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How export shocks corrupt: theory and evidence*

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Abstract

In this article we uncover a positive effect of both export booms and busts on firm-level corruption. Our theory underlines the central role played by human capital in the underlying mechanism. In low human capital settings, export-related revenues are highly elastic to incremental gains of export shares, thence pushing firms to intensify corruption with export busts so as to avoid a radical drop in their revenues. In high human capital settings, export booms lead to more corruption as an increment of export share achieved through bribery concerns a large export market. We corroborate these findings with an extensive database of some 45,000 firms from 72 developing and transition economies, surveyed over 2006-2017. Besides confirming that export booms and busts corrupt and highlighting the mediat-ing role of human capital, we also highlight the corruption-deterrent effect institutions during export market expansion and contraction.

Keywords: Corruption, Bribery, Export shocks, Human capital.

JEL classification: D73, F19, 017.

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1 Introduction

There is a wide consensus in the literature that revenue windfalls are conducive to rent seeking activities under the form of corruption, bribery, or black markets. This in turn can have dreadful economic consequences since the misallocation of resources has been shown to potentially overturn the benefits of the windfall, with economic growth being lower than absent the positive revenue shock in some instances (Lane and Tornell 1996, Tornell and Lane 1999). The mechanisms giving rise to these inefficiencies are multiple, and the empirical evidence seems to converge on two important findings: rent seeking is more likely to be observed in connection to natural resources, and the effect is conditioned on the presence of weak institutions. Taken together, these elements seem to suggest that rent seeking results from revenue windfalls and that it is exclusively a problem of poor and non-industrialized countries. And yet the real world delivers a much more nuanced picture.

First, high-profile cases of widespread private sector's corruption and malpractices in industrialized economies that were revealed after the 2008 financial crisis but which had spread during the pre-crisis economic expansion phase (Baker, 2010; Thiemann, 2014), remind us that the corruption-windfalls nexus is neither exclusively a problem of the poor, nor of natural resource-rich countries alone. Second, it is far from uncommon, for instance, to witness an intensification of rent-seeking, especially corrupt practices, in periods of revenue contractions. This pattern has frequently been observed in low-income countries, like Zimbabwe or Uganda, for instance[1], where recurrent shortages in various common commodities have fuelled both petty and grand corruption.

To acquire a better understanding of the relationship tying revenue windfalls and contractions to rent seeking activities, this paper focuses on bribery at exports, a topic which has received considerable attention by the scholarship (Hines, 1995; Lambsdorff, 1998; D'Souza, 2012; Lee & Weng, 2013; Ahsan, 2017; Couttenier & Toubal, 2017). Besides their paramount economic importance, exports are particularly salient to study rent seeking because of their inherent characteristics giving rise to corrupt practices (Dutt & Traca, 2010; Sequeira & Djankov, 2014; Ahsan, 2017).[2] The relationship between bribery (and other forms of corruption) and exports is an intricate one. On the one hand, corruption may constrain exports by inducing additional monetary and non-monetary costs on firms' operations (Shleifer & Vishny, 1993), maintaining less efficient firms in the game, favoring rent-seeking and rent-creating behaviour at the cost of reduced investment, innovations, organizational change and other sources of productivity (Murphy et al, 1993). Corruption may therefore entrench the corrupt firm's position into the domestic market, and lower its inclination and capacity to operate abroad (Lee & Weng, 2013).

On the other hand, bribery in export markets is a very common practice that may reinforce a corrupt firms' position in export markets by facilitating access to public resources and privileged information in both home and destination countries, by circumventing burdensome regulations, compensating the lack

[1] To illustrate this corruption pattern in Uganda see https://www.newvision.co.ug/news/1289993/scarcity-promotes-corruption; in Zimbabwe, see https://www.herald.co.zw/corruption-worsens-fuel-shortages/

[2] A quite large literature has instead focused on the effect of restrictions upon import on rent seeking, starting by Krueger (1974).

of social network in foreign markets and hedging against political risks (Krammer, 2019). In the home country, exporting firms may bribe to benefit from tax exemptions and subsidies, obtain export licensing facilitation, secure faster customs' clearance and trade protection. This in turn enables firms to secure access to scarce resources, to exploit economies of scale, and to absorb trade-related costs so as to enhance their competitive advantage in export markets (Lee & Weng, 2013; Ahsan, 2017). In foreign markets, bribery of foreign public officials is so widespread that the OECD enacted in 1997 a convention that criminalizes acts of bribery of foreign public officials in international business transactions. Evidence shows that its progressive implementation by exporting signatory states has induced trade deflection in favour of less corrupt export markets, at the expense of more corrupt ones (D'Souza, 2012). This evidence comes in support to previous research that shows how improved anti-corruption standards in international trade might disadvantage exporters' performance in corrupt import markets (Hines, 1995; Lambsdorff, 1998). Bribery in foreign markets is therefore a common practice, instrumental to export performance, which helps firms building networks, securing contracts, avoiding red tape, taxation, and non-trade barriers abroad (Dutt & Traca, 2010; Sequeira & Djankov, 2014; Couttenier & Toubal, 2017).

In light of this reality that – for a given institutional setting – corruption facilitates trade from a firm's perspective, we explore both theoretically and empirically how export market expansions and contractions affect firm-level bribe decisions. We consider bribery as a complementary action to the production process. For the reasons explained earlier, bribery at exports enables the firm gaining or entrenching its position in export markets, which then incentivizes the firm to increase its production to supply these markets. In our model firms can bribe officials to obtain export licences, at the cost of foregone productive activity. The revenue firms derive from exporting goods depends both on the value of the export market controlled by the firm and on the quantity of goods it produces, and we assume decreasing marginal returns to both revenue components: increasing the market value (or the quantities of exported goods) increases a firm's revenues at a decreasing rate. Moreover, we account for the role of human capital, which we conceptualize as a factor increasing the value of export markets to firms, possibly for instance because of higher product quality subsequent to R&D (Stokey 1991, Redding 1996, Strulik 2005). Human capital is indeed instrumental to product quality which, for a given market size, increases the revenue generated in foreign markets. On the other hand, human capital is also necessary to build corrupt networks and to negotiate corrupt deals, and thereby, helps ensuring sufficient revenue from firms' foreign operations. As a result, bribery is subject to diminishing returns, whose magnitude depends on human capital endowments, and is therefore subject to the same constraints as usual production factors.

We then show that the effect of export booms or busts – induced for instance by changes in international prices, exchanges rates or interest rates – on bribery may be non-linear since the marginal return to bribes in order to get market shares has to be balanced against the marginal return to invest in the production process. Importantly, the effect is shown to critically hinge on the level of human capital. Indeed, in low human capital setups, the *marginal* revenue of an export windfall will be large, and thence subject to strong diminishing marginal revenue. Consequently, an exogenous expansion of the export

market will result into a reduction of the marginal revenue of bribery because of the revenue function's concavity, and this effect will be exacerbated by the complementarities between bribery and production. In contrast, for high levels of human capital, the opposite holds true if complementarities are not too strong. Since the value of the claimed market will then be high, the marginal revenue generated through corruption will then increase by more than the marginal revenue of output production. Consequently, positive export shocks will increase the incentives to bribe.

We thence uncover a non-linear relationship between export booms and bribery, depending on human capital level. We test this prediction using repeated cross-section survey data on bribe payments reported by some 45,000 firms located in 72 developing and transition economies, through 11 survey waves conducted between 2006 and 2017. Pooled OLS estimations including location, industry, and year fixed effects are conducted, thereby lowering the concern for omitted variable bias. Following the recent literature on economic and financial fluctuations' causes and consequences, we measure the severity of aggregate export shocks relying on the skewness coefficient of a country's exports distribution around their trend value (Rancière et al., 2008; Cariolle & Goujon, 2015; Popov, 2014; Bakeart & Popov, 2019; Jensen et al., 2020). Estimates support that irrespective of a country's human development level, aggregate export booms and busts are both associated with a larger size and a greater probability of bribe payments. This unconventional relationship is found to be mediated by human capital, especially education level: above a given threshold value of different proxies of human capital level, export booms leads to higher bribes. Below this threshold, export booms are found to reduce bribery.

Our contribution nuances in a fundamental way the negative finding underlined throughout the literature according to which revenue windfalls map into rent seeking, bribery, and other corrupt activities.[3] Looking at the channels tying rents to corruption that have been identified earlier in the literature, an encompassing ingredient is that from an individual firm's perspective higher rents always map into more intense rent-seeking (e.g. Ades & Di Tella 1999). The bulk of the evidence concerns *resource exports* (e.g. Treisman 2007), with the core underlying mechanism being common to all studies: higher rents accruing either from more valuable markets (size and/or value) or from larger market power (and thus higher margins) generate higher rent-seeking incentives (Dalgaard & Olsson, 2008).

Murphy et al. (1993), Robinson (1994) and Acemoglu (1995) all develop theoretical setups where rent-seeking proves detrimental to the economy because of the adverse effect this has on the productive sector, thereby crowding out entrepreneurial activity. As such, revenue windfalls incentivize firms to reallocate resources to rent-seeking activities, eventually resulting into a reduced equilibrium entrepreneurial activity. Inefficiencies may equally emerge when groups with power and influence in the society push for increased redistribution in the presence of windfalls, and this in turn contains the incentives to invest in productive

[3] In the specific contest of exports, the reverse link through which corruption affects exports has equally received attention. These same incentives to corrupt officials have the potential of affecting the size of exporting markets (Lee & Weng, 2013; Olney, 2016). Bribery and other forms of corruption may hinder exports by inducing additional monetary and non-monetary costs on firms (Shleifer & Vishny, 1993), by maintaining less efficient firms in the game, and by distorting incentives away from productive activities such as investment, innovation, or organizational change (Murphy et al, 1993). Corruption may therefore entrench the corrupt firm's position into the domestic market thereby lowering its inclination and capacity to operate abroad (Lee & Weng, 2013).

sectors, thereby resulting in lower growth rates. This mechanism has been coined the "voracity effect" (Lane and Tornell, 1996; Tornell & Lane, 1999), and is supported by empirical evidence (Arezki & Brückner, 2012; Abbott & Jones, 2013; Abbott et al, 2015). Rather than conceptualizing an economy composed of a rent-seeking sector and a productive sector, we instead consider the rent-seeking-production trade-off at the firm rather than the aggregate level, and view bribes as an input of a firm's revenue. By making the natural assumption that firms' revenues are non-linear in market size, bribes, and inputs, we uncover a non-linear relationship between exports and bribes, thus contrasting with all existing literature on the topic. Moreover, and always in contrast to much of the existing literature, the effects we uncover result from corruption strategies adopted by firms operating in both the manufacture and the service sectors, and not in the resources sectors specifically (e.g. Treisman 2007).

Our study also confirms earlier findings on the attenuating effect of institutional quality when exploring the voracity effect of resource windfalls (Mehlum et al, 2006; Robinson et al, 2006). Institutions have been shown to play a central role in understanding the prevalence of corruption and rent-seeking activities. In fact, strong institutions, reflected by an efficient bureaucracy, well-designed regulations, or a stable democratic political system endowed with strong checks and balances, contain corruption by making public and private agents more accountable, by increasing the probability for corrupt agents of getting caught and sanctioned (Lederman et al, 2005; Brunetti & Weder, 2003; Bhattacharyya & Hodler, 2010), and by improving the protection of property rights and the freedom of choice (Farhadi et al, 2015; Banalieva et al, 2018). Interestingly, Mehlum et al. (2006) and Robinson et al. (2006) establish empirically that the natural resource curse is conditional on the presence of weak institutions, thence putting institutions on the spotlight. The attenuating effect of institutions on rent-seeking has been repeatedly confirmed thereafter (Bhattacharyya & Hodler, 2010; Ebeke et al, 2015). We therefore incorporate this dimension in the last part of our empirical analysis and emphasize the attenuating role of institutional quality on the effects of export booms and busts on corruption. Using a wide range of proxies for institutional quality, our results point that improvements in various dimensions of the governance framework – such as the rule-of-law, government effectiveness, corruption control, regulatory quality or even the time spent by firms dealing with regulations – cushion the positive effects of both export booms and busts on firms' bribery without, however, cancelling these effects.

The next section presents our theoretical model. The third section exposes our empirical framework, while the fourth section presents our empirical results. The last section concludes.

2 The model

2.1 The setup

We consider an industry featuring n symmetric firms involved in bribery. The firms produce a good destined to the export market, and they are each endowed with a cash flow F that may be invested in

inputs to produce goods, or in improving their access to the export market by bribing officials.[4] We denote respectively these investments for firm i by z^i and b^i. The total revenue of firm i, $R(m^i, z^i)$, is a function of the value of the market controlled by firm i, m^i, and of the inputs of the firm, z^i. We make the following assumptions on function $R(m^i, z^i)$: $R(0, z^i) = R(m^i, 0) = 0$, $R_m > 0$, $R_{mm} \leq 0$, $R_z > 0$, $R_{zz} < 0$, and $R_{mz} \geq 0$, where indices denote partial derivatives. We are thus assuming decreasing marginal revenues to both market value and the amount of inputs. The sign of R_{mm} reflects the decreasing opportunities (at the margin) of offering one's products on a wider market, for a given level of output. Similarly, the sign of R_{zz} captures the decreasing marginal revenue from higher output, as is usually assumed. Last, the positive sign of the cross derivative reflects the fact that in the presence of more valuable markets, a firm has a higher marginal return on production, as is typically the case in most oligopolistic setups. Additionally, we make the following assumption on the functional form $R(.)$: $\epsilon_{R_m,m^i} = \frac{R_{mm}}{\frac{R_m}{m^i}} \lesseqgtr -1 \Leftrightarrow m^i \lesseqgtr \bar{m} > 0$. We are thereby assuming that the revenue function is sufficiently concave in m^i for low-value markets so that the marginal revenue of controlling a more valuable market is highly elastic to market value; while when the market is of high value, the opposite holds true.[5]

The total size of the export market that is subject to bribery is denoted by X. We assume that officials allocate export licences and/or give preferential bureaucratic treatment to firms according to the relative size of their individual bribe b^i. In other words, we assume that the export licences for this industry are fixed (e.g. trade agreements), and the total size of the export market controlled by firm i, s^i, is then given by:

$$s^i = \begin{cases} \frac{b^i}{\sum_j b^j} X & \text{if } \sum_j b^j > 0 \\ 0 & \text{otherwise} \end{cases} .$$

We are thence assuming that (i) if no firm decides to bribe authorities, then the export rights are not allocated to any firm[6], and (ii) that the cost of export licences is endogenous since firms' market shares depend on their relative bribe levels.

Next, the actual value of the export market controlled by firm i, m^i, is defined as:

$$m^i = \alpha s^i - C.$$

Parameter α reflects the level of human capital, and we are thus assuming that human capital increases the quality of products (e.g. Stokey 1991, Redding 1996), so that the revenue obtained from operating on a given market size is larger for higher values of human capital. Second, the parameter C reflects an exogenous loss of market value, and captures an efficiency loss related to corruption. For instance, the

[4] Such bribes may aim at getting preferential access to export licences, exonerating firms from levies, or securing reductions in transaction costs by speeding up tolls and shipping processes.

[5] We extend below the analysis using a a CES revenue function for which there is a range of elasticity of substitution parameters such that the above assumption is verified at equilibrium.

[6] Observe that any alternative assumption on the allocation of export licences in such instances would deliver the same equilibrium.

firms' reputation on the foreign market may be tarnished by their corrupt practices. To ensure that all firms are active in the bribe game at equilibrium, we impose the following parameter restriction:

$$\alpha \frac{X}{n} \geq C.$$

Lastly, given the above-described budget constraint, the firm's inputs equal $z^i = [F - b^i]$.

All firms simultaneously decide the allocation of their cash flow between bribery and productive activities, and we solve for the Nash equilibrium.

2.2 Equilibrium

The optimization problem of any firm i reads as:

$$\max_{b_i} R\left(\alpha \frac{b^i}{\sum b^j} X - C, F - b^i\right). \tag{1}$$

We can then write the first order condition of this problem when dropping the functions' arguments for clarity reasons as:

$$\frac{\partial R\left(m^i, z^i\right)}{\partial b^i} = \alpha \frac{B^{-i}}{B^2} X R_m - R_z = 0, \tag{2}$$

where $B = \sum_j b^j$, $B^{-i} = \sum_{j \neq i} b^j$, and indices denote partial derivatives.

The problem is globally concave if the following second-order condition is satisfied:

$$\frac{\partial^2 R\left(m^i, z^i\right)}{\partial b^i \partial b^i} = \left[\alpha \frac{B^{-i}}{B^2} X\right]^2 R_{mm} - 2\alpha \frac{B^{-i}}{B^3} X R_m - 2\alpha \frac{B^{-i}}{B^2} X R_{mz} + R_{zz} < 0, \tag{3}$$

and this is always true.

Observe that the problem admits no bribes-free equilibrium. If $b^j = 0$ for all players, then any firm has a profitable deviation since in such instance $\frac{b^i}{B} = 1$ for any $b^i > 0$, thus implying that $\lim_{b^i \to 0} R\left(m^i, z^i\right) = R\left(\alpha X - C, F\right) > R\left(0, F\right) = R(m^i, z^i)_{|b^i = 0}$. Moreover, if $b^i = F$ for firm i, then $z^i = 0$ and its payoff is therefore nil, thence implying a profitable deviation by setting a strictly positive investment $z^i > 0$.

Consequently, expression (2) uniquely defines firm i's best response function $b^i(B^{-i})$ and the (symmetric) equilibrium bribe investment is thus implicitly defined by:

$$\phi(b^*) = \alpha \frac{[n-1]}{n^2 b^*} X R_m \left(\alpha \frac{X}{n} - C; F - b^*\right) - R_z \left(\alpha \frac{X}{n} - C; F - b^*\right) = 0. \tag{4}$$

2.3 Export market expansion and contraction

We are interested in the effect of export market expansions and contractions on equilibrium bribery. We accordingly explore the effect of an exogenous change in X –the size of the export market– on equilibrium bribery b^{i*}. To do so, we first inspect how the firms' best response functions $b^i(B^{-i})$ are impacted by a

change in X, and then deduce how the equilibrium bribe levels are modified by an expansion of export markets. Applying the implicit function theorem on expression (2), and given that the second-order condition (eq. (3)) is satisfied, we have that the sign of $\frac{\partial b^i}{\partial X}$ is given by the sign of:

$$sign\left\{\frac{\partial^2 R\left(m^i, z^i\right)}{\partial b^i \partial X}\right\} = sign\left\{\frac{\partial \phi^i}{\partial X}\right\}$$
$$= sign\left\{\alpha\left[\frac{B^{-i}}{B^2}\left[R_m + \alpha X \frac{b^i}{B} R_{mm}\right] - \frac{b^i}{B} R_{mz}\right]\right\}. \quad (5)$$

Evaluating this expression at the symmetric equilibrium where $b^i = b^*$ as implicitly defined by (4), the sign of $\frac{\partial b^i}{\partial X}$ at equilibrium is thus given by the sign of:

$$sign\left\{\frac{[n-1]}{nb^*} R_m + \frac{[n-1]}{n^2 b^*} \alpha X R_{mm} - R_{mz}\right\}. \quad (6)$$

The sign of this expression is ambiguous since the first term in (6) is positive, while the second and third terms are negative. We can then scrutinize each of these terms to disentangle the mechanisms underlying the overall effect. A larger export market will –all else equal– increase the marginal return of bribing public officials since any bribe now aims at expanding the controlled share of a larger market. This is captured by the expression's first term. The second term, however, nuances the first one due to the decreasing marginal revenues one obtains from controlling a larger market segment. Last, the third term gauges the effect of higher export markets on the opportunity cost of bribery: given the assumed complementarity between market size and inputs, positive export shocks will map into increased complementarities between the two components of the firm's total revenue, and thus in an increase in the opportunity cost of bribery, i.e. in foregone revenue due to a contraction of inputs.

We then inspect the sign of expression (6). A first observation is that $s^{i*} = \frac{1}{n}$, thence implying that $m^{i*} = \frac{\alpha X}{n} - C$, $\forall i$. It is immediate then to observe that m^{i*} is monotonically increasing in X, with $m^{i*} \to 0$ as $X \to Cn/\alpha$ and $m^{i*} \to \infty$ as $X \to \infty$. Assume first that $m^* = \alpha \frac{X}{n} - C$, in which case $m^* < \bar{m}$, and thus $\epsilon_{R_m, m^*} < -1$. This in turn implies that the sum of the first two terms in (6) is then negative and that the entire expression (6) is negative since $R_{mz} > 0$. In such instances $\frac{db^*}{dX} < 0$. If $X \to \infty$, and thus $m \to \infty$, we accordingly have that $\epsilon_{R_m, m^*} > -1$ so that the sum of the first two terms in (6) is positive. Hence, if R_{mz} is not too strong, it follows that $\frac{db^*}{dX} > 0$. Last, since m^{i*} is monotonically increasing in X, we deduce that – provided R_{mz} is not too strong – $\frac{db^*}{dX} \lesseqgtr 0$ for $X \lesseqgtr \bar{X}$, where $\bar{X} = \frac{n}{\alpha}\left[\bar{m} + C\right]$.

We can then state our first result:

Proposition 1 *For low export levels bribery decreases with exports while for high export levels it increases with exports, provided revenue complementarities between market valuation and input use are not too strong.*

Proposition 1 establishes that the relationship between export shocks and bribery critically hinges on the size of the export markets X. When the export market size is small, firms' opportunities to sell

abroad greater quantities are limited, which pushes firms maximising their market value through bribery. As a result, the marginal return from bribery (R_m) is strong but the pace of decreasing marginal returns (R_{mm}) is even stronger, making the revenue highly elastic to market value ($\epsilon_{R_m,m^i} < -1$). Market value being positively related to export market size, an increase in the latter will induce a drastic reduction in the marginal revenue of controlling a larger market, while simultaneously boosting the marginal return from investing in the (exported) product because of the complementarities tying market size and output. Thence, bribery will drop with export markets expansion.

By contrast, when the export market is large, the marginal return from bribery (R_m) is low, but the rate as which marginal returns decrease (R_{mm}) is so soft so as to make the revenue poorly elastic to market value ($-1 < \epsilon_{R_m,m^i} < 0$), and thereby to bribery. In other words, the marginal return from bribery will not be very sensitive to changes in market value, and in such instances, if the revenue function does not exhibit too strong complementarities, positive export shocks will increase bribery.

2.4 The mediating effect of human capital

We now explore the role of human capital, and emphasize its important mediating effect on the relationship between changes in export markets size and bribery. In fact, the mechanisms tying human capital to the effect of export shocks on bribery are very similar to those exposed in the previous subsection.

Consider first the value of b^* when $\alpha = \underline{\alpha} = C.\frac{n}{X}$, so that $m^i = 0$ at the symmetric equilibrium. In the optimality condition (4), we know by assumption that $\lim_{m^i \to 0} R_m = +\infty$. It thus follows that for any $b^* < F$, R_z is finite, and the sign of expression (4) is positive since $\lim_{\alpha \to \underline{\alpha}} \alpha R_m = +\infty$

Focusing next on the other limit case, i.e. $\alpha \to \infty$, we can deduce that $m \to \infty$, and since $R_m > 0$, then $\lim_{\alpha \to \infty} \alpha R_m = +\infty$. Upon inspection of (2) we then deduce that $\lim_{\alpha \to \infty} b^* = F$.

Combining the above findings, we can then state the following result:

Lemma 1 *The equilibrium bribes are such that* $\lim_{\alpha \to \underline{\alpha}} b^* = \lim_{\alpha \to \infty} b^* = F$.

In the presence of low human capital, the firms' production is lowly valued on markets, and this incentivizes firms to attempt expanding their market size by increasing corrupt activities. On the other hand, high levels of human capital increases the value of controlled market segments, thus incentivizing firms to bribe intensively to control a bigger share of the very large market. Therefore, bribery will be prevalent in both low and high human capital settings.

We now turn our attention back to the effect of positive export shocks on equilibrium bribery. Observing that m^{i*} is a monotonic function of α, with $m^{i*} \to 0$ as $\alpha \to \underline{\alpha}$ and $m^{i*} \to \infty$ as $\alpha \to \infty$, we can follow the steps of the previous section to deduce the following proposition:

Proposition 2 *The effect of positive export shocks on equilibrium bribery depends on human capital levels. For low human capital bribes decrease with exports and for high human capital they increase with exports, provided revenue complementarities between market value and output are not too strong.*

Proposition 2 establishes that the relationship between export shocks and bribery is conditioned by the level of human capital. An increase in export market size influences incentives to bribe officials through three effects. First, the presence of a larger export market pushes firms to increase bribery. Yet, this effect is countered by the revenue function's concavity which implies that larger markets map into a reduction of the marginal return to all bribe efforts that would have otherwise been invested. Last, the first effect is equally countered by the complementarity in the revenue function which incentivizes firms operating in markets of higher value to substitute bribes with inputs, as is the case when exogenously increasing market value.

In low human capital settings, firms are dedicating much of their resources to bribery, and yet the value of the controlled market is low because of the dearth of human capital. Consequently, the marginal return from bribery is high thence implying an intense corrupt activity. Export windfalls in such instances will imply a reduction in the marginal revenue generated by bribery, while simultaneously boosting the marginal return from investing in the (exported) product because of the complementarities tying market size and output. Thence, bribery will drop with exports. In high human capital setups, since human capital inflates the value of the export market, the marginal return from bribery will consequently be low and also not very sensitive to changes in market value. An increase in exports will consequently increase the marginal return to bribing and if the revenue function does not exhibit too strong complementarities, positive export shocks will then map in more bribery.

We now consider a CES production function to convince the reader that our results emerge in the context of very common technologies.

2.5 A CES production function

We now fully characterize the comparative statics results in the context of a widely accepted functional form that fits our setup, we thus consider the following CES revenue function:

$$R(m^i, z^i) = \left[\beta \left[m^i\right]^{\rho} + [1-\beta] \left[z^i\right]^{\rho}\right]^{\frac{1}{\rho}}.$$

Optimizing gives rise to the next first order condition:

$$\frac{\partial R^i}{\partial b^i} = \frac{1}{\rho}\left[[m^i]^{\rho} + [z^i]^{\rho}\right]^{\frac{1-\rho}{\rho}} \left[\beta\rho\alpha[m^i]^{\rho-1}\frac{B^{-i}}{B^2}X - [1-\beta]\rho[z^i]^{\rho-1}\right] = 0.$$

Imposing symmetry, this condition is verified if:

$$\beta\alpha^{\rho}\left[\alpha\frac{X}{n} - C\right]^{\rho-1}\frac{n-1}{n^2 b^*}X - [1-\beta][F-b^*]^{\rho-1} = 0.$$

Since the second-order condition can easily be shown to hold, the sign of $\partial b^*/\partial X$ is (at the symmetric equilibrium) given by:

$$sign\left\{\frac{\partial b^*}{\partial X}\right\} = sign\left\{\frac{\partial \phi}{\partial X}\right\} = sign\left\{[\rho-1]\frac{\frac{\alpha X}{n}}{\frac{\alpha X}{n}-C}+1\right\}.$$

Consider an elasticity substitution parameter $\rho \in]0,1[$ reflecting not too strong complementarities in the revenue function. Define $Y = \alpha X$, and $\underline{Y} = nC$, such that if $Y = \underline{Y}$, then $m = 0$. Then, since (i) for $Y = \underline{Y}$, the sign is given by the sign of $[\rho - 1]$ which is assumed negative, (ii) for $Y \to \infty$, the sign is positive for any $\rho \in]0,1[$, and (iii) given that the expression is monotonically increasing in Y, we can deduce that there exists a unique Y such that $\frac{\partial b^*}{\partial X} \gtrless 0 \Leftarrow Y \gtrless \hat{Y}$. Now, since Y is given by the product of export levels X and the level of human capital α we can then state the following result:

Proposition 3 *For CES revenue functions with mildly complementary arguments (i.e. $\rho \in]0,1[$), there exist a unique level of exports such that the effect of positive export shocks on equilibrium bribery depends on export levels as follows: $Y \lessgtr \hat{Y} \Rightarrow \frac{\partial b^*}{\partial X} \lessgtr 0$. Moreover, the effect of positive export shocks on equilibrium bribery is mediated by the level of human capital α since, for any level of exports, $\alpha \lessgtr \hat{\alpha} \Rightarrow \frac{\partial b^*}{\partial X} \lessgtr 0$.*

By considering a specific CES functional form, we are therefore in a position to fully characterize the comparative statics and to draw clear-cut predictions for our empirical framework. Beyond confirming the findings of propositions 1 and 2, the use of a specific functional form allows us to convince the reader that the results derived earlier are verified with a widely accepted modelling setup: when revenue complementarities between market value and output are not too strong, for low levels of human capital export market expansion reduces bribery, while for high levels of human capital it increases it.

3 Empirical framework

The theory developed in the previous section reveals a non-linear relationship between export booms and bribery that is conditioned by the level of human capital. Our predictions point at a bribe-increasing effect of busts in the presence of low human capital and at a bribe-increasing effect of booms for high levels of human capital. We now provide empirical evidence in support of these findings.

3.1 Data

Firm's bribe payments. Our dependent variable reflects firms' involvement in bribery with public officials, drawn from the World Bank Enterprise Survey (WBES). The WBES is a comprehensive, standardized and internationally comparable firm-level dataset assessing business environment conditions around the world. These surveys cover an original representative sample of some 160,000 firms from 142 developing and transitions economies, operating in the formal economy's non-agricultural manufacturing and service sectors, surveyed over the period 2006-2019.[7] This survey encompasses a wide range of information on the supply side of bribery along with other firm-level characteristics.

[7] WBES data has been collected according to a stratified random sampling with replacement, based on firm size, geographic location and sector of activity. It is worth mentioning that this standardized dataset is not suited for panel data analysis, firms' panel ID being missing.

Our main bribery variable is the annual value of "gifts or informal payments to public officials to 'get things done' with regard to customs, taxes, licenses, regulations, services etc…", reported by firms, and expressed as a share of their total sales. An increase in this variable therefore reflects an increase in the average size of bribe and/or an increase in the incidence of bribe payments among firms.

In the robustness analysis, to complement this variable and to address possible under or over-reporting biases in bribe reports (Clarke, 2011), we compute a second dependent variable of bribe incidence which equals to one if the firm reported an informal payment and zero otherwise.

Export booms and busts. Our measure of export shocks is not confined to specific sources of export variations – such as natural resources (Isham et al, 2005) – but instead considers fluctuations in total exports (expressed in 2010 constant USD) since our theoretical predictions are not restricted to specific export types or markets. Moreover, our empirical analysis focuses on episodes of export booms and busts, rather than on simple variations in export proceeds because the latter may reflect adjustments in international trade rather than sustained expansions or contractions of exports. As such, we view simple variations as imperfectly capturing export market expansions and contractions studied in our theory, since in periods of recovery or in the presence of correction phenomena positive (negative) simple differences may be observed in periods of export busts (booms).[8]

Our measure of export booms and busts is based on the skewness of exports, following the recent literature on the causes and consequences of economic and financial upheavals (Rancière et al., 2008, Popov, 2014, Jorda et al, 2017; Bakeart & Popov, 2019, Jensen et al., 2020). The skewness is a measure of the asymmetry and abnormality of a variable's distribution around its trend, therefore isolating the impact of the large, infrequent, and abrupt export movements, associated with export booms (for positive values) and busts (for negative values)(Cariolle & Goujon, 2015). For instance, the negative skewness of credit growth has been used by Rancière et al. (2008) as a measure of credit bust, while Jensen et al. (2020) and Popov (2014) use it as a measure of expansionary (when above 0) or contractionary (when below 0) growth shocks. According to Rancière et al. (2008), using the skewness instead of *ad hoc* crisis/boom indices has the advantage of being an objective, comparable, *de facto* measure of abnormal asymmetric patterns in a variable's distribution.[9]

The skewness of the distribution of exports around their trend is calculated, over a four-year time-window, and expressed as a share of their trend value, as follows:

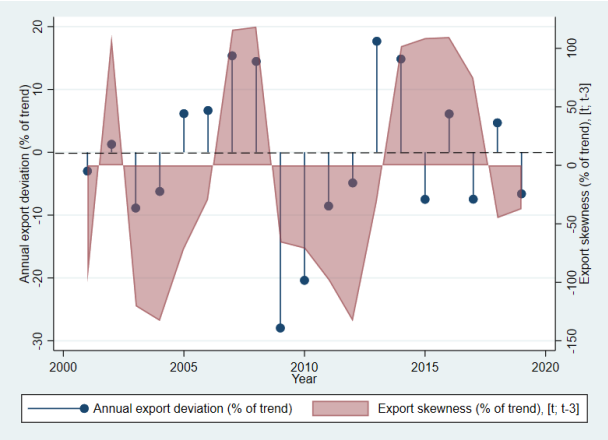
$$S_{jt} = 100 \times \frac{\frac{1}{4}\sum_{t-3}^{t}\left(\frac{y_{jt}-\bar{y}_{jt}}{\bar{y}_{jt}}\right)^3}{\left[\frac{1}{4}\sum_{t-3}^{t}\left(\frac{y_{jt}-\bar{y}_{jt}}{\bar{y}_{jt}}\right)^2\right]^{\frac{3}{2}}}$$

where y_{it} is the observed constant value of exports in country i at time t, and $\bar{y}_{jt}$ a trend isolated by the

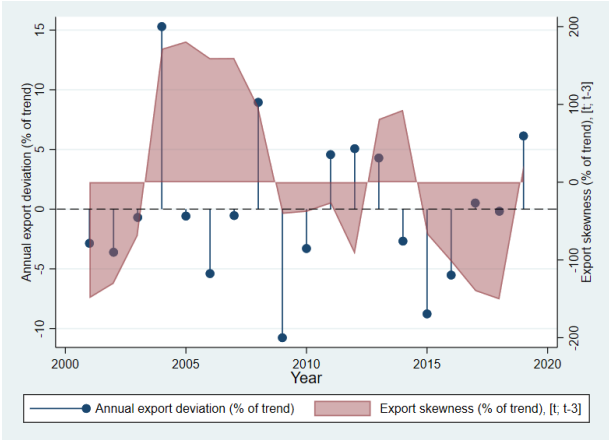
[8] We nevertheless test our model prediction focusing on simple exports deviations from their trend in the robustness section.

[9] Estimations using annual export deviation variables are reported in robustness section 5.1.

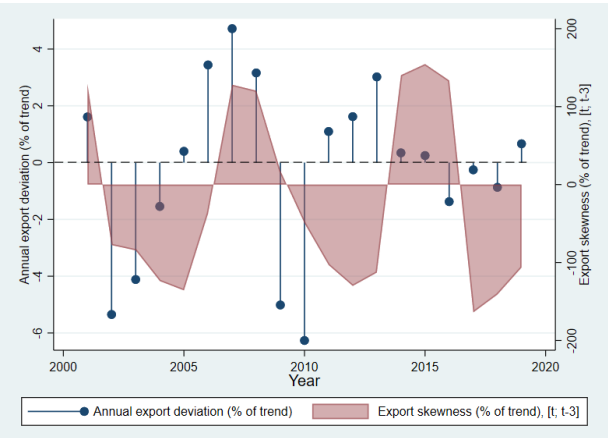
Figure 1: Export skewness and annual export shocks



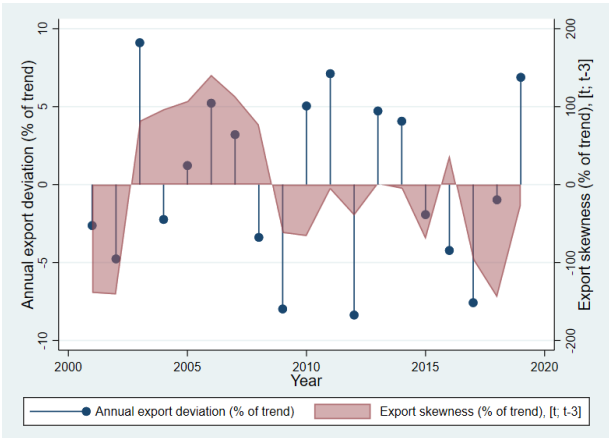
(a) Botswana



(b) Ukraine



(c) Colombia



(d) Pakistan

Hodrick-Prescot (HP) filter.[10] The four-year time window for skewness calculation has been set to match the average export cycle duration, reflected by the autocorrelation order in export cyclical components ($\frac{y_{jt} - \bar{y}_{jt}}{\bar{y}_{jt}}$). In this regard, Table 1 reports the statistics of the Born and Breitung (2016) test for serial correlation, which stresses a third-order autocorrelation in export cycle components.[11] Figure 1 plots the values taken by the export skewness variable against annual export cycle variations, both expressed as a share of exports' trend component. These figures highlight that unlike annual export deviations from the trend, the export skewness allows a better identification of episodes of export booms and busts, by re-contextualizing the occurrence of export shocks with regards to their recent evolution.

The value of the skewness is therefore easily interpretable, reflecting either episodes of export expansions when positive, or episodes of export contractions when negative. An increase in the skewness value reflects an increase in the occurrence of positive shocks relative to negative ones, as illustrated in Figure

[10] We impose a a smoothing parameter set at 6, as recommended by Ravn and Uhlig (2002) and Maravall and Del Rio (2001). The HP filter is a two-sided filter, exploiting all the longitudinal data to separate the trend component from the cycle component in the series (see Cariolle & Goujon, 2015).

[11] In the robustness section, we extend this time-window to check the consistency of our results.

Table 1: Born and Breitung (2016) Q(p)-test for serial correlation: cyclical component of exports (HP-filtered).

Lags	Q(p)-stat	p-value	N	Max T
1	6.81	0.01	207	60
2	7.10	0.03	207	60
3	7.50	0.06	207	60
4	7.60	0.11	207	60
5	8.07	0.15	207	60

Notes: Under H_0, $Q(p) \backsim chi2(p)$. H_0: No serial correlation up to order p. H_a: Some serial correlation up to order p.

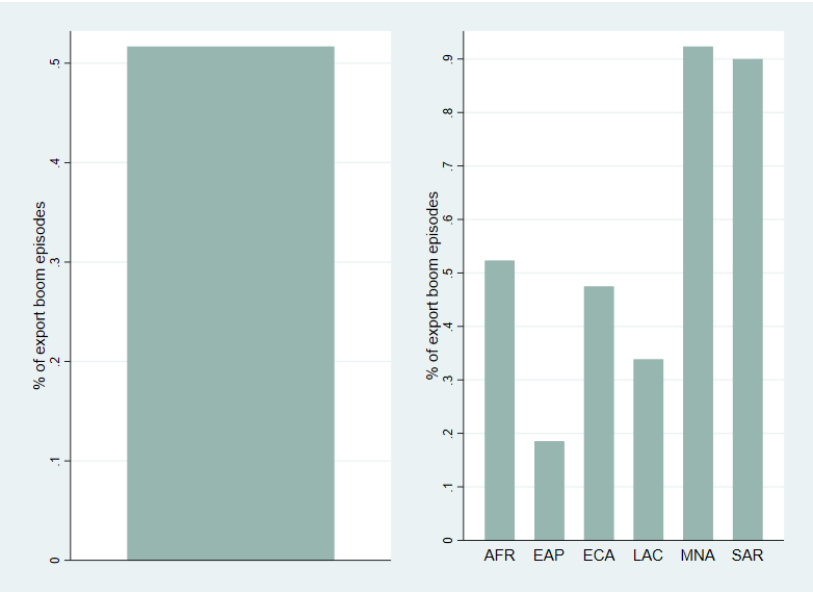
1, and yet such an increase may very well occur in a context where negative shocks are predominant, i.e. in the presence of a negative skewness. This is illustrated in Figure 1 where positive (negative) variations push skewness upwards (downwards) without, however, necessarily inverting its sign. To account for this important nuance, we split our skewness variable into two separate ones: an export boom and an export bust variable:

- **The positive export skewness** variable measures the intensity of export boom episodes and equals the value of the skewness if positive, and takes the value of zero otherwise;
- **The negative export skewness** measures the intensity of export bust episodes, and equals the absolute value of the skewness if negative, and takes the value of zero otherwise.

Figure 2 depicts the percentage of export booms measured with the skewness variable for the full sample (left panel) and at the regional level (right panel). This figure reveals that about half of the sample of firms experienced episodes of export booms, while the other half has experienced episodes of export busts. Yet, this distribution appears to be quite uneven across regions. While East-Asia and the Pacific region (EAP) and Latin America (LAC) have mostly experienced export bust episodes, the Middle-East and North Africa (MENA)and South Asia (SAR) have mostly experienced export booms episodes. Last, episodes of export booms and busts are overall balanced for Sub-Saharan Africa (SSA) and Eastern Europe and Central Asia (ECA).

Control variables. Our set of control variables comprises the relevant country-level and firm-level determinants of corruption that have been identified by the literature (Mauro, 1995; La Porta et al, 1999; Treisman, 2000; Svensson, 2003; Hellman et al, 2003; Diaby & Sylwester, 2015). The specificity of our study commands the inclusion of additional variables. First, we focus on the effect of asymmetric abnormal shocks and we therefore ought to control for the effect of symmetric and normal fluctuations, i.e. for the inherent risk (or uncertainty) in export movements (Elbers et al., 2007). We accordingly include the four-year standard deviation of exports around the HP trend in the corruption equation. Second, our mechanism operates through the level of human capital which may correlate with determinants of the development level. We therefore control for the logarithm of GDP per capita, the logarithm of the

Figure 2: Distributions of export boom and bust episodes, baseline sample shares.



Notes: Baseline sample of 44,790 firms. AFR: sub-Saharan Africa; EAP: East-Asia and Pacific; EAC: Eastern-Europe and Central Asia; LAC: Latin America and Caribe; SAR: South Asia Region. Distributions of export boom and bust episodes represented in this figure are based upon a dummy variable equal to 1 when the export skewness is positive, 0 when it is negative.

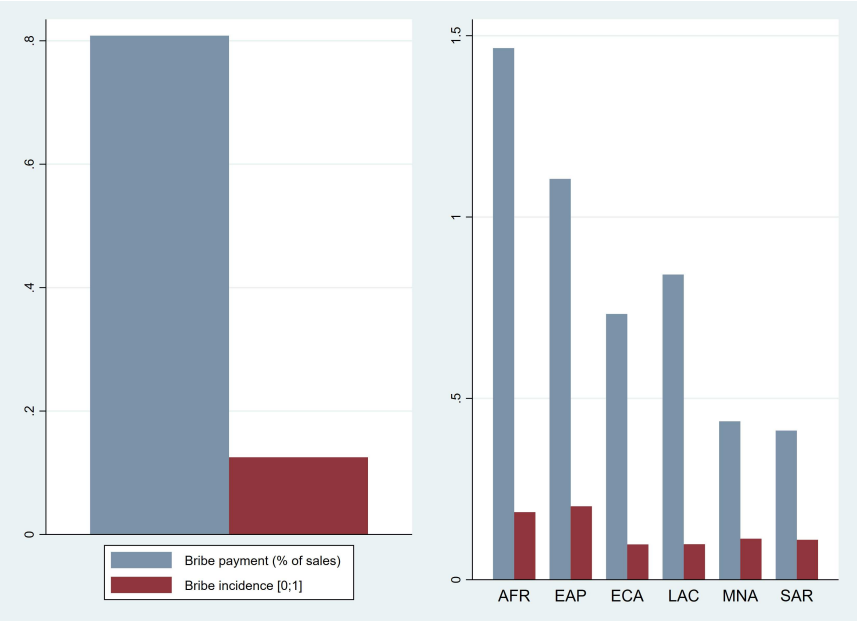
population size, the shares of exports and imports in GDP, and the level of democracy. Third, we control for various determinants of the size of rents in the economy: the shares of different types of natural resource rents in GDP (mineral rents, gas rents, oil rents), the shares of government expenditures and tax revenues in GDP. Last, we control for various micro-level determinants of a firm's inclination to bribe: its total sales, its workforce size, the share of direct and indirect exports in total sales, the firm's shares of public and foreign ownership, its share of working capital funded by internal funds, and its share of working capital funded by public and private commercial banks. Table 2 reports dependent, interest and control variables' summary statistics for the baseline estimation sample.

Further in the analysis, we also include different proxies for the level of educational attainment as control and interaction variables, to test our model's principal prediction. Additionally, we also test the mitigating effects of institutional quality by including three key dimensions of a country's governance framework, as identified by the World Governance Indicators[12]: the regulatory quality, voice and accountability mechanisms, government effectiveness, political stability, corruption control, and the rule of law.

The sample. The baseline estimation sample consists of pooled data covering 44,790 firms interviewed through 11 survey rounds, between 2006 and 2017, and located in 72 developing and transition economies. Some 29.5% of firms surveyed are located in Latin America and the Caribbean, 19.5% in South Asia, 19% in Eastern Europe and Central Asia, 14% in East-Asia and the Pacific area, 10.5% in Sub-Saharan

[12]https://info.worldbank.org/governance/wgi/

Figure 3: Bribe prevalence, baseline sample averages



Note: Baseline sample of 44,790 firms. AFR: sub-Saharan Africa; EAP: East-Asia and Pacific; EAC: Eastern-Europe and Central Asia; LAC: Latin America and Caribe; SAR: South Asia Region.

Africa, and the remaining 7.5% in the Middle-East and North Africa (Table (3)). 12% of firms in the sample have made informal payments, amounting to 0.8% of their total sales on average, while 10.2% of their sales are direct or indirect exports. Sub-Saharan Africa is the region with the lowest share of firm exports (5.6% of sales are direct and indirect exports), the area with the second highest bribery incidence rate (18%), and where the average amount of bribe (almost 2.1% of sales) is the largest. Eastern Asia and the Pacific region is the area with the greatest share of exporting firms (12.6% of sales are direct and indirect exports) and where the incidence of bribery is the highest, as 20% of firms have paid at least one informal payment in the last fiscal year. Figures 3 and 4 depict graphically this information, while Table 2 provides additional summary statistics.

3.2 Econometric framework

Our theory delivers two testable predictions. First, Proposition 1 suggests that for low levels of exports, i.e. in periods of export busts, a further decrease in the level of exports should map into more bribes. In a specular fashion, we predict that increases in exports in periods of booms will equally increase bribery activity. Second, in Proposition 2 we show the mediating effect of human capital: booms and busts will only be conducive to bribery if human capital is, respectively, low and high.

In other words, the ultimate prediction of our theoretical setup is that a positive export shock will increase (decrease) bribery for high (low) levels of human capital. To test this prediction, we estimate

Table 2: Summary statistics

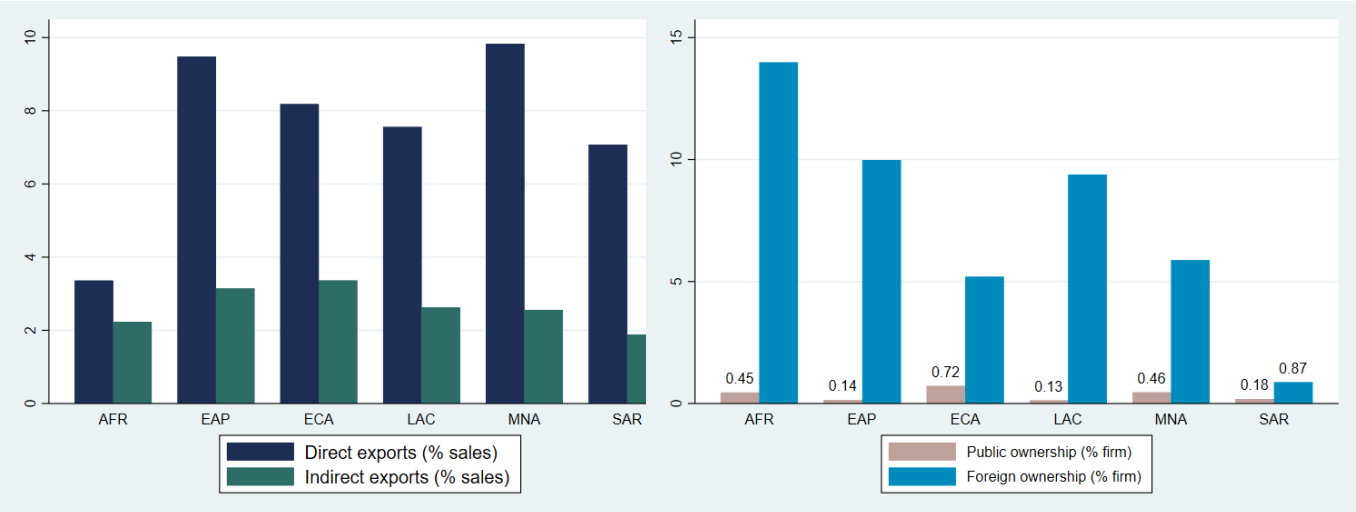
	Mean	Std. Dev.	Min	Max
Dependent variables				
Bribe payments (% of total sales)	.8039389	4.432122	0	100
Bribery incidence (% of firms]	.123532	.3290506	0	1
Firm-level controls				
Total sales (USD, Ln)	13.31373	2.55702	0	29.20451
State ownership (% of firm)	.3246037	4.537276	0	100
Foreign ownership (% of firm)	7.204039	24.21368	0	100
Indirect exports (% of firms' sales)	2.659011	12.94766	0	100
Direct exports (% of firms' sales)	7.537397	22.03343	0	100
Internal funds (% of working capital)	68.47563	34.94427	0	100
External funds (% of working capital)	15.46054	25.95713	0	100
Workforce size (# workers, Ln)	3.466268	1.341818	0	11.06796
Export shock variables				
Export 4-year skewness(in % of trend)	2.068915	115.0369	-191.4861	170.9461
Export 4-year std. dev. (in % of trend)	3.8103	2.954509	.7632416	22.77878
Country-level controls				
Ln GDP per capita (2010 Constant USD)	8.233451	.8999738	6.133235	10.3859
Ln population	17.55523	1.924559	12.32254	20.96489
Exports (% in GDP)	30.38149	13.87499	8.149135	85.6584
Imports (% in GDP)	34.14649	15.6465	11.2546	112.0518
Democracy level index (Freedom House)	7.18061	2.210975	1.166667	10
Oil rents (% of GDP)	2.284596	5.577015	0	43.3093
Gas resource rents (% of GDP)	.5159028	.986977	0	3.761766
Mineral rents (% of GDP)	2.105993	4.129648	0	20.94604
Gov. expenditures (% of GDP)	13.50417	4.10142	5.20998	40.44422
Tax revenue (% of GDP)	14.55172	4.894262	5.835822	39.25777

Dependent variables and firm-level controls are drawn from the WBES. Export shock variables are based on export data drawn built from the World Development Indicators (WDI). Country-level controls are also drawn from the WDI, except for the democracy index drawn from the Freedom House database.

Table 3: Sample composition, by region.

Region	**Freq.**	**Percent**	**Cum.**
Sub-Saharan Africa	4,805	10.73	10.73
East-Asia & Pacific	6,181	13.80	24.53
Eastern Eur. & Central Asia	8,471	18.91	43.44
Latin America & Caribe	13,196	29.46	72.90
Middle East & North Africa	3,392	7.57	80.48
South Asia	8,745	19.52	100.00
Total	**44,790**	**100.00**	

Figure 4: Firm's exports and ownership structure



(a) Firm's exports (b) firm's ownership

Note: Baseline sample of 44,790 firms. AFR: sub-Saharan Africa; EAP: East-Asia and Pacific; EAC: Eastern-Europe and Central Asia; LAC: Latin America and Caribe; SAR: South Asia Region.

the following corruption equation:

$$B_{ijt} = \alpha_0 + \alpha_1 \cdot S_{jt} + \alpha_2 \cdot S_{jt} \times H_{ijt} + \alpha_3 \cdot H_{ijt} + \alpha_4 \cdot \mathbf{X_{ijt}} + D_l + D_t + D_s + \varepsilon_{ijt}. \quad (7)$$

In (7) B_{ijt} is a measure of bribery (bribe payment or incidence) made by firm i in country j at survey-time t. S_{jt} is an aggregate export shock variable in country j at survey-time t, which is measured by the skewness of exports. This variable is interacted with a measure of human capital H_{ijt}, since our model shows that the direction of the effect of positive export shocks on bribery depends on human capital. $\mathbf{X}_{ijt}$ is a matrix of micro-level and country-level control variables, described in subsection 3.1, and ε_{ijt} an error term. D_l, D_t, and D_s are respectively firm's location, survey time and industry fixed effects, included to reduce concerns related to omitted variable biases. Given that S_{jt} is aggregated at the country-year level, we cluster the standard errors at the same level.

The other prediction of our model is that both export booms and busts may increase bribery if the mediating effect of human capital is not accounted for. We test this implication by estimating the following corruption equation:

$$B_{ijt} = \beta_0 + \beta_1 \cdot S_{jt} + \beta_2 \cdot S_{jt}^2 + \beta_3 \cdot \mathbf{X_{ijt}} + D_l + D_t + D_s + \epsilon_{ijt}. \quad (8)$$

If the hypothesis of both export booms and busts increasing bribery holds, then estimates of (8) should support a U-shaped relationship. Accordingly we would then expect the separate effects of export booms and busts to be salient as captured by the following specification:[13]

[13]This considerably simplifies the analysis when the export shock variable takes negative values and is centered around 0, which is the case in our empirical analysis

$$B_{ijt} = \beta_0 + \beta_1 \cdot S_{jt}^{+} + \beta_2 \cdot S_{jt}^{-} + \beta_3 \cdot \mathbf{X_{ijt}} + D_l + D_t + D_s + \epsilon_{ijt}. \quad (9)$$

Where S_{jt}^{+} refers to the positive export skewness variable, and S_{jt}^{-} refers to the negative export skewness variable. ϵ_{ijt} is an error term, and standard errors are again clustered at the country-year level.

4 Empirical results

4.1 Baseline estimations

Our theoretical model therefore suggests that i) human capital level should determine the direction of the export shocks-corruption nexus, and hence that ii) export booms and busts may both be conducive to bribery if the mediating role of human capital is not taken into account.

Table 4 exposes baseline estimates of Equation (7), while Figure 5 reports the associated marginal effects. In columns (1) and (2), we use the primary and the secondary school gross enrolment rates as proxies of human capital level, respectively.[14] In column (3), we include together these two human capital variables as interaction terms to identify the respective contribution of primary and secondary enrolment rates in the mediation of the effect of export shocks on bribery. In column (4), we re-estimate (7) using a different proxy for human capital : the average share of skilled production workers in manufactures' production workforce[15], computed at the country-sector level.

Estimates support in a consistent way that human capital level mediates the effect of export shocks on bribery in the expected and significant way: below a certain level of human capital, positive export shocks reduce bribery, while above it, they increase it. This mediating effect is better apprehended by the marginal effects of export skewness at different values of the interaction variable (Brambor et al, 2006), as depicted on Figure 5. This figure shows that above (below) a certain cut-off value of human capital proxies, corresponding approximately to their median values, an increase in skewness significantly leads to an increase (decrease) in bribery.

However, given the large number of regressors in our corruption equation, it is possible that interactive terms capture different kind of unobserved interactions between dependent and independent variables (Balli & Sorensen, 2013). In particular, we are concerned by a possible positive correlation between aggregate measures of human capital, i.e. primary and secondary gross enrolment rates, and exposure to export booms, which could eventually drive the previously estimated relationships. To address this possibility, we follow Balli and Sorensen (2013) and orthogonalize primary and secondary gross enrolment rates with respect to other regressors. To do this we use as the interactive term the residuals obtained when regressing school enrolment rate variables over the export skewness variable and the set of control variables X_{ijt}. This amounts to estimating the following model:

$$B_{ijt} = \gamma_0 + \gamma_1 \cdot S_{jt} + \gamma_2 \cdot S_{jt} \times H_{ijt}^{\perp} + \gamma_3 \cdot H_{ijt} + \gamma_4 \cdot \mathbf{X_{ijt}} + D_l + D_t + D_s + \xi_{ijt}. \quad (10)$$

[14] The measures are taken from the WDI database: https://data.worldbank.org/indicator/SE.PRM.ENRR

[15] The measures are taken from the WBES. This variable is not available for service firms, which explains the smaller sample size.

Table 4: Baseline estimations, Equation 7

Dep. var: Bribe payments (% sales)	(1)	(2)	(3)	(4)
Export skewness (t; t-3)	-0.302***	-0.0747***	-0.227***	-0.00613*
	(0.0434)	(0.0100)	(0.0487)	(0.00326)
Export skew. x 1ary enrol. rate	0.0028***		0.00195***	
	(0.0004)		(0.00048)	
Export skew. x 2ary enrol. rate		0.00086***	0.000122**	
		(0.0001)	(0.000056)	
Export skew. x % skilled prod. worker				0.00940*
				(0.0051)
1ary school gross enrol rate	-0.207***		0.0596***	
	(0.0437)		(0.0110)	
2ary school gross enrol rate		0.227***	0.155***	
		(0.0385)	(0.0146)	
Sector % of skilled prod. workers				-0.266
				(0.486)
N	42,140	41,125	40,491	32,751
$R2$	0.126	0.124	0.125	0.242

Std err. in parentheses, corrected for heteroscedasticity and clustered at the country-year level. * p < 0.1, ** p < 0.05, *** p < 0.01. Control variables, location, time and sector fixed effects are included in regressions but not reported in the table.

Where $H_{ijt}^{\perp}$ is the orthogonalized human capital variable, and ξ_{ijt} the error term. Standard errors are clustered at the country-year level.

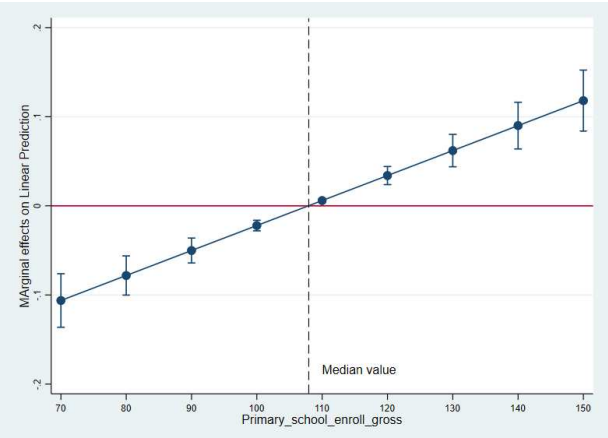
The resulting estimates, reported in columns (1) and (2) of Table 5, stress that orthogonalized primary enrolment, rather than secondary enrolment, is the significant mediator in the export shocks-corruption nexus. Therefore, the main prediction of our model according to which the level human capital mediates the direction of the effect of export shocks is supported by the data. On the other hand, if the mediating role of human capital is not accounted for, and given the heterogeneity in human development levels in our sample, both export booms and busts could be conducive to bribery. We explore this possibility in the next section.

4.2 Export boom and busts

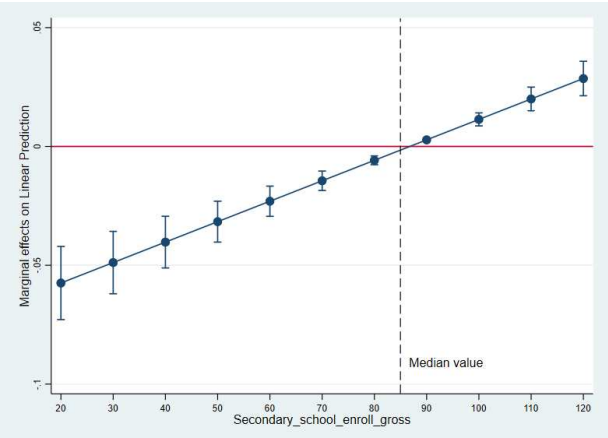
The export skewness variable, as specified in equation (7), does not allow us to properly identify episodes of export booms and export busts. To estimate their separate effects on bribery, we first introduce the squared term of the skewness variable in equation (7), expecting a U-shaped effect of positive export shocks on bribery, with a threshold value lying around 0 if both booms and busts increase bribery. Second, we decompose the skewness variable into distinct variables of positive and negative export skewness, and estimate equation (9). Last, we explore if human capital, proxied by the gross primary enrolment rate and the share of skilled production workers, mediates the effect of export booms and busts on bribery. Estimates are presented in Table 6.

Column (1) reports estimates of equation (8), while Figure 6 depicts their associated marginal effects. The shift in the direction of the effect of export skewness on bribes is not directly observable in the table, but marginal effects clearly stress a U-shaped relationship with a turning point located approximately at

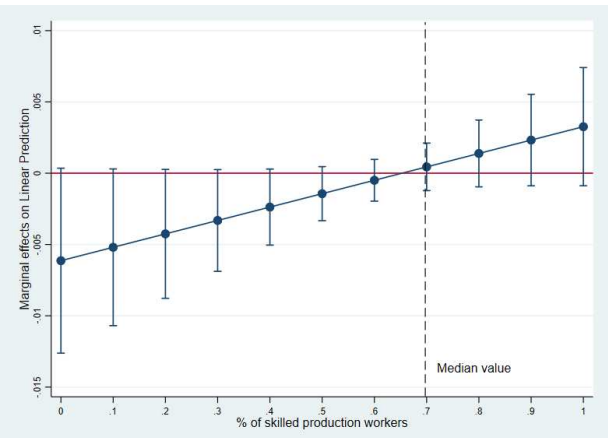
Figure 5: Marginal effects of export skewness on bribery, Equation 7.



(a) Primary gross enrolment rate.



(b) Secondary gross enrolment rate.



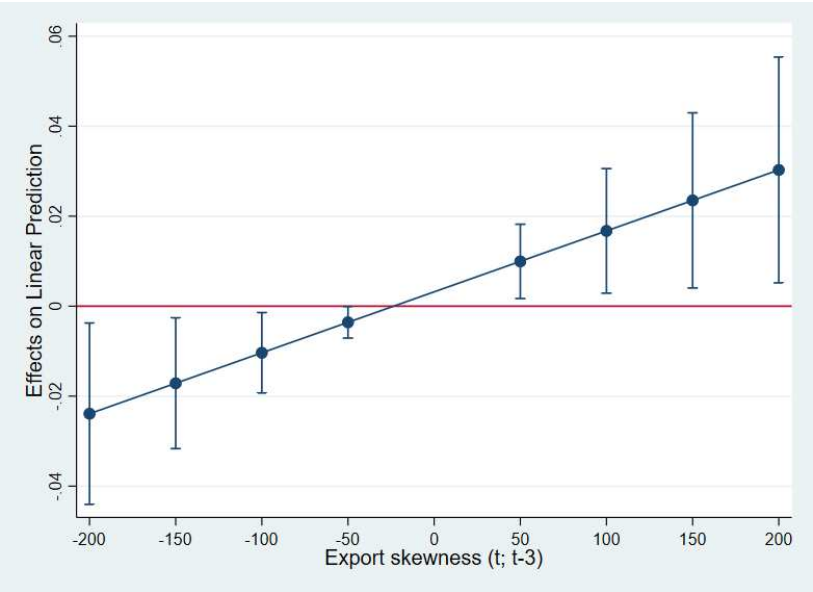
(c) % skilled workers in prod. workforce

Table 5: Orthogonalizing human capital proxies, Equation 10.

Dep. var: Bribe payments	(1)	(2)
Skew (t; t-3)	-0.0189***	0.00702
	(0.00243)	(0.0357)
Skew x 1^{ary} enroll rate$^{\perp}$	0.0173***	
	(0.00242)	
Skew x 2^{ary} enroll rate$^{\perp}$		-0.00597
		(0.0261)
1^{ary} school gross enrol rate	1.272***	
	(0.167)	
2^{ary} school gross enrol rate		-0.425
		(1.994)
N	42,140	41,125
$R2$	0.126	0.124

Std err. in parentheses, corrected for heteroscedasticity and clustered at the country-year level. * p < 0.1, ** p < 0.05, *** p < 0.01. Control variables, location, time and sector fixed effects are included in regressions but not reported in the table.

Figure 6: Marginal effects of export skewness on bribery, Equation (8).



skewness values around 0. Consequently, we decompose the export skewness variable into a positive and a negative skewness and include separately these variables in our econometric specification, as specified in equation (9). The resulting estimates support at a 5% significance level our previous findings that both export booms and busts are conducive to bribery, as suggested by our theoretical model.

In the remaining columns of Table 6, we test the following hypotheses, which are important predictions of our model:

- During export boom episodes, bribery should increase in countries endowed with higher human capital.
- During export busts episodes, bribery should increase in countries endowed with lower human capital.

To test these predictions, we estimate equation (7) with the additional nuance that we separately interact human capital with the export boom variable on the one hand, and the bust variable on the other hand. Human capital is approximated by the primary gross enrolment rate in columns (2) and (3), and by the share of skilled production workers in columns (4) and (5). Estimates show that the positive effect of export booms on bribery is confirmed in high human capital settings, but also that export busts increase bribe payments in the presence of low human capital.

Our empirical analysis therefore confirms that both export expansions and contractions may increase bribe prevalence, and –quite importantly– that these asymmetric effects reflect heterogeneous endowments in human capital.

4.3 The mitigating effect of institutions

We now extend our empirical analysis to test the robustness of our findings to the inclusion of institutions. Scholars have recurrently pointed at the mitigating effect of institutions on rent seeking and corruption,

Table 6: Export booms, busts, and human capital

Dep. var: Bribe payments	(1)	(2)	(3)	(4)	(5)	(6)
Export skewness	0.00319**					
	(0.00146)					
Export skewness^2	0.00007**					
	(0.00003)					
Skew>0 (t; t-3)		0.0123**	-7.735***	0.0154***	-0.00056	0.00997**
		(0.0050)	(1.024)	(0.0031)	(0.0076)	(0.0049)
Skew<0 (t; t-3)		0.00773**	-0.00271***	0.244***	0.00544	0.0187**
		(0.00351)	(0.000698)	(0.0325)	(0.0033)	(0.00741)
Skew>0 × 1^{ary} enrol.			0.0716***			
			(0.00949)			
Skew<0 × 1^{ary} enrol.				-0.00219***		
				(0.000290)		
Skew>0 × skilled %					0.0148*	
					(0.0089)	
Skew<0 × skilled %						-0.0193*
						(0.0103)
1^{ary} gross enrol. rate			-3.970***	-0.144***		
			(0.543)	(0.0383)		
% skilled prod. workers					-1.037	0.793
					(0.862)	(0.531)
N	44,790	44,790	42,140	42,140	32,751	32,751
$R2$	0.125	0.125	0.126	0.126	0.242	0.242

Std err. in parentheses, corrected for heteroscedasticity and clustered at the country-year level. * p < 0.1, ** p < 0.05, *** p < 0.01. Control variables, location, time and sector fixed effects are included in regressions but not reported in the table.

with the deleterious effect of, e.g., resource windfalls being potentially flipped in the presence of strong institutions (e.g. Mehlum et al. (2006) and Robinson et al (2006)). In line with this literature, good institutions as measured by an efficient bureaucracy, well-designed regulations, and strong check and balances, should contain firms' inclination to allocate their resources to bribes and instead incentivize them to invest in inputs and boost their output. We therefore expect key features of the institutional framework to mitigate the positive effect of export booms and busts on bribery. Accordingly, we interact the export boom and bust variables with various proxies of institutional quality, as follows:

$$B_{ijt} = \delta_0 + \delta_1 \cdot S^{+}_{jt} + \delta_2 \cdot S^{-}_{jt} + \delta_3 \cdot S^{+}_{jt} \times Inst_{jt} + \delta_4 \cdot S^{-}_{jt} \times Inst_{jt} + \delta_5 \times Inst_{ijt} + \delta_6 \cdot \mathbf{X_{ijt}} + D_l + D_t + D_s + \upsilon_{ijt}. \quad (11)$$

Where $Instit_{jt}$ is a measure of institutional quality, and υ_{ijt} the error term. Standard errors are clustered at the country-year level.

We consider good governance as an direct outcome of institutional quality, and therefore, measure it using the World Bank Governance Indicators (WBGI), which reflect six independent dimensions of governance quality: Regulatory Quality, Voice and Accountability, Political Stability, Government Effectiveness, Corruption Control, and the Rule of Law indexes.[16] In addition, we build a measure of "red tape" within the sector where the firm operates, by computing the average share of senior management's time spent in dealing with government regulations, a variable drawn from the WBES. An increase in this red tape variable reflects a deterioration of governance quality.

Results are presented in Table 7. Except for the WBGI's Political Stability index (column (3)), all other WBGI's governance quality variables are found to significantly mitigate the positive effect of both export booms and busts on bribery; while the average amount of red tape faced by managers is, as expected, found to mediate it. Therefore, good governance, promoted by strong institutions, is found to attenuate the positive effect of export booms, as already pointed by the literature, but also the positive effect of export busts on bribery.

[16] According to the World Bank, "Governance consists of the traditions and institutions by which authority in a country is exercised. This includes the process by which governments are selected, monitored and replaced; the capacity of the government to effectively formulate and implement sound policies; and the respect of citizens and the state for the institutions that govern economic and social interactions among them." Definitions and sources of these variables can be found at http://info.worldbank.org/governance/wgi/Home/Documents.

Table 7: The mitigating effect of institutional quality, Equation (11).

Dep. var: Bribe payments (%)	(1)	(2)	(3)	(4)	(5)	(6)	
Export skew>0	0.143***	0.281***	0.0198	0.149***	0.0694***	0.2170***	0.00447
	(0.0445)	(0.0380)	(0.0186)	(0.0312)	(0.00869)	(0.0766)	(0.00739)
Export skew<0	0.0633***	0.0861***	0.00955	0.0658***	0.00914**	0.1017***	-0.00323
	(0.0190)	(0.0103)	(0.00880)	(0.0143)	(0.00378)	(0.0342)	(0.00709)
Export skew>0 x Reg. Qual.	-0.0550***						
	(0.0183)						
Export skew<0 x Reg. Qual.	-0.0239***						
	(0.00819)						
Export skew>0 x Voice Account.		-0.107***					
		(0.0148)					
Export skew<0 x Voice Account.		-0.0332***					
		(0.00417)					
Export skew>0 x Pol. Stab.			-0.00517				
			(0.0102)				
Export skew<0 x Pol. Stab.			-0.00202				
			(0.00423)				
Export skew>0 x Gov. Effect.				-0.0753***			
				(0.0167)			
Export skew<0 x Gov. Effect.				-0.0337***			
				(0.00762)			
Export skew>0 x Corr. Cont.					-0.0320***		
					(0.00525)		
Export skew<0 x Corr. Cont.					-0.00716***		
					(0.00216)		
Export skew>0 x Rule of Law						-0.1361***	
						(0.0508)	
Export skew<0 x Rule of Law						-0.0649***	
						(0.0240)	
Export skew>0 x Red tape							0.000578**
							(0.000258)
Export skew<0 x Red tape							0.000780**
							(0.000326)
Additive interaction terms	3.675	2.196*	0.350	5.546***	-3.333***	-0.0710**	
	(2.264)	(1.210)	(0.863)	(1.531)	(0.688)	(0.0295)	
N	44,790	44,790	44,790	44,790	44,790	44,774	
$R2$	0.125	0.125	0.125	0.125	0.125	0.125	

Std err. in parentheses, corrected for heteroscedasticity and clustered at the country-year level. * p < 0.1, ** p < 0.05, *** p < 0.01. Control variables, location, time and sector fixed effects are included in regressions but not reported in the table. Sector red tape is the sector average time spent by managers dealing with regulations. Other interaction variables are drawn from the World Bank Governance Indicators. Additive interaction terms stand for WBGI's Regulatory Quality, Voice and Accountability, Political Stability, Government Effectiveness.

5 Robustness checks

In this section, we undertake a wide range of checks aimed at testing the robustness of our empirical results. First, we ensure that estimated relationships are well identified, i.e. that they are actually driven by firm's export activities. Second, we test our model using alternative and more common export shock variables, based on export deviations from their trend. We also re-run estimations extending the export skewness' time-window. Third, we use a binary bribery variable as the dependent variable in order to reduce a possible estimation bias related to the risk of firms under-reporting the actual size of bribe payments. Fourth, we address a possible reverse causality bias that could result from the macroeconomic consequences of large or foreign firms' corrupt transactions.

5.1 Identification channel: firm's export share.

Thus far, we have highlighted a positive effect of aggregate export booms and busts on firm-level bribery, irrespective of the firm's exporting activity. Bribe payments could however potentially be paid by non-exporting firms and therefore be driven by indirect redistribution schemes, such as public transfers (as suggested by Lane & Tornell, 1999). As a result, our previously estimated relationships may not be clearly identified. Therefore, a primary robustness check consists in making sure that previous empirical estimates of the effect of export shocks on bribery are actually driven by firms' activity in export markets. To this end, we augment equation (9) by interacting our variables of export booms and busts with each firm's share of exports in its total sales as follows:

$$B_{ijt} = \delta_0 + \delta_1 \cdot S^+_{jt} + \delta_2 \cdot S^-_{jt} + \delta_3 \cdot S^+_{jt} \times EXP_{ijt} + \delta_4 \cdot S^-_{jt} \times EXP_{ijt} + \delta_5 \times EXP_{ijt} + \delta_6 \cdot \mathbf{X_{ijt}} + D_l + D_t + D_s + \nu_{ijt}. \quad (12)$$

The share of export, EXP_{ijt}, is measured by the share of direct exports, indirect exports, or both direct and indirect exports in firm's total sales, ν_{ijt} is the error term, and standard errors are clustered at the country-year-sector level.

Results, reported in Table 8, support that the previously estimated relationships actually reflect the bribery effect of export shocks uncovered in our theoretical model. In fact, estimates highlight that the share of exports in firms' total sales significantly drives the positive effect of export booms and busts on bribery. They also reveal that the effect of export booms and busts is no longer different from zero when the share of (direct) exports is nil (columns (1) and (3)). Therefore, this additional piece of evidence suggests that previous findings are related to the firms' export activity.

5.2 Alternative shock variables

We re-estimate equations (7) and (8) after replacing the export skewness variable by a simple measure of export deviations from their trend, $\frac{y_{jt} - \bar{y}_{jt}}{\bar{y}_{jt}} \times 100$. This measure yields separate positive and negative export shock variables, allowing us to proceed to an equivalent decomposition to the one we previously used for the skewness variable.

In Table 9 we estimate equation (7) while interacting the export deviation variable with our different proxies of educational attainment: primary and secondary gross enrolment rates and the firm's sector share of skilled production workers. Results support our model's prediction and confirm the mediating

Table 8: Identification channel: firm's export share.

Dep. var: Bribe payments	(1)	(2)	(3)
Export skew>0	0.0115	0.0122	0.0108
	(0.0076)	(0.00756)	(0.0076)
Export skew<0	0.0062	0.00774*	0.0058
	(0.0047)	(0.0046)	(0.0048)
Export skew>0× Dir. Exp.	0.00019*		
	(0.00012)		
Export skew<0× Dir. Exp.	0.00038**		
	(0.0002)		
Export skew>0× Indir. Exp.		0.0000565	
		(0.00006)	
Export skew<0× Indir. Exp.		-0.0000192	
		(0.00007)	
Export skew>0× Dir. & indir. Exp.			0.00015*
			(0.00009)
Export skew>0× Dir. & indir. Exp.			0.000259*
			(0.00014)
Direct exports (% firm's sales)	-0.0345	-0.00835	-0.0271
	(0.0210)	(0.0082)	(0.0172)
Indirect exports (% firm's sales)	0.000726	-0.0006	-0.0168
	(0.00527)	(0.00784)	(0.0106)
N	44790	44790	44790
$R2$	0.126	0.125	0.126

Std err. in parentheses, corrected for heteroscedasticity and clustered at the country-year-sector level. * p < 0.1, ** p < 0.05, *** p < 0.01. Control variables, location, time and sector fixed effects are included in regressions but not reported in the table.

effect of primary (column (5)) and secondary schooling (columns (3) and (4)) on the relationship between export shocks and corruption. Moreover, they also support the mediating effect of the skilled worker intensity of the sector the firm operates in, but at a 13% confidence level.

In Table 10, we estimate equation (8) while using the export deviation variable, but we do not find any significant evidence of a U-shaped relationship (column (1)). We nevertheless proceed to estimating equation (9), by separating the effect of positive export deviations from negative export deviations. Results in column (2) show a negative effect of both positive and negative export shocks, although they feature rather high p-values.

To ensure that the positive effect of export booms and busts highlighted in Table 6 is not driven by large size deviations, we build deviation-based measures of export booms and busts:

- The *Export boom dev* variable is equal to the value of export deviations when the latter is positive and exceeds the four-year standard deviation around their trend;
- The *Export bust dev* variable is equal to the absolute value of export deviations when the latter is negative and exceeds (in absolute value) the four-year standard deviation of exports around their trend;

We report in Column (3) the estimates of equation (9) using these variables, and they are not conclusive. This could be explained by a lagged persistent effect of export shocks on corruption, supported by the third-order autocorrelation in export cycles evidenced in Table 1. We address this possibility by introducing in equation (9) the current and up-to-order-3 lagged values of export shock variables (column (4)). This approach produces significant but highly unstable coefficients[17], which pushes us to consider the estimated relationships with high caution, and suggests that using the export skewness variable is more appropriate to test our model.

As a last test of this section, we re-estimate (7) and (8) while extending the skewness computation time-window to (t; t-5). Estimates, reported in Table 11, confirm the mediating effect of human capital, using different proxies for educational attainment.[18] This suggests that the previously estimated relationships are not affected by the export skewness time-window.

5.3 Endogeneity concerns

5.3.1 Measurement errors.

Clarke (2011) stressed the risk of under and over-reporting biases in bribe declarations, which may, in turn, bias estimated relationships when our dependent variable is the size of informal payments expressed as a share of total sales. One way of circumventing this drawback consists in using instead a binary variable of bribe incidence, equal to one if the firm has reported an informal payment, and zero otherwise.

We accordingly re-estimate equation (7) with this binary bribery variable, using OLS because of the complexity of interpreting estimates associated with interactive terms resulting from binomial model

[17] These unstable estimates could result from autocorrelation in export cycles, but also from possible conflicting effects export shocks could have on bribery: a direct effect explained by our model, and an indirect effect operating through changes in the level of economic development.

[18] Estimates with additional time windows can be provided upon request.

Table 9: Alternative shock variables, equation (7).

Dep. var: Bribe payments (%)	(1)	(2)	(3)	(4)	(5)
Export deviation (% trend)	-0.0863	0.00536	-3.117***	-3.800	-0.117*
	(0.0586)	(1.177)	(0.398)	(2.455)	(0.0610)
Export dev × 1^{ary} enrol.		-0.00514		0.0270	
		(0.0124)		(0.0248)	
Export dev × 2^{ary} enrol.			0.0491***	0.0103***	
			(0.0071)	(0.00260)	
Export dev × skilled %					0.0698†
					(0.0458)
1^{ary} gross enrol. rate		0.105**		-0.0252	
		(0.0490)		(0.0580)	
2^{ary} gross enrol. rate			0.0315***	0.0945**	
			(0.0139)	(0.0471)	
Sector % skilled prod. work.					-0.134
					(0.455)
N	45,740	43,090	41,194	41,194	33,167
R2	0.126	0.127	0.125	0.125	0.244

Std err. in parentheses, corrected for heteroscedasticity and clustered at the country-year level. † p < 0.15, * p < 0.1, ** p < 0.05, *** p < 0.01. Control variables, location, time and sector fixed effects are included in regressions but not reported in the table. Export deviations are computed as follow: $\frac{y_{jt} - \bar{y}_{jt}}{\bar{y}_{jt}} \times 100$.

estimations (Greene, 2010). The resulting estimates are reported in Table 12 and are consistent with previous estimations.

5.3.2 Reverse causality.

Moreover, the relationship between exports and bribery is possibly bi-directional (Lee & Weng, 2013). Although the use of a firm-level dependent variable mitigates the issue of reverse causality from firm bribery to aggregate export shocks – since it is unlikely that a (corrupt) transaction undertaken by a single firm has macro-level consequences (Héricourt & Poncet, 2015; Paunov & Rollo, 2015; Farla, 2014) – some studies have shown that micro-level interdependencies between firms are such that a micro phenomenon may have aggregate consequences (Gabaix, 2011; Acemoglu et al., 2012; Chaney, 2014).

Therefore, to ensure that reverse causality from corrupt firms to aggregate exports is not at play, estimations of equation (7) are also conducted while restraining the sample to Small and Medium Enterprises (SMEs) and excluding foreign firms.[19] These sample restrictions should neutralize a possible influence of large and foreign firms' decisions on aggregate exports. Results are reported in Table 13. Despite the strong attrition induced by this restriction upon the estimation sample, estimates are again consistent with previous estimations.

Conclusion

Rents are typically viewed as drivers of corruption, and yet it is quite common to witness a proliferation of corrupt practices when rents experience contractions. In this article we have focused on bribe activities in

[19]Domestic firms are identified as firms with less than 10% of foreign ownership.

Table 10: Alternative shock variables, equation (8).

Dep. var: Bribe payments (%)	(1)	(2)	(3)	(4)
Export deviation (% trend)	-0.0866			
	(0.0621)			
Export deviation^2 (% trend)	-0.00004			
	(0.0040)			
Export deviation>0(% trend)		-0.202*		-8.193***
		(0.121)		(0.982)
Export deviation<0 (% trend)		-0.0234		-37.69***
		(0.130)		(4.805)
Export boom dev			0.0727	
			(0.0997)	
Export bust dev			-0.120	
			(0.152)	
L1 Export deviation>0(% trend)				10.54***
				(1.376)
L1 Export deviation<0(% trend)				20.61***
				(2.689)
L2 Export deviation>0(% trend)				26.71***
				(3.447)
L2 Export deviation<0(% trend)				19.18***
				(2.509)
L3 Export deviation>0(% trend)				-6.864***
				(0.866)
L3 Export deviation<0(% trend)				-24.40***
				(3.110)
N	45,740	45,740	45,740	44,790
$R2$	0.126	0.126	0.126	0.125

Std err. in parentheses, corrected for heteroscedasticity and clustered at the country-year level. * p < 0.1, ** p < 0.05, *** p < 0.01. Control variables, location, time and sector fixed effects are included in regressions but not reported in the table. *Export deviations* are computed as follow: $\frac{y_{jt} - \bar{y}_{jt}}{\bar{y}_{jt}} \times 100$. *Export boom dev* is equal to *Export deviations* when the latter is above 0 and exceeds the 4-year standard deviation of exports, 0 otherwise. *Export bust dev* is equal to the absolute value of *Export deviations* when the latter is below 0 and its absolute value exceeds the 4-year standard deviation of exports, 0 otherwise.

Table 11: Extending skewness time-window, equation (7).

Dep. var: Bribe payments	(1)	(2)	(3)
Export skewness (t; t-5)	-0.0734***	-0.463***	-0.00234
	(0.00792)	(0.0560)	(0.00204)
Export skew. x 1ary enrol. rate	0.000476***		
	(0.00006)		
Export skew. x 2ary enrol. rate		0.00734***	
		(0.00088)	
Export skew. x % skilled prod. worker			0.00629*
			(0.00356)
1ary school gross enrol rate	0.353***		
	(0.0424)		
2ary school gross enrol rate		3.000***	
		(0.367)	
Sector % of skilled prod. workers			0.213
			(0.478)
N	41,211	40,215	32,064
$R2$	0.126	0.124	0.242

Std err. in parentheses, corrected for heteroscedasticity and clustered at the country-year level. * p < 0.1, ** p < 0.05, *** p < 0.01. Control variables, location, time and sector fixed effects are included in regressions but not reported in the table.

Table 12: Export shocks and bribe incidence, equation (7).

Dep. var: Bribe incidence	(1)	(2)	(3)	(5)
Export skewness (t; t-3)	-0.00024**	-0.0281***	-0.0086***	-0.0006***
	(0.0001)	(0.0018)	(0.0005)	(0.0002)
Export skew. x 1ary enrol. rate		0.00026***		
		(0.00006)		
Export skew. x 2ary enrol. rate			0.00010***	
			(0.00001)	
Export skew. x % skilled prod. worker				0.0007***
				(0.0002)
1ary school gross enrol rate		0.0324***		
		(0.0056)		
2ary school gross enrol rate			0.0309***	
			(0.00177)	
Sector % of skilled prod. workers				0.0003
				(0.0317)
N	47,532	44,448	43,699	34,421
$R2$	0.281	0.278	0.276	0.279

Std err. in parentheses, corrected for heteroscedasticity and clustered at the country-year level. * p < 0.1, ** p < 0.05, *** p < 0.01. Marginal effects not reported. Control variables, location, time and sector fixed effects are included in regressions but not reported in the table.

Table 13: Export shocks and bribery, domestic SMEs, equation (7).

Dep. var: Bribe payments	(1)	(2)	(3)	(4)
Export skewness (t; t-3)	-0.339***	-0.0806***	-0.259***	-0.0057
	(0.0529)	(0.0124)	(0.0463)	(0.0037)
Export skew. x 1ary enrol. rate	0.0031***		0.0023***	
	(0.0005)		(0.00043)	
Export skew. x 2ary enrol. rate		0.0009***	0.00005**	
		(0.0001)	(0.000025)	
Export skew. x % skilled prod. worker				0.00853†
				(0.00579)
1ary school gross enrol rate	-0.252***		0.0780***	
	(0.0508)		(0.0110)	
2ary school gross enrol rate		0.259***	0.178***	
		(0.046)	(0.0257)	
Sector % of skilled prod. workers				-0.367
				(0.532)
N	31,419	30,683	30,202	24,160
$R2$	0.137	0.136	0.137	0.271

Std err. in parentheses, corrected for heteroscedasticity and clustered at the country-year level. † p < 0.15, * p < 0.1, ** p < 0.05, *** p < 0.01. Control variables, location, time and sector fixed effects are included in regressions but not reported in the table.

contexts notoriously exposed to corruption –i.e. export markets– and have attempted rationalizing such observations. We propose a theory that explains both why export booms and export busts spur bribery, and uncover the role of human capital in mediating this nexus. The mechanism we highlight is quite intuitive. Exporting firms decide how to allocate their cash flow between producing goods and bribing officials to secure more valuable export markets in a setup where both components are conceptualized as arguments of the firm's total revenue. In low human capital settings, the *marginal* revenue of an export windfall will be large, and thence subject to strong diminishing marginal revenue. Consequently, an exogenous expansion of the export market will result into a reduction of the marginal revenue of bribe because of the revenue function's concavity, and this effect will be exacerbated by the complementarities between bribery and production: export busts increase bribe payments. In contrast, for high levels of human capital, the opposite holds true if complementarities are not too strong. Since the value of the claimed (corrupt) export market will then be high, the marginal revenue generated through corruption will then increase by more than the marginal revenue of output production. Consequently, positive export shocks will increase the incentives to bribe.

Our empirical evidence fully confirms that both export booms and busts are conducive to bribery, but also that the effect is mediated by the level of human capital. Using a large repeated cross-section survey database of some 45,000 firms located in 72 developing and transition economies covering the 2006-2017 period, we uncover that –in line with our theory– export booms and busts are associated with a larger size and probability of bribe payments. Importantly, however, we establish that human capital as measured by education level plays a crucial mediating role in the process: above a given threshold value of different proxies of human capital level export booms lead to higher bribes, and below this threshold export booms are found to reduce bribery. Our results are shown to be robust to alternative measures of booms and busts, of bribery, as well as to the exclusion of large firms that could potentially endogenously affect

export levels. Moreover, we confirm the widespread view that strong institutions mitigate rent-seeking practices, and thus corruption in the context of our study, without, however, eradicating the effect of booms and busts on bribing.

By rationalizing and establishing empirically the non-monotonic effect of export market expansions on bribery as well as the mediating effect of human capital helps us break the myth that corruption is a problem of the poor, while equally tempering findings exclusively tying windfalls to corruption. Although the richness of our data conforts us viewing this result as robust, further research should be conducted to verify whether similar non-linearities are at play between other types of resources and rent seeking.

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"Sur quoi la fondera-t-il l'économie du monde qu'il veut gouverner? Sera-ce sur le caprice de chaque particulier? Quelle confusion! Sera-ce sur la justice? Il l'ignore."

Pascal

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