	0.130	0.024
2007	0.211	0.019	0.162	0.029
2008	0.212	0.020	0.163	0.029
2009	0.233	0.030	0.178	0.025
2010	0.259	0.035	0.205	0.020
2011	0.230	0.026	0.182	0.023
2012	0.271	0.031	0.221	0.020
2013	0.263	0.028	0.224	0.011
Average	0.235	0.031	0.181	0.023

share into three groups: the share of firms with national connections only, the share of firms with local connections only, and the share of firm that have both types of connections simultaneously. We find that the majority (about 3/4) of the connected firms have connections to local governments only.

To account for the fact that firms differ in their TMT and board member sizes, we scale the number of connected members by the total number of TMT and board members to obtain our baseline measure of the degree of political connectedness. The second row of Table 1 reports the summary statistics of our baseline measure. The mean proportion of connected TMT or board members in the full sample is 1.9%.[11] We also separately calculate the proportions of TMT or board members with national connections and local connections and report the corresponding summary statistics in Rows 3 and 4 of Table 1. Fig. 1 provides the time-series plots for the yearly averages of our baseline measure of political connectedness across firms and decompositions at the national and the local levels. We find no obvious time trends in the three series. While the average proportions of connected members remains fairly stable over time, changes in the degree of connectedness actually occur quite often for connected firms. Over 90% (431/473) of the connected firms experienced changes in political connectedness over the sample years.

Appendix Table A2 further illustrates the sector distribution of political connectedness using the ISIC 3-digit classification. The first column reports the sectoral averages of our baseline measure, and the next two columns show those of the national and the local connection measures, respectively. According to our baseline measure, the degrees of connectedness of all sectors fall into a range of 1.3%–2.2%. The Iron and Steel sector has the lowest degree of political connectedness (1.3%). The sectors with the highest degree of political connectedness (2.2%) are Textiles, Other Chemicals, and Other Manufactured Products.

We also check whether politically connected firms are systemically larger than firms with no connections. We compute the average firm sizes (log of total assets) for connected and non-connected firms and find they are quite close to each other. The average size for connected firms is 21.56 and that for non-connected firms is 21.45. Alternatively, we also split sample based on the median of total assets and calculate the degree of political connectedness for large and small firms. The average degrees of connectedness for large and small firms are 1.97% and 1.89%, respectively.

In addition to the above measures, we also consider other alternative measurements of political connectedness for the sake of robustness. First, to account for the possibility that the absolute number of connected members also matters, we use a simple count of connected members as an alternative. Second, following Fan et al. (2007), we consider a more general measure using information on all levels of government bureaucrats. We manually check if a TMT or board member is currently (or previously was) a government official at any level and scale the number of connected members by the total number of TMT and board members. The summary statistics for these two alternative measures are reported in Rows 5 and 6 of Table 1.

[11] The mean proportion of connected TMT or board members in the connected-firm subsample is 8.0%.

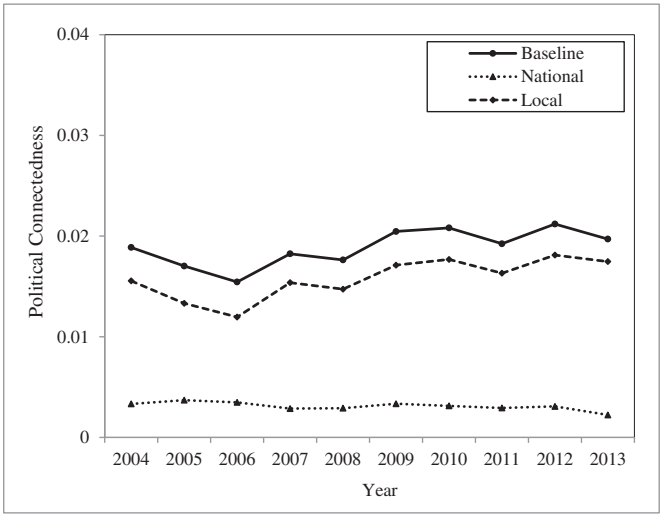

Fig. 1. Time trends of political connectedness.

3.4. Dependence on financial or contracting institutions

To carry out our empirical exercises, we also need two key measures at the sector level. One captures firms' dependence on external finance (a proxy of d in our model), and the other measures firms' reliance on contract enforcement (a proxy of $\frac{P_G^{1-\varsigma}}{P_G^{1-\varsigma}+P_N^{1-\varsigma}}$ in our model). To measure firms' needs for external finance, we use Rajan and Zingales's (1998) external finance dependence index, which is computed as the share of capital expenditures not financed with cash flows from operations. This index is constructed using data on all publicly traded U.S. companies, and the median value is used for each ISIC 3-digit sector. We obtain the index value for each ISIC 3-digit sector from Manova (2013). A larger

Appendix Table A2
Political Connectedness across Sectors.

ISIC code	Sector	Baseline	National	Local
311	Food Products	0.014	0.002	0.011
313	Beverages	0.020	0.009	0.012
321	Textiles	0.022	0.004	0.018
322	Wearing apparel, except footwear	0.020	0.006	0.014
323	Leather products	0.021	0.007	0.014
331	Wood products, except furniture	0.020	0.004	0.016
332	Furniture, except metal	0.015	0.001	0.014
341	Paper and products	0.019	0.005	0.014
342	Printing and publishing	0.020	0.005	0.015
352	Other chemicals	0.022	0.006	0.016
353	Petroleum refineries	0.018	0.006	0.012
354	Misc. petroleum and coal products	0.014	0.001	0.012
355	Rubber products	0.018	0.004	0.013
356	Plastic products	0.020	0.004	0.016
361	Pottery, china, earthenware	0.019	0.007	0.013
362	Glass and products	0.016	0.005	0.011
369	Other non-metallic products	0.016	0.002	0.014
371	Iron and steel	0.013	0.002	0.012
372	Non-ferrous metals	0.017	0.002	0.015
381	Fabricated metal products	0.018	0.003	0.015
382	Machinery, except electrical	0.018	0.003	0.016
383	Machinery, electric	0.017	0.003	0.015
384	Transport equipment	0.015	0.002	0.013
385	Professional and scientific equipment	0.016	0.003	0.013
390	Other manufactured products	0.022	0.004	0.018
3511	Industrial chemicals	0.021	0.004	0.017

Table 2
A simple comparison of firm export performance.

Firm type	With connections	Without connections	Difference
Panel A: classify by means of financial dependence and contract intensity			
Low dependence	10.695	10.789	−0.094***
	(0.023)	(0.014)	(0.027)
High dependence	10.722	10.514	0.207***
	(0.022)	(0.013)	(0.025)
Panel B: classify by medians of financial dependence and contract intensity			
Low dependence	10.683	10.801	−0.119***
	(0.023)	(0.014)	(0.028)
High dependence	10.657	10.482	0.175***
	(0.022)	(0.013)	(0.025)

Note: Standard errors are in parentheses.
*** Indicate significance at the 1% level.

index value corresponds to a higher degree of external finance dependence.

We use the industry-level contract intensity index developed by Nunn (2007) as a proxy for firm dependence on the contracting institution. This index is constructed using a U.S. input-output table and measures the proportion of an industry's inputs requiring relationship-specific investments in their production. For each final good, Nunn (2007) computes the proportion of its intermediate inputs that are relationship specific as $\sum_j \theta_{ij} R_j$, where is θ_{ij} is the ratio of the value of input j used in industry i to the total value of all inputs used in industry i, and R_j is the proportion of input j that is relationship-specific. This is consistent with the contract intensity measure in our model (see footnote 6).[12] A larger index values reflects a higher degree of dependence on the quality of contracting institutions.

4. Empirical results

4.1. Benchmark regression results

We begin our empirical analysis with some suggestive evidence. In Table 2, we compare export revenues of connected firms with those of non-connected firms in different sectors. We construct a low-dependence sector subsample and a high-dependence sector subsample. The top panel of Table 2 classifies sectors according to the sample means of our external finance dependence and contract intensity measures. A sector is classified as low dependence (high dependence) if both measures are below (above) the sample means. Similarly, the bottom panel classifies sectors based on the median values of our external finance dependence and contract intensity measures. The results from both panels suggest that, compared with non-connected firms, politically connected firms export less in low-dependence sectors but more in high-dependence sectors. The evidence from this simple comparison is thus consistent with the predictions of our model.

We then conduct more rigorous regression analysis and report our benchmark regression results in Table 3. Panel A shows the estimation results of Eq. (19) using firm-destination-sector-year data. Column (1) does not include firm-level control variables, whereas Column (2) contains the full set of controls. The benchmark regression results are in favor of our hypotheses. The estimated coefficient on political connections per se is negative and significant at the 1% level, but those on the two interaction terms are positive and significant at the 1% level, meaning that political connections have a general negative effect on firm exports, and the beneficial effects are stronger in sectors relying more on contract enforcement or external finance.

Table 3
Benchmark regression results.

	Panel A: exports by Des.-Sector-Year		Panel B: exports by Sector-Year	
Variables	(1)	(2)	(3)	(4)
Connection	−7.320***	−7.134***	−5.180**	−5.730**
	(0.727)	(0.734)	(2.463)	(2.513)
Contract intensity * Connection	11.292***	11.462***	8.398**	10.388**
	(1.257)	(1.257)	(4.216)	(4.207)
External finance dep. * Connection	4.013***	3.846***	7.090***	6.561***
	(0.791)	(0.792)	(2.248)	(2.283)
TFP		0.587***		0.310
		(0.068)		(0.251)
log of no. of employees		−0.046		0.160
		(0.035)		(0.115)
log of total assets		0.056		−0.069
		(0.037)		(0.120)
ROA		0.598***		−0.189
		(0.200)		(0.617)
Leverage		−0.030		−0.631
		(0.099)		(0.334)
Tax burden		−1.129		−1.946
		(0.688)		(1.928)
Domestic sales ratio		−1.725***		−2.508***
		(0.089)		(0.358)
log of board size		0.119		−0.164
		(0.095)		(0.282)
Board independence		0.107		0.133
		(0.278)		(1.009)
CEO duality		0.038		0.070
		(0.034)		(0.120)
Firm F.E.	Yes	Yes	Yes	Yes
Destination-Sector-Year F.E.	Yes	Yes	–	–
Sector-Year F.E.	–	–	Yes	Yes
Observations	154,013	154,013	17,140	17,140
R-squared	0.413	0.416	0.442	0.446

Notes: A constant is in included in all regressions. Columns (1) and (2) control for firm and destination-sector-year fixed effects, and Columns (3) and (4) control for firm and sector-year fixed effects. Robust standard errors are reported in parentheses and are clustered at the destination-sector-year level in Columns (1) and (2) and the sector-year level in Columns (3) and (4).
** Indicate significance at the 5% level.
*** Indicate significance at the 1% level.

In Panel B, we conduct similar exercises to examine the effects of political connections on aggregate exports by sector. We do so by aggregating firm exports across destinations and using firm-sector-year data to estimate Eq. (20). The results shown in Columns (3) and (4) are similar to those reported in the first two columns.[13] We again obtain significantly negatives coefficient on political connections but significantly positive coefficients on the interaction terms.

Quantitatively, the coefficients on political connections and the interaction terms imply that the effects of political connections on exports substantially vary across sectors. It can either be positive or be negative depending on the degrees of contract intensity and external finance dependence. Take the professional and scientific equipment sector and the petroleum refineries sector as an example. The former ranks second in both contract intensity (0.78) and external finance dependence (0.96) among all sectors, whereas the latter has the lowest ranking in contract intensity (0.06) and the fifth lowest score in external finance dependence (0.04). Our benchmark results in Column (2) of Table 3 suggest that a one-standard-deviation increase in the degree of political connectedness leads to a 25.98% increase in export revenue in the former sector but a 23.22% reduction in export revenue in the latter sector.[14]

[12] See Nunn (2007) for details of the construction of the variable. Nunn (2007) constructs two measures of contract intensity. The first one defines input that is neither sold on an organized exchange nor reference priced as being relationship-specific, whereas the second measure considers reference-priced inputs as being relationship-specific. We use the first one in our analysis, but using the second one does not affect our results. We have a total of 26 sectors at the ISIC 3-digit level that have values for both contract intensity and external finance dependence and also positive exports in our data. Appendix Table A2 offers the ISIC 3-digit codes and the names of these sectors.

[13] The standard errors are clustered at the destination-sector-year level in regressions in Panel A and at the sector-year level in regressions in Panel B.

[14] The effect of a one-standard-deviation increase in political connections is exp. [0.042 * (−7.134 + 11.462 * *contract intensity* + 3.846 * *external finance dependence*)] − 1.

Table 4
Robustness checks: additional controls.

	Panel A: additional interaction terms			Panel B: additional fixed effects	
	Firm Size	TFP	INDEP	Firm-Year	Province-Sector-Year
	(1)	(2)	(3)	(4)	(5)
Connections	−7.078***	−7.099***	−7.121***		−9.365***
	(0.731)	(0.734)	(0.734)		(0.890)
Contract intensity * Connection	10.405***	11.302***	11.547***	16.514***	15.040***
	(1.247)	(1.259)	(1.257)	(1.594)	(1.469)
External finance dep. * Connection	5.012***	4.001***	3.671***	4.616***	4.455***
	(0.793)	(0.794)	(0.792)	(0.830)	(0.874)
Contract intensity interaction	1.259***	−0.903***	5.081***		
	(0.061)	(0.087)	(1.016)		
External finance dep. interaction	−0.778***	0.295***	−2.495***		
	(0.037)	(0.050)	(0.715)		
Observations	154,013	154,013	154,013	154,013	154,013
R-squared	0.421	0.417	0.417	0.444	0.488

Notes: A constant as well as control variables are included but are not reported in each regression. The first three columns include firm and destination-sector-year fixed effects. Column (4) includes firm-year and destination-sector-year fixed effects. Column (5) includes firm, destination-sector-year, and province-sector-year fixed effects. Robust standard errors clustered at the destination-sector-year level are in parentheses.
*** Indicate significance at the 1% level.

Table 5
Robustness checks: alternative sample and measures of political connectedness.

	Exclude the top 5%	Count MEASURE	General measure	National connection	Local connection
	(1)	(2)	(3)	(4)	(5)
Connection	−7.771***	−0.401***	−3.914***	−11.784***	−6.901***
	(1.027)	(0.040)	(0.318)	(1.614)	(0.888)
Contract intensity * Connection	13.777***	0.770***	5.389***	21.286***	9.896***
	(1.823)	(0.071)	(0.601)	(2.748)	(1.499)
External finance dep. * Connection	3.261**	0.095**	3.053***	4.591***	4.110***
	(1.290)	(0.047)	(0.470)	(1.401)	(1.037)
Observations	146,395	154,013	154,013	154,013	154,013
R-squared	0.417	0.416	0.417	0.416	0.416

Notes: A constant, control variables, and firm and destination-sector-year fixed effects are included but are not reported in each regression. Robust standard errors clustered at the destination-sector-year level are in parentheses.
** Indicate significance at the 5% level.
*** Indicate significance at the 1% level.

4.2. Robustness checks

In this subsection, we conduct a variety of sensitivity analyses to check the robustness of our results. Here, we mainly focus on exports by destination-sector. But we also report the results on exports by sector (aggregated across destinations), which we find are consistent with the evidence obtained from using more disaggregate data, in the Appendix Tables A4-A6. For the sake of space saving, we only report the coefficients on political connections and the interaction terms.

We first want to make sure that our results are not driven by other uncontrolled factors. In Panel A of Table 4, we interact contract intensity and external finance dependence with firm size, TFP, and board independence and include the interaction terms one at a time as additional controls. The results suggest that our main findings are not driven by those additional interaction terms. We continue to find that, all else equal, connected firms export less but that they export more in contract-intensive and financially-dependent sectors.

Panel B of Table 4 controls for additional fixed effects. Column (4) replaces the firm fixed effects in the benchmark model with the more stringent firm-year pair fixed effects to control for the impacts of potential unobserved time-varying firm characteristics on exports.[15] Column (5) adds province-sector-year fixed effects to the benchmark model to control for the potential heterogeneous effects of time-varying province characteristics across sectors. For example, better formal legal (or financial) institutions at the provincial level may benefit sectors with a higher degree of contract intensity (external finance dependence) (e.g., Feenstra et al., 2013). We find that our main findings still hold with the inclusion of additional fixed effects.

Our second set of sensitivity analyses is to check whether our results are robust to alternative samples and measures of political connectedness. To address the concern that our results may be driven by extreme values, in the first column of Table 5, we exclude from our sample the top 5% of observations that have the highest degree of political connectedness according to our baseline measure. In this new sample, the maximum proportion of politically connected members is only 0.11. Our results hold strongly in this alternative sample.[16]

The rest of the columns of Table 5 consider alternative measures of political connectedness. In Column (2), we employ a simple count of CPC or CPPCC members as an alternative measure. In addition, we also follow Fan et al. (2007) and consider a more general measure of political connectedness. The estimation results obtained from using this general measure of connectedness are shown in Column (3). Using these two alternative measures of political connectedness does not alter our main findings either. In Columns (4) and (5), we further separate political connections at the national level from those at the provincial level. The results suggest that both types of connections are associated with more exports in contract-intensive and financially-dependent sectors.

[15] The term of political connections submerges with the inclusion of firm-year fixed effects.

[16] We also tried to winsorize those observations. The results are similar.

We also find that, compared with local connections, connections at the national level have a significantly larger beneficial effect on contract enforcement. There is no significant difference between these two types of connections in helping firms obtaining external finance though.

Finally, Table 6 explores the potential heterogeneity across firm ownerships. We first split the full sample into two subsamples, a private-firm subsample and a non-private-firm subsample, which includes SOEs, collectively owned firms, and foreign-owned firms. Compared with non-private firms, private firms in China have weaker legal protections and face more obstacles in obtaining external finance. We thus expect that the beneficial effects of political connections on firm exports through contract enforcement and obtaining external finance are stronger for private firms.

Columns (1) and (2) of Table 6 show the estimation results from the two subsamples. In the last column, we use the full sample but add a triple-interaction term among contract intensity (or external finance dependence), political connections, and a private firm dummy as an addition regressor. We also control for the interaction between political connections and the private firm dummy as well as the interactions between the private dummy and contract intensity (external finance dependence). The evidence is in favor of our speculation. First, we find that the interaction effects between political connections and contract intensity are both significantly positive in Columns (1) and (2), but they are quantitatively much larger in the private-firm subsample. Second, the interaction effects between political connections and external finance dependence are significantly positive for private firms but insignificant for non-private firms, which are less financially constrained. Finally, Column (3) shows that the estimated coefficients on the triple-interaction terms are both significantly positive.

4.3. Dealing with endogeneity

Since our empirical strategy focuses on identifying heterogeneous effects of political connections at different levels of contract intensity or external finance dependence, it is less vulnerable to a potential endogeneity bias (e.g., Rajan and Zingales, 1998). Nonetheless, to formally address the potential endogeneity issue, we consider two approaches, instrumental variables and propensity scores. Table 7 reports the results on exports by destination-sector, and Appendix Table A7 shows the results on exports by sector (aggregated across destinations).

Table 6
Robustness checks: heterogeneity across ownerships.

	(1) Non-private	(2) Private	(3) Pooled
Connection	−2.747***	−28.279***	−3.126***
	(0.906)	(2.291)	(0.845)
Contract intensity * Connection	5.165***	37.020***	5.683***
	(1.564)	(3.481)	(1.500)
External finance dep. * Connection	1.241	12.456***	1.551
	(1.140)	(1.813)	(1.108)
Contract intensity * Connection * Private			25.514***
			(2.565)
External finance dep. * Connection * Private			3.845**
			(1.599)
Observations	132,249	21,764	154,013
R-squared	0.422	0.542	0.418

Notes: A constant, control variables, and firm and destination-sector-year fixed effects are included but are not reported in each regression. In Column (3), we also control for the three interaction terms: Private * Contract intensity, Private * External finance dependence, and Private * Political connections. Robust standard errors clustered at the destination-sector-year level are in parentheses.
** Indicate significance at the 5% level.
*** Indicate significance at the 1% level.

Table 7
IV regression and propensity score matching results.

	(1) IV results	(2) PSM results
Connection	−12.832***	−7.508***
	(3.270)	(1.062)
Contract intensity * Connection	18.039***	9.767***
	(3.500)	(1.766)
External finance dep. * Connection	6.197***	5.263***
	(1.933)	(1.095)
Kleibergen-Paaprk LM statistic	268.181	–
Kleibergen-Paaprk Wald F statistic	470.812	–
Observations	83,618	71,007
R-squared	0.1919	0.471

Notes: A constant, control variables, and firm and destination-sector-year fixed effects are included but are not reported in each regression. Robust standard errors clustered at the destination-sector-year level are in parentheses.
*** Indicate significance at the 1% level.

We first employ an instrumental variable (IV) regression approach using lagged political connections (and its interactions with contract intensity and external finance dependence) as instruments for contemporaneous political connections (and its interactions with contract intensity and external finance dependence). The selection of this instrument is based on the rationale that past connections influence current connections, but they affect trade flows only though their impacts on current connections. Column (1) of Table 7 demonstrates the IV regression results, which are similar to the OLS results as we continue to find political connections help promote exports in contract-intensive and financially-dependent sectors. The reported Kleibergen-Paaprk LM statistic and F statistic also suggest that the regressions pass both the underidentification and weak identification tests.

In addition to the use of instrumental variables, we also employ a propensity score matching method to deal with firms' non-random selection into building political connections. We first divide firms into two groups based on whether they have any political connections. We obtain comparable firm pairs with similar characteristics based on the estimated propensity scores and then examine the differential responses of export values between connected and non-connected firms using the matched sample.

To match connected and non-connected firms, we estimate the following logit model using a panel dataset at the firm-year level,

$$P_{it} = Pr\{connected_{it} = 1 \mid X_{it}\} = e(X'_{it}\beta)/[1 + e(X'_{it}\beta)] \quad (21)$$

where $connected_{it}$ is a connected-firm dummy and X_{it} a vector of variables used to match firms, including TFP, log number of employees, log total assets, ROA, leverage, tax burden, domestic sales ratio, log board size, independent board members, and CEO-chairman duality. Year fixed effects are also included.[17] Next, we employ the nearest-neighbor matching procedure to search for matched firm pairs. That is, we calculate each firm's predicted propensity score and then, for each connected firm, we choose the non-connected firm that minimizes the distance between their propensity scores. To ensure that the matched firm pairs are comparable, we perform the balance tests of matching covariates and present the test results in Appendix Table A3. The results show that connected firms and the matched non-connected firms share similar characteristics. The differences in the means of all covariates are not statistically different from zero at the conventional significance levels.

[17] It is not feasible to include firm fixed effects in the logit regressions here. A logit regression with firm fixed effects would automatically drop firms with a dependent variable that exhibits no time variations because these observations are not informative in deriving the conditional maximum likelihood function used to estimate the fixed effects logit regression.

Appendix Table A3
Covariates imbalance tests.

Variable	Mean		% Bias	*t*-test	
	Treated	Control		t statistic	p > |t|
TFP	0.110	0.105	0.6	0.16	0.872
log of no. of employees	7.696	7.750	−5.0	−1.26	0.206
log of total assets	21.572	21.621	−4.7	−1.15	0.250
Return on Assets	0.046	0.047	−0.9	−0.26	0.797
Leverage	0.403	0.409	−2.8	−0.74	0.460
log of board size	2.203	2.207	−2.2	−0.55	0.583
Board independence	0.363	0.365	−3.8	−0.95	0.340
CEO duality	0.243	0.234	2.0	0.51	0.611
Tax burden	0.024	0.024	1.4	0.38	0.708
Domestic sale ratio	0.870	0.874	−2.6	−0.62	0.537

Column (2) of Table 7 reports the regression results using the sample of matched firm pairs. The estimated coefficient on political connections is significantly negative, but those on the interaction terms are positive and statistically significant. The matching results suggest that even after controlling for potential selection bias, there is still strong evidence in favor of our hypotheses.

4.4. Other dimensions of export performance

So far we have focused on export values at the ISIC 3-digit sector level. This subsection provides further evidence on other predictions of our model. First, our model (Eq. (18)) suggests that political connections have similar effects on export quantity. We test the predictions in Panel A of Table 8 using the ISIC 3-digit sector-level data. In Columns (1) and (2), we estimate Eqs. (19) and (20) using (log) export quantity at the destination-sector-year level and that at the sector-year level as the dependent variables, respectively. The results are consistent with the prediction of the model. The coefficient on political connections is significant with a negative sign, but those on the interaction terms are significantly positive.

Compared to that measured at the ISIC 3-digit sector level, export quantity measured at the HS 6-digit level is more precise because product varieties in different HS 6-digit categories but within the same ISIC 3-digit sector could be quite different. As a result, it is better to use more disaggregate data to analyze the impact of political connections on export quantity. In addition, in the multi-product case of our model, we also show that political connections have similar effects on export revenue and quantity at the more disaggregate export variety level (Eqs. (A12) and (A13)). In Panel B of Table 8, we test this prediction using data at the HS 6-digit level. Columns (3) and (4) examine the effects of political connections on export value and export quantity at the destination-variety (HS 6-digit) level, and Columns (5) and (6) explore the effects on export value and export quantity by variety (aggregated across destinations). The empirical results support our theoretical predictions. Political connections have similar effects on export value and quantity also at the more disaggregate variety level.

Finally, in Table 9, we explore the effects of political connections on the extensive margins of trade. Eq. (A17) in the appendix indicates that political connections also have similar effects on number of export varieties. We consider four different measures of the extensive margins. In the first three columns, we use firm-sector-year data to examine the effects of political connections on firms' (log) number of export destinations by sector-year, the (log) number of HS 6-digit products by sector-year, and the (log) number of destination-product pairs by sector-year. In Column (4), we use firm-destination-sector-year data to investigate the effects of connections on the (log) number of HS 6-digit products by destination-sector-year. The estimated coefficients on political connections are all negative and significant, but those on the interaction terms are positive and mostly significant, suggesting that political connections also contribute to a larger number of export product varieties in sectors relying more on contract enforcement or external finance.

Appendix Table A5
Alternative sample and measures of political connectedness (sector-level exports aggregated across destinations).

	Exclude top 5%	Count measure	General measure	National connection	Local connection
	(1)	(2)	(3)	(4)	(5)
Connection	−7.675**	−0.360**	−3.949***	−7.378	−6.130**
	(3.765)	(0.147)	(1.105)	(4.991)	(2.828)
Contract intensity * Connection	13.022**	0.687***	4.504**	12.220	10.713**
	(6.527)	(0.241)	(1.921)	(8.448)	(4.829)
External finance dep. * Connection	8.656**	0.278**	5.141***	10.281**	6.326**
	(4.092)	(0.129)	(1.109)	(4.184)	(2.753)
Observations	16,318	17,140	17,140	17,140	17,140
R-squared	0.449	0.446	0.447	0.446	0.446

Notes: A constant, control variables, and firm and sector-year fixed effects are included but are not reported in each regression. Robust standard errors clustered at the sector-year level are in parentheses.
** Indicate significance at the 5% level.
*** Indicate significance at the 1% level.

Appendix Table A4
Additional controls (sector-level exports aggregated across destinations).

	Panel A: additional interaction terms			Panel B: additional fixed effects	
	Firm size	TFP	INDEP	Firm-Year	Province-Sector-Year
	(1)	(2)	(3)	(4)	(5)
Connection	−5.780**	−5.845**	−5.747**		−3.823
	(2.509)	(2.491)	(2.515)		(3.152)
Contract Intensity * Connection	10.216**	10.902***	10.466**	8.987*	10.928**
	(4.178)	(4.175)	(4.207)	(4.637)	(4.897)
External finance dep. * Connection	6.935***	6.275***	6.556***	6.740***	3.146
	(2.240)	(2.312)	(2.286)	(2.172)	(2.502)
Contract intensity interaction	0.117	−0.721	5.406*		
	(0.219)	(0.494)	(2.747)		
External finance dep. interaction	−0.336***	0.681***	1.467		
	(0.109)	(0.213)	(1.529)		
Observations	17,140	17,140	17,140	17,140	17,140
R-squared	0.447	0.448	0.447	0.468	0.542

Notes: A constant as well as control variables are included but are not reported in each regression. The first three columns include firm and sector-year fixed effects. Column (4) includes firm-year and sector-year fixed effects. Column (5) includes province-sector-year and firm fixed effects. Robust standard errors clustered at the sector-year level are in parentheses.
* Indicate significance at the 10% level.
** Indicate significance at the 5% level.
*** Indicate significance at the 1% level.

Appendix Table A6
Heterogeneity across Ownerships (Sector-Level Exports Aggregated across Destinations).

	(1) Non-private	(2) Private	(3) Pooled
Connection	−2.975	−23.192***	−2.826
	(2.932)	(6.783)	(2.808)
Contract intensity * Connection	6.896	36.969***	6.518
	(4.795)	(8.529)	(4.675)
External finance dep. * Connection	3.967	13.852***	3.875
	(2.688)	(4.087)	(2.630)
Contract intensity * Connection * Private			28.070***
			(9.089)
External finance dep. * Connection * Private			8.302*
			(4.837)
Observations	15,346	1794	17,140
R-squared	0.443	0.566	0.448

Notes: A constant, control variables, and firm and sector-year fixed effects are included but are not reported in each regression. In Column (3), we also control for the three interaction terms: Private * Contract intensity, Private * External finance dependence, and Private * Political connections. Robust standard errors clustered at the sector-year level are in parentheses.
* Indicate significance at the 10% level.
*** Indicate significance at the 1% level.

5. Conclusions

A key foundation in Chinese-style institutions is that governments at different levels control resources and utilize their powers to support the business connected to them. We have studied how this informal institution affects firms' exports in an environment of weak formal institutions. To rationalize our empirical examinations, we first presented a simple theoretical model to illustrate the underlying mechanisms through which political connections can affect firm exports. In our model, connected firms enjoy a better contracting environment and also have better access to external finance. They thus gain a comparative advantage in contract-intensive and financially-dependent sectors. However, political connections may not have a clearly defined unilateral effect on firm exports. Firms with connected managers or board members have lower managerial efficiency, which, in turn, adversely affects firm exports.

Employing merged Chinese listed manufacturing firm data and Chinese custom data for the years 2004 to 2013, we offer robust evidence supporting the predictions of the model. The estimated coefficient on political connections is significantly negative, but those on the interaction terms between political connections and measures of dependence on contract enforcement and external finance are significantly positive. Quantitatively, our results suggest that the trade effects of political connections substantially vary across sectors and can be either positive or negative depending on sectors' dependence on external finance or contract enforcement. We also obtain similar effects of political connections on export quantity and on measures of the extensive margins.

Appendix Table A7
IV Regression and Propensity Score Matching Results (Sector-Level Exports Aggregated across Destinations).

	(1) IV Results	(2) PSM Results
Connection	3.566	−7.591**
	(9.341)	(3.100)
Contract intensity * Connection	4.892	9.001*
	(7.381)	(5.232)
External finance dep. * Connection	7.890**	9.401***
	(3.819)	(2.691)
Kleibergen-Paaprk LM statistic	38.578	–
Kleibergen-Paaprk Wald F statistic	12.552	–
Observations	11,832	7358
R-squared	0.333	0.489

Notes: A constant, control variables, and firm and sector-year fixed effects are included but are not reported in each regression. Robust standard errors clustered at the sector-year level are in parentheses.
* Indicate significance at the 10% level.
** Indicate significance at the 5% level.
*** Indicate significance at the 1% level.

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Appendix A. Extending the model to the multi-product case

A firm with productivity ϕ chooses its number of varieties, z, and each variety's price, $p(v)$, for all $v\in[0,z]$, to maximize its total profit:

$$\max_{z;p(v)} \int_0^z \left(p(v)-\frac{\tau b(\kappa) r^{\mu_\kappa} w^{\mu_L} P_M^{\mu_M}}{\phi} v^{\alpha}\right)\frac{p(v)^{-\sigma}}{P^{1-\sigma}} Y dv - \int_0^z f_x v^{\beta} dv \tag{A1}$$

$$s.t.\theta(\kappa)\left(\int_0^z \left(p(v)-(1-d)\frac{\tau b(\kappa) r^{\mu_\kappa} w^{\mu_L} P_M^{\mu_M}}{\phi} v^{\alpha}\right)\frac{p(v)^{-\sigma}}{P^{1-\sigma}} Y dv-(1-d)\int_0^z f_x v^{\beta} dv\right) \geq d\left[\int_0^z \frac{\tau b(\kappa) r^{\mu_\kappa} w^{\mu_L} P_M^{\mu_M}}{\phi} v^{\alpha}\frac{p(v)^{-\sigma}}{P^{1-\sigma}} Y dv + \int_0^z f_x v^{\beta} dv\right] \tag{A2}$$

The Lagrange multiplier function is

$$\int_0^z \left(p(v)-\left(1+d\frac{(1-\theta)\lambda}{\theta(1+\lambda)}\right)\frac{\tau b r^{\mu_\kappa} w^{\mu_L} P_M^{\mu_M}}{\phi} v^{\alpha}\right)\frac{p(v)^{-\sigma}}{P^{1-\sigma}} Y dv - \left(1+d\frac{(1-\theta)\lambda}{\theta(1+\lambda)}\right)\int_0^z f_x v^{\beta} dv \tag{A3}$$

where λ is the Lagrange multiplier associated with the budget constraint Eq. (A2). Solving the optimization problem by choosing price, p, and number of varieties, z, yields

$$p(v)=\frac{\sigma}{\sigma-1}\left(1+d\frac{(1-\theta)\lambda}{\theta(1+\lambda)}\right)\frac{\tau b r^{\mu_\kappa} w^{\mu_L} P_M^{\mu_M}}{\phi} v^{\alpha} \text{ for } v\in[0,z] \tag{A4}$$

$$\left(1+d\frac{(1-\theta)\lambda}{\theta(1+\lambda)}\right) f_x z^{\beta} = \left(p(z)-\left(1+d\frac{(1-\theta)\lambda}{\theta(1+\lambda)}\right)\frac{\tau b r^{\mu_\kappa} w^{\mu_L} P_M^{\mu_M}}{\phi} z^{\alpha}\right)\frac{p(z)^{-\sigma}}{P^{1-\sigma}} Y \tag{A5}$$

The budget constraint Eq. (A2) can be rewritten as

$$\frac{p(z)^{1-\sigma} Y}{[1-\alpha(\sigma-1)]P^{1-\sigma}} = \left(1+\frac{1-\theta}{\theta}d\right)\left(\frac{\tau b r^{\mu_\kappa} w^{\mu_L} P_M^{\mu_M}}{\phi}\frac{z^{\alpha} p(z)^{-\sigma} Y}{[1-\alpha(\sigma-1)]P^{1-\sigma}} + \frac{f_x z^{\beta}}{1+\beta}\right) \tag{A6}$$

We assume that $\alpha(\sigma-1)<1$. This condition ensures the existence of solution. From Eqs. (A4) and (A5), we know $f_x z^{\beta}$ satisfies

$$f_x z^{\beta} = \frac{\tau b r^{\mu_\kappa} w^{\mu_L} P_M^{\mu_M}}{\phi}\frac{z^{\alpha}}{\sigma-1}\frac{p(z)^{-\sigma}}{P^{1-\sigma}} Y \tag{A7}$$

Table 8
Evidence from export quantity and more disaggregated data.

	Panel A: data by ISIC 3-digit level		Panel B: data by HS 6-digit level			
	Export quantity by Des.-Sector-Year (1)	Export quantity by Sector-Year (2)	Export value by Des.-Variety-Year (3)	Export quantity by Des.-Variety-Year (4)	Export value by Variety-Year (5)	Export quantity by Variety-Year (6)
Connection	−7.293***	−4.453*	−3.598***	−2.921**	−5.164***	−5.946***
	(0.790)	(2.445)	(1.131)	(1.165)	(1.289)	(1.350)
Contract Intensity * Connection	10.299***	8.582**	4.433***	4.364**	6.835***	7.697***
	(1.364)	(4.309)	(1.667)	(1.700)	(1.943)	(1.990)
External Finance Dep. * Connection	4.556***	6.140***	4.246***	2.213**	4.253***	4.091***
	(0.801)	(2.049)	(0.938)	(0.945)	(1.211)	(1.201)
Observations	154,013	17,140	295,817	295,817	71,985	71,985
R-squared	0.568	0.457	0.676	0.765	0.530	0.639

Notes: A constant, control variables, and firm fixed effects are included but are not reported in each regression. Destination-sector-year fixed effects are included in Columns (1), and sector-year fixed effects are included in Columns (2). Columns (3) and (4) control for destination-variety (HS 6-digit)-year fixed effects, and Columns (5) and (6) include variety (HS 6-digit)-year fixed effects. Robust standard errors are reported in parentheses. They are clustered at the destination-sector-year level in Column (1), the sector-year level in Column (2), the destination-variety (HS 6-digit)-year level in Columns (3) and (4), and the variety (HS 6-digit)-year level in Columns (5) and (6).
* Indicate significance at the 10% level.
** Indicate significance at the 5% level.
*** Indicate significance at the 1% level.

Substituting Eq. (A7) into Eq. (A6), we have

$$p(z)=\left(1+\frac{1-\theta}{\theta}d\right)\left(1+\frac{1-\alpha(\sigma-1)}{(1+\beta)(\sigma-1)}\right)\frac{\tau br^{\mu_K}w^{\mu_L}P_M^{\mu_M}}{\phi}z^{\alpha} \tag{A8}$$

which, together with Eq. (A4), implies that

$$1+d\frac{(1-\theta)\lambda}{\theta(1+\lambda)}=\left(1+\frac{1-\theta}{\theta}d\right)\left(\frac{\sigma-1}{\sigma}+\frac{1-\alpha(\sigma-1)}{(1+\beta)\sigma}\right) \tag{A9}$$

Let $\Delta\equiv 1+d\frac{(1-\theta)\lambda}{\theta(1+\lambda)}$, which is constant and satisfies $\Delta\equiv 1+d\frac{(1-\theta)\lambda}{\theta(1+\lambda)}=(1+\frac{1-\theta}{\theta}d)(\frac{\sigma-1}{\sigma}+\frac{1-\alpha(\sigma-1)}{(1+\beta)\sigma})$. The optimal pricing rule Eq. (A4), together with Eq. (A9), implies that the optimal export value $R(v)$ and quantity $Q(v)$ for each variety satisfy

$$R(v)=\frac{p(v)^{1-\sigma}}{P^{1-\sigma}}Y=\left(\frac{\sigma}{\sigma-1}\Delta\frac{\tau br^{\mu_K}w^{\mu_L}P_M^{\mu_M}v^{\alpha}}{\phi}\right)^{1-\sigma}\frac{Y}{P^{1-\sigma}} \tag{A10}$$

$$Q(v)=\frac{p(v)^{-\sigma}}{P^{1-\sigma}}Y=\left(\frac{\sigma}{\sigma-1}\Delta\frac{\tau br^{\mu_K}w^{\mu_L}P_M^{\mu_M}v^{\alpha}}{\phi}\right)^{-\sigma}\frac{Y}{P^{1-\sigma}} \tag{A11}$$

Differentiating the above two equations with respect to κ, we have

$$\frac{\partial lnR(v)}{\partial\kappa}=-(\sigma-1)b'(\kappa)+\frac{d(\sigma-1)}{(1-d)\theta+d}\frac{\theta'(\kappa)}{\theta}+\frac{(\sigma-1)\mu_M P_D^{1-\varsigma}}{P_D^{1-\varsigma}+P_Z^{1-\varsigma}}\frac{ry\rho'(\kappa)}{wx+r(2-\rho)y} \tag{A12}$$

$$\frac{\partial lnQ(v)}{\partial\kappa}=-\sigma b'(\kappa)+\frac{d\sigma}{(1-d)\theta+d}\frac{\theta'(\kappa)}{\theta}+\frac{\sigma\mu_M P_D^{1-\varsigma}}{P_D^{1-\varsigma}+P_Z^{1-\varsigma}}\frac{ry\rho'(\kappa)}{wx+r(2-\rho)y} \tag{A13}$$

The above two equations thus indicate that the results obtained in the main text regarding the effects of political connections on export revenue and quantity also hold for each variety here in the multi-product case.

Substituting Eq. (A4) into Eq. (A7), we obtain the optimal number of varieties chosen by a firm with productivity ϕ:

$$z=\Delta^{\frac{-\sigma}{\beta+\alpha(\sigma-1)}}\left(\frac{\sigma}{\sigma-1}\frac{\tau br^{\mu_K}w^{\mu_L}P_M^{\mu_M}}{\phi}\right)^{\frac{1-\sigma}{\beta+\alpha(\sigma-1)}}\left(\frac{Y}{\sigma f_x P^{1-\sigma}}\right)^{\frac{1}{\beta+\alpha(\sigma-1)}} \tag{A14}$$

The optimal aggregate export quantity $Q=\int_0^z Q(v)dv$ and export value $R=\int_0^z R(v)dv$ satisfy

$$R=\Delta^{-\frac{\beta(\sigma-1)+\sigma-\alpha(\sigma-1)}{\beta+\alpha(\sigma-1)}}\left(\frac{\sigma}{\sigma-1}\frac{\tau br^{\mu_K}w^{\mu_L}P_M^{\mu_M}}{\phi}\right)^{-\frac{(\beta+1)(\sigma-1)}{\beta+\alpha(\sigma-1)}}\left(\frac{Y}{\sigma f_x P^{1-\sigma}}\right)^{\frac{1-\alpha(\sigma-1)}{\beta+\alpha(\sigma-1)}}\frac{Y}{(1-\alpha(\sigma-1))P^{1-\sigma}} \tag{A15}$$

Table 9
The effects on the extensive margins.

	(log) # of destinations by Sector-Year (1)	(log) # of HS6 products by Sector-Year (2)	(log) # of Destination-Product pairs by Sector-Year (3)	(log) # of HS6 Products by destination-Sector-Year (4)
Connection	−2.553***	−1.072**	−3.021***	−1.693***
	(0.856)	(0.517)	(0.963)	(0.148)
Contract intensity * Connection	4.770***	2.175**	5.613***	2.671***
	(1.431)	(0.919)	(1.636)	(0.266)
External finance dep. * Connection	1.832**	0.385	1.949**	0.129
	(0.740)	(0.419)	(0.833)	(0.162)
Observations	17,140	17,140	17,140	154,013
R-squared	0.373	0.426	0.359	0.358

Notes: A constant, control variables, and firm fixed effects are included but are not reported in each regression. Sector-year fixed effects are included in Columns (1), (2), and (3). Destination-sector-year fixed effects are included in Column (4). Robust standard errors are reported in parentheses and are clustered at the sector-year level in Columns (1), (2), and (3) and the destination-sector-year level in Columns (4).
** Indicate significance at the 5% level.
*** Indicate significance at the 1% level.

$$Q = \Delta^{-\frac{(\beta+1-\alpha)\sigma}{\beta+\alpha(\sigma-1)}}\left(\frac{\sigma}{\sigma-1}\frac{\tau b r^{\mu_K} w^{\mu_L} P_M^{\mu_M}}{\phi}\right)^{-\frac{\beta\sigma+\sigma-1}{\beta+\alpha(\sigma-1)}}\left(\frac{Y}{\sigma f_x P^{1-\sigma}}\right)^{\frac{1-\alpha\sigma}{\beta+\alpha(\sigma-1)}}\frac{Y}{(1-\alpha\sigma)P^{1-\sigma}} \tag{A16}$$

Totally differentiating Eqs. (A14), (A15), and (A16), we have

$$\frac{\partial lnz}{\partial\kappa} = -\frac{\sigma-1}{\beta+\alpha(\sigma-1)}b'(\kappa) + \frac{\sigma}{\beta+\alpha(\sigma-1)}\frac{d}{(1-d)\theta+d}\frac{\theta'(\kappa)}{\theta} + \frac{(\sigma-1)\mu_M}{\beta+\alpha(\sigma-1)}\frac{P_D^{1-\varsigma}}{P_D^{1-\varsigma}+P_Z^{1-\varsigma}}\frac{ry\rho'(\kappa)}{wx+r(2-\rho)y} \tag{A17}$$

Eq. (A17) gives the effects of political connections on number of export varieties. The first term is negative and captures the managerial inefficiency channel. The next two terms reflect the external finance and contract enforcement channels, respectively, and they are both positive. Moreover, the second term is increasing in firms' need for external finance (d), and the third term increases with contract intensity ($\frac{P_G^{1-\varsigma}}{P_G^{1-\varsigma}+P_N^{1-\varsigma}}$). Therefore, we obtain the following proposition:

Proposition A1. Political connections negatively affect the number of export varieties through a managerial inefficiency channel. They also positively affect the number of export varieties by helping enforce contracts and obtaining external finance. The beneficial effects are larger in sectors with a higher dependence on contract enforcement or external finance.

Similar, the effects of political connections on export revenue and quantity are given by

$$\frac{\partial lnR}{\partial\kappa} = -\frac{(\beta+1)(\sigma-1)}{\beta+\alpha(\sigma-1)}b'(\kappa) + \frac{\beta(\sigma-1)+\sigma-\alpha(\sigma-1)}{\beta+\alpha(\sigma-1)}\frac{d}{(1-d)\theta+d}\frac{\theta'(\kappa)}{\theta} + \frac{(\beta+1)(\sigma-1)\mu_M}{\beta+\alpha(\sigma-1)}\frac{P_D^{1-\varsigma}}{P_D^{1-\varsigma}+P_Z^{1-\varsigma}}\frac{ry\rho'(\kappa)}{wx+r(2-\rho)y} \tag{A18}$$

$$\frac{\partial lnQ}{\partial\kappa} = -\frac{\beta\sigma+\sigma-1}{\beta+\alpha(\sigma-1)}b'(\kappa) + \frac{(\beta+1-\alpha)\sigma}{\beta+\alpha(\sigma-1)}\frac{d}{(1-d)\theta+d}\frac{\theta'(\kappa)}{\theta} + \frac{(\beta\sigma+\sigma-1)\mu_M}{\beta+\alpha(\sigma-1)}\frac{P_D^{1-\varsigma}}{P_D^{1-\varsigma}+P_Z^{1-\varsigma}}\frac{ry\rho'(\kappa)}{wx+r(2-\rho)y} \tag{A19}$$

Eqs. (A18) and (A19) show that the results obtained in the main text for the effects of political connections on a firm's total export revenue and quantity also hold here for total revenue and total quantity (aggregated across varieties) in the multi-product case.

Appendix B. Variable definitions and data sources.

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