Examining the Export Wage Premium in Developing Countries*

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Abstract

There are arguably potential wage gains from exports in developing countries. Export markets bring about opportunities for firms and successful exporting firms translate some of the benefits of exports to workers via employment and wage premia. Using comparable data for 61 developing and low-income countries, we document the prevalence of the export wage premia worldwide. With an extensive literature review, we identify four major drivers of the wage premia: exporting firms hire more skilled workers, utilize more sophisticated machines, buy higher quality material inputs, and are more productive than non-exporting firms. Our empirical analysis confirms the worldwide prevalence of these mechanisms and, furthermore, establishes a strong link to the estimated wage premia.

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1 Introduction

Export markets bring gains to the domestic economy and can become an engine for development in low income countries. In particular, the evidence shows that exporting firms pay higher wages and hire more workers than non-exporters. This is due to the combination of special requirements of the act of exporting, such as quality upgrades or exporting services, and some inherent attributes of firms, such as productivity, technology, and efficiency (Matsuyama, 2007; Verhoogen, 2008). In this scenario, exporting brings up enhanced opportunities for firms in world markets, and these opportunities can be successfully exploited if firms have, or develop, the needed attributes to become efficient world producers. In turn, this process has implications for employment and wages and, in consequence, the whole mechanism allows those world export opportunities to be transmitted to the local economy. In the end, the benefits from globalization can be realized not only at the firm level (e.g., in terms of profits) but also at the worker level (e.g., in terms of wages and employment).

Our goal in this paper is to assess these arguments. We want to study whether exporting firms do pay higher wages, focusing in particular on lower income countries, and to investigate some of the operating mechanisms. To this end, we build on a literature review that identifies major theories and hypothesis related to exports and wages. In this review, we find that export markets demand high quality products and that the production of high quality products requires high-quality, skilled labor, high-quality, imported inputs, high-quality, sophisticated machine, and high-quality, productive firms. Then, we use comparable micro-data from the Enterprise Surveys to quantitatively document the wage premia paid by exporting firms in 61 developing and low-income countries and we document the role of product quality, labor quality, input quality, technology and productivity. We find strong evidence of a wage premium among exporting firms and we provide strong support for the operating mechanisms advocated by the literature. In our sample of 61 countries, these mechanisms explain most of the wage premia.

The paper is organized as follows. In section 2, we describe and use firm-level micro data to estimate the wage exporter premia. In section 3, we do a comprehensive literature

review of several dozen papers from the literature and we provide evidence of some of the mechanisms at play behind those premia. In section 4, we assess the role of these mechanisms in explaining the wage premia. Section 5 concludes.

2 Exporting Firms and the Wage Premium

The aim of this section is to establish empirically the main premise of this study, namely that exporting leads to gains in wages. Since the literature mostly provides estimates of wage export premia in middle-income and developed countries, we are particularly interested in determining whether this observation holds for developing and low-income countries too. This is an important contribution of our paper.

2.1 The Data

The basic set of stylized facts concerning exporting firms and wages is derived here using comparable data from the Enterprise Surveys. An Enterprise Survey is a firm-level survey of a representative sample of an economy's private sector. The surveys cover a broad range of business environment topics including access to finance, corruption, infrastructure, crime, competition, and performance measures. The Enterprise Surveys provide the world's most comprehensive firm-level data for low income countries. The Enterprise Surveys project is jointly led by the World Bank and various partners, such as the European Bank for Reconstruction and Development, the Inter-American Development Bank (IDB), COMPETE Caribbean, and the UK's Department for International Development (DFID).

In every country, there is a unique and consistent definition of the universe of the survey. This universe can be described as the non-agricultural formal, private economy and it includes manufacturing, retail, other services, IT, construction, and transport. All firms with 5 employees or more are included. Samples are stratified by industry, size, and geographical regions. The number of strata is defined according to the size of the economy. For large and very large economies between 2 to 6 manufacturing sectors are selected to be surveyed with samples large enough to allow for sector analysis (productivity). Retail is also

single out as a stratum on its own. The rest of the economy is allocated into two additional strata: rest of manufacturing, and the rest of the economy (including construction, transport, and other services). Medium size economies are stratified only into manufacturing, retail and the rest of the economy. Small economies are stratified into manufacturing and services and usually their sample size is 150 firms.

Special emphasis is placed on the quality of the information. Experience shows that this is highly correlated to the length of the questionnaire which also affects the response rate. Consequently, the questionnaire is designed to not take longer than 1 hour to complete. A unique global questionnaire is used across all regions. To incorporate regional interests, 60 variables are allocated to reflect regional characteristics, provided that the questions follow the general format of the global questionnaire. Regional questions can be distributed across the questionnaire or ideally into modules about topics of interest for the region. Two versions of the questionnaire are used to facilitate implementation and reduce the duration of the interview. There is a core minimum number of questions that apply to every establishment. The services version adds some questions specific for the retail sector and other services sectors; the manufacturing version adds questions specific to the sector and some basic accounting information to estimate productivity at the establishment level.

Table 1 lists the countries covered in the analysis as well as some basic information on export exposure. The data cover most developing countries, and many low-income countries, especially in Africa. As it can be seen in column 3 of Table 1, the Enterprise Survey data uncover a significant exposure to exports. On average, worldwide, 34 percent of firms participates in exports. The fraction of exporting firms is 36 percent in Latin America and Asia, 32 percent in Europe and only 28 percent in Africa. There is a lot of dispersion, even within continents. For instance, the fraction of exporters is 71 percent in Macedonia, and 17 percent in Russia; 55 percent in Argentina, and 26 percent in Nicaragua; 62 percent in Thailand, and 14 percent in Kazakhstan. In Africa, the fraction of exporters ranges from as high as 61 percent in South Africa and 60 percent in Morocco, to 3 percent in Nigeria, 5 percent in Burundi, or 7 percent in Ethiopia.

It is noteworthy that the intensity of exports also varies a lot across countries, and not

necessarily as export participation does. We define export intensity as the share of exports in total sales for exporting firms. Worldwide, the average exporter ships 53 percent of its sales abroad. The highest export intensity is computed in Asia, 69 percent. In Africa, the average exporting firm exports 53 percent of its sales, the worldwide average, but the share of exporting firms is the lowest. Latin American exporters ship on average 34 percent of their sales abroad, and the corresponding figure for Europe is 46 percent.

In Table 2, we provide basic summary statistics for the main variables used in this study. For all variables, the data show significant heterogeneity and, to simplify the exposition, we briefly discuss world averages relative to regional averages. For instance, the average world ratio of skilled to unskilled workers is 1.64 (column 1). This ratio is 3.17 in Europe, 1.26 in Latin America, 1.67 in Africa, and 1.65 in Asia. The average capital to labor ratio is 8.59 in the world, 9.97 in Europe, 8.84 in Latin America and Africa and 8.08 in Asia (column 2). On average, 22 percent of firms has ISO-certified products (column 3). Around 51 percent of firms is an importer (column 4) and the share of imported input use is 27 percent (column 5). Around 12 percent of firms has at least some degree of foreign ownership, while 9 percent has majority foreign ownership (columns 6 and 7). In column 8, we report measures of total factor productivity. The highest TFP is estimated in Europe, followed by Latin America, Asia and, finally, Africa.

2.2 The Wage Premium

The starting point of our quantitative analysis is the exploration of the correlation between exports, exporting firms, and wages. Since the firm-level Enterprise Survey is a cross-section, the regression model is

$$(1) \quad \ln w_{ij} = \delta E_{ij} + \phi_j + u_{ij},$$

where $\ln w_{ij}$ is log of the average wage in firm i in industry j, E_{ij} is a measure of exporting status, ϕ_j is an industry fixed effect and u_{ij} is an error term. In (1), the exporting status of firm i is measured with a dummy (equal to 1 for exporting firms) so that the coefficient

of interest, δ, is interpreted as the wage exporter-premium. It should be noted that the regression model in equation (1) can only uncover (unconditional or conditional) correlations, and that no causality can be inferred.

We explore the wage premium in Table 3. We estimate different wage premia for each country in our data as well as for countries within regions (continents) and for the developing world as a whole. This is important in order to quantify worldwide wage premia and, in particular, wage premia for the poorest countries in the world—countries for which evidence on exporter premia is missing entirely.

On average across developing countries, exporting firms pay 31 percent higher wages than non-exporters. There is a fair degree of heterogeneity across regions. The premia are 20 percent in Europe, 22 percent in Africa, 38 percent in Latin America, and 30 percent in Asia. As expected, there is a lot of cross-country heterogeneity as well. For instance, the highest wage premia are estimated in Moldova (67 percent), Côte d'Ivoire (77 percent), Peru (52 percent), Brazil and Uruguay (51 percent), and the Philippines (62 percent). The lowest premia (which often are not statistically significant) are estimated in Hungary (9 percent), Ghana (6 percent), Kenya and Zimbabwe (7 percent), Paraguay (6 percent), and India (5 percent).

To some extent, these cross-country differences are due to differences in industry coverage. In fact, the surveys may target different industries in different countries and in different time periods. To assess this, we identify a group of "selected" industries that are covered in all Enterprise Surveys. These are Textiles, Garment, Food, Beverages, and Metals and Machinery. As we report in column 2 of Table 3, we find that the estimated premia is in general robust.

While we study the main determinants of these premia below, it is important at this moment to explore whether our findings can be affected by firm ownership. In many developing countries, exporting firms are owned by foreign companies and this may affect wages and employment. In column 3, however, we find, overall, similar patterns of wage exporting premia as before. For instance, the average worldwide premium is 25 percent (as opposed to 31 percent in column 1). The premia are generally attenuated (relative to the

regressions without controlling for ownership): for Europe, the premium declines from 20 to 17 percent; in Africa, it declines from 22 to 18 percent; in Latin America, from 38 to 33 percent; and, in Asia, from 30 to 21 percent. This happens because foreign firms pay higher wages. Nevertheless, conditional on this, there is still evidence of a sizeable wage exporting premium.[1]

Finally, to put these estimates into better context, we compare them with the main findings in the literature. In fact, the finding of an export wage premium is actually not surprising. It is a very well-documented fact since the seminal work of Bernard and Jensen (1995), Bernard and Jensen (1999) and Bernard and Wagner (1997). A large literature follows Bernard and Jensen's methodology (to different degrees) and establishes the existence of export premium in wage regressions. Most of these studies, however, cover middle-income or high-income countries. Specifically, see Bernard and Jensen (1995), Bernard and Jensen (1999), Bernard and Jensen (2004) for the U.S. Their estimated wage premia range from 7 to 14 percent. For Germany, Bernard and Wagner (1997) find wage premia of 7 percent, Arnold and Hussinger (2005) of 24 percent, and Baumgarten (2013) of 22.3 to 29.8 percent. For Taiwan, Aw and Batra (1999) and Liu et al. (1999) report wage premia of 30 percent for non-production workers, 14 percent for production workers, and around 15.5 percent for the average worker. Also for Taiwan, Tsou et al. (2002) find wage premia of 18.6 to 23.8 percent. Greenway and Yu (2004) estimate wage premia in the UK ranging from 4.5 to 6.4 percent. In Korea, the wage premium is around 12 percent (Hahn, 2004); in Sweden, it is 1.5 percent for unskilled workers and 7 percent for skilled workers (Hansson and Lundin, 2004); in Slovenia, it is around 16 percent (De Loecker, 2007); in Spain, it is around 25-35 percent (Farinas and Martin-Marcos, 2007).

While, overall, our estimates in Table 3 are in line with this evidence, it is difficult to elaborate on this comparison because of major differences in country coverage. There are, nevertheless, a few instances in the literature that allow for a more meaningful comparative

[1]It is important to note that we are estimating these premia using cross-sectional data collected at, often, different years. It might consequently be possible that these wage premia are capturing differences in business cycles across countries. These factors can contribute to the heterogeneity in wage premia observed in the data. For these reasons, we focus on averages rather than country-specific estimates and, as we explain below, on the underlying mechanisms.

analysis. Zhou (2003), for instance, examines the case of Mexico and finds wage premia of around 7 to 9 percent. Our estimate for Mexico is larger, about 40 percent. Isgut (2001) studies the Colombian case and finds a wage premia of 40-50 percent for managers and 9-16 percent for blue-collar workers. Our estimate for Colombia is 42 percent. In Chile, Alvarez and Lopez (2005) report wage premia of 15 percent for production workers, 28 percent for non-production workers and 21 percent for the average worker. Our estimate for Chile is 26 percent. For Latin America as a whole, our estimated average premium ranges from 33 to 38 percent.

By exploiting the data from the Enterprise Surveys, we are able to produce estimates of the wage premium for a much wider set of countries. We arguably fill a gap in the literature. A nice paper, which is close to ours, is Van Biesebroeck (2005), who explores nine African countries: Burundi, Cameroon, Côte d'Ivoire, Ethiopia, Ghana, Kenya, Tanzania, Zambia and Zimbabwe. This paper reports an average African wage exporting premia of 40 percent. Our average estimate, across several other countries, is smaller, around 22 percent.

3 Mechanisms

For both analytical purposes and for policy purposes, it is important to understand the mechanisms by which the link between exports, wages and employment operates. To explore this issue, we proceed as follows. First, we do a comprehensive literature review to identify, both theoretically and empirically, the main mechanisms. These turn out to be skilled labor utilization, technology sophistication, imported input use, and productivity. Second, illustrate formally the literature by introducing a simple model that captures, in a cohesive way, those four major mechanisms.

3.1 Identifying Some of the Main Mechanisms

The literature has postulated several hypotheses to explain the link between exporting and the wage (and employment) premium. Originally, two theories stood out (Roberts and Tybout, 1997; Clerides, Lach, and Tybout, 1998). One theory argues that firms self-select

into exporting. Consequently, "better" firms becomes exporters and, jointly, perform better. This better performance manifests itself with the payment of a wage premium and the hiring of more workers, among other features (such as productivity, input use, technology adoption; more on this below). An elaboration of this idea is the conscious self-selection theory, whereby self-selection is a conscious decision of firms that become "better" (e.g., become more productive) with the intended purpose of becoming exporters (Alvarez and Lopez, 2005; Lopez, 2009). The other theory postulates a learning-by-exporting process. Firms become exporters and later become "better," paying higher wages, employing more workers, and so on. Both theories imply a correlation between exports and firm productivity. The evidence, however, tends to support a theory of self-selection more than a theory of learning-by-exporting. A widespread (but not universal) interesting finding of this literature is that, while it is clear that good firms become exporters, it is less clear that exporters remain significantly better than non-exporters (Bernard and Jensen, 1995; Bernard and Jensen, 1999; Bernard and Wagner, 1997).[2]

In this paper, our aim is to take further steps into disentangling the underlying mechanisms. Our starting point is thus the well-established fact that exporters are more productive than non-exporters and, following Melitz (2003), that this productivity advantage translates into higher wages and employment. Our goal in what follows is to uncover some of the mechanisms behind the main productivity channel.

There are many reasons why more productive exporters hire more workers and, especially, why they pay higher wages. A key reason is that the production of goods for export requires skilled labor. Skilled labor is needed because exporting requires quality upgrades, as in Verhoogen (2008) or because the act of exporting involves operational services, as in Matsuyama (2007).[3] Both the provision of quality and the production of exporting

[2]See the review in Wagner (2007). Key paper in this literature are Alvarez and Lopez (2005), Hansson and Lundin (2004), Greenaway and Yu (2004), Serti and Tomassi (2008), Isgut (2001), Delgado, Farinas and Ruano (2002), Fryges and Wagner (2008), Arnold and Hussinger (2005), Frias, Kaplan and Verhoogen (2009), Kandilov (2009), De Loecker (2007), Wagner (2002), Park, Yang, Shi, and Jiang (2010), Marin (1992).

[3]Using aggregate product-level bilateral trade data, Hallak (2006) is one of the first authors to document the positive correlation between export unit values and the level of income of the country of destination. More recent studies, such as Baldwin and Harrigan (2011) and Johnson (2012), also find positive correlations between export unit values and the income of the destination country. Using firm-level data, Manova and

services are skilled-intensive activities. As a result, firms that choose to export need to hire proportionately more skilled labor and pay their high-skilled workers a wage premium. Exporters can afford to do that because exports markets pay, in turn, a premium for their products. Another reason why exporters pay higher wages is a complementarity between the choice of technology of production used in exporting and the skilled level needed to use those technologies. Yeaple (2005) and Acemoglu and Zilibotti (2001) are examples.[4]

There is a large empirical literature linking skill utilization and exports. Bernard and Jensen (1997) document that increases in employment at exporting plants contribute to the observed increase in relative demand for skilled labor in manufacturing in the U.S. Moreover, exporters account for almost all of the increase in the wage gap between high– and low–skilled workers. Munch and Skaksen (2008) study the link between the education level of a firm workers, its export performance and the workers wages. Using matched worker–firm panel data, these authors find that firms with high export intensities do indeed pay higher wages and use more skilled labor. However, an interaction term between export intensity and skill intensity has a positive impact on wages and it absorbs the direct effect of the export intensity. This means that the export wage premium found in the data accrues to workers in firms with high skill intensities. Verhoogen (2008) uses the Mexican devaluation of 1994 as an exogenous change in exports. He finds that firms that were more intensively affected by this "export" shock paid higher wages and that this was in part due to an increase in the composition of skilled employment needed to upgrade product quality in Mexican exports to the U.S. Bustos (2014) studies the experience of Argentine firms in the face of enhanced export opportunities to Brazil and confirms that the reduction in Brazil's tariffs induces the most productive Argentine firms to upgrade skills. In fact, she documents that one third of the increase in the relative demand for skills can be attributed to the reduction in Brazil's tariffs. There are many other papers linking exports to skill utilization. Serti, Tomasi and

Zhang (2012) show that Chinese exporting firms do indeed charge higher prices in richer markets. Similar evidence is reported by Bastos and Silva (2010), for the case of Portuguese exporters, and Görg, Halpern and Muraközy (2010), for the case of Hungarian exporters.

[4]Yet another reason is profit-sharing. Exporters make higher profits and, because of efficiency wages, firms share part of those higher profits with workers. See Egger and Kreickemeier (2009), Egger and Kreickemeier (2010) and Egger and Kreickemeier (2012) for a theoretical approach and Amiti and Davis (2011) for empirical evidence for Indonesia.

Zanfei (2010) investigate the Italian manufacturing industry and Söderbom and Teal (2000) focus on Ghana.

A different strand of literature provides evidence in support for a quality provision mechanism in exports. Schott (2004) explores U.S. import unit values and reports higher unit values for varieties originating in capital- and skill-abundant countries. Moreover, exporting countries that become more skill- and capital-abundant with time experience increases in unit values relative to other exporters. He also finds that richer countries tend to export higher quality products. Hummels and Klenow (2005) show that quality differentiation is needed to explain differences in unit values and show that these unit values positively correlate with per capita income of the exporting country. Hallak (2010) documents that trade is more intense among countries with similar income per capita—the Linder hypothesis. Caron, Fally, and Markusen (2014) establish a positive correlation between the income elasticity of a good and its skilled-labor intensity. This implies that richer countries demand and produce higher quality goods and, as a consequence, trade between rich countries is more intense than trade between rich and poor countries (especially in higher quality goods).

Exporters may pay higher wages (on top of the skilled labor utilization mechanism) because of complementarities with technology upgrades. Bustos (2011) provides evidence on the link between exports and technology upgrading in Argentina after MERCOSUR. Her empirical analysis reveals that firms in industries facing higher reductions in Brazil's tariffs (main MERCOSUR partner for Argentine firms) increase investment in technology faster, especially for middle-upper and high-productivity firms. Lileeva and Trefler (2010) study the experience of Canadian firms and their exports to the U.S. They find that those lower-productivity Canadian plants that were induced by the tariff cuts to start exporting engaged in more product innovation and had high adoption rates of advanced manufacturing technologies. In contrast, they find no effects for higher-productivity plants. An important related paper is Aw, Roberts and Xu (2011). This paper estimates a dynamic structural model of a producer's decision to invest in R&D and export, allowing both choices to endogenously affect the future path of productivity. Using plant-level data for the Taiwanese electronics industry, both activities are found to have a positive effect on

the plant's future productivity. This in turn drives more plants to self-select into both activities, contributing to further productivity gains. Simulations of an expansion of the export market are shown to increase both exporting and R&D investment and generate a gradual within-plant productivity improvement.

The literature has pointed out that the production of export goods (e.g., products of higher quality) often requires high quality inputs (besides high quality labor, as above). In general, in developing countries, higher quality inputs are imported. If there is, as suggested in the literature, a complementarity between the use of higher-quality inputs and the use of higher-quality labor, then this is another mechanism underlying the wage export premium. This mechanism can be interpreted as an extension of the idea advanced by Verhoogen (2008). Kugler and Verhoogen (2012) elaborate on this "quality-complementarity" hypothesis and show that input quality and plant productivity are complementary in generating output quality. The empirical results for Colombia indicate that higher productivity firms (which are more likely to be exporters) charge more for their outputs and pay more for their material inputs.

The empirical evidence on the link between imported inputs and wages is indirect. Bas (2012) looks at the relationship between changes in input tariffs and within-firm changes in export status. Using detailed firm-level data from Argentina, she finds that the probability of entering the export market is higher for firms producing in industries that have experienced greater input tariff reductions. Bas and Strauss-Kahn (2011) use firm import data at the product (HS6) level in France to confirm that access to new varieties of inputs increase productivity, and thereby exports, through better complementarity of inputs and transfer of technology. Feng, Li and Swenson (2012) look at Chinese manufacturing firms following the country accession to the WTO. Their results show that firms that expanded their intermediate input imports expanded the volume of their exports and increased their export scope.

3.2 Theoretical Model

To better organize our discussion, we develop here a simple model that captures the mechanisms outlined in the review. The goal is to lay out a theoretical framework to formalize the intuitions provided by the empirical results. The model is a simple partial equilibrium model. We introduce the demand and production structure and we study optimal firm decisions. In the process, we describe how the four mechanisms work.

Firms operate in a monopolistic competition framework. Goods are differentiated in quality. A variety j has quality θ_j and price p_j. As in Verhoogen (2008) and Brambilla, Lederman, and Porto (2012), we work with logit demands. Firms can sell domestically $d = h$ (home) or abroad $d = e$ (export). Aggregate demand in market d is:

$$(2) \quad x_j^d(p_j^d, \theta_j^d) = \frac{M^d}{W^d} \exp\left(\alpha^d \theta_j^d - p_j^d\right),$$

where α^d captures quality valuation and we assume that $\alpha^e > \alpha^h$ because export markets are willing to pay a premium for a good of a given quality. In (2), M^d is the number of consumers in market d, or market size, and W^d is an index that summarizes the characteristics of all available products in that market (i.e. $W^d = \sum_{d \in Z^d} \exp(\alpha^d \theta_z^d - p_z^d)$, where Z^d is the set of available products).

Firm j chooses the quality θ_j of the good and its selling price p_j to maximize profits:

$$(3) \quad \pi_j = [p_j - c_j(\theta_j)]\, x(p_j, \theta_j) - F,$$

where $c_j(\theta_j)$ is the marginal cost of production, that depends on quality, with $c_j'(\theta_j) > 0$ and $c_j''(\theta_j) > 0$. F is a fixed cost of production or of entering a market, which for simplicity is assumed to be the same across firms. As in Verhoogen (2008), we assume that firms can choose prices p_j^d and quality θ_j^d for the domestic and the export market separately. The first order conditions for profit maximization are:

$$(4) \quad p_j^d = 1 + c_j(\theta_j^d),$$

$$(5) \quad \alpha^d = \frac{c'_j(\theta_j^d)}{p_j^d - c_j(\theta_j^d)}.$$

The intuition is straightforward. Firms charge a constant markup over marginal costs (equation (4)) and, given the optimal markup, optimal quality in a given market requires equating the marginal costs of quality provision with the quality valuation α (equation (5)). Note that since $\alpha^e > \alpha^d$, we have that $\theta_j^e > \theta_j^d$ and $p_j^e > p_j^h$. Since export markets value quality more, firms optimally sell higher quality products at higher prices abroad.

To explore the mechanisms in more detail, we need to describe the marginal cost function $c_j(\theta_j)$. We adopt a unifying framework based on Johnson (2012), Crino and Epifani (2012), Hallak and Sivadasan (2013), Flam and Helpman (1987), Hummels and Klenow (2005), Verhoogen (2008), Bastos, Silva and Verhoogen (2014), Brambilla, Lederman, and Porto (2012), Feenstra and Romalis (2012), and Kugler and Verhoogen (2012). To produce quantity and quality, a firm utilizes three production factors: labor, (imported) material inputs, and capital or technology. These factors are combined with the inherent attributes of a firm, which we call productivity. The technology to produce physical quantity differs from the technology to produce quality.

The production of one unit of physical output requires 1 unit of labor, 1 unit of imported material inputs, and 1 unit of capital/technology. This is a fixed-coefficient production function. All these three production factors are heterogeneous in quality. Workers are heterogeneous in skills or ability, S. Imported materials differ in quality M, and capital or technology differs in their "sophistication" K.

The quality of the inputs is instead relevant in the production of the quality of the output (the "quality-complementarity" hypothesis of Kugler and Verhoogen, 2012). Thus, for example, a higher ability worker can produce, ceteris paribus, 1 unit of physical output, but of a higher quality θ. To model quality production, firms combine factors with "capability" or "caliber" λ (Kugler and Verhoogen, 2012; Hallak and Sivadasan, 2013) as follows:

$$(6) \quad \theta_j = \lambda_j (K_j)^{\sigma^K} (M_j)^{\sigma^M} (S_j)^{\sigma^S},$$

where $\sigma^K > 0$, $\sigma^M > 0$, $\sigma^S > 0$. This is a standard Cobb-Douglas production function and

it implies some degree of complementarity among capability, the quality or sophistication of capital, the quality of (imported) material inputs and skills. Since we are interested in wages, it is important to highlight that this production function implies that firms with higher λ, higher K, and higher M are more efficient in using skilled labor in the generation of quality. More generally, equation (6) delivers a positive relationship between the production of quality θ_j and the quality of inputs S_j, M_j and K_j.

To attract higher skilled workers (to produce higher quality), firms face an upward sloping wage scheduled as in Verhoogen (2008). We work with a simple functional form

$$S_j = (w_j^S)^{\xi^S}, \tag{7}$$

where w_j^S is the wage rate offered to skills S_j and $\xi^S > 0$ governs the responsiveness of skills to the offered wage. Equation (7) can be interpreted as a reduced-form representation of an efficiency-wage model or a profit sharing model. We adopt similar factor-price schedules for technology, $K_j = (w_j^K)^{\xi^K}$, and material inputs $M_j = (w_j^M)^{\xi^M}$, where w_j^K and w_j^M are the prices for technology and material inputs and $\xi^K, \xi^M > 0$.

For a firm, the cost of producing one unit of output of quality θ_j is the cost of hiring one worker of skill S_j at the wage w_j^S, one unit of capital with sophistication K_j at price w_j^K and one unit of material inputs with quality M_j at price w_j^M. As in Verhoogen (2008), we assume that firms run separate production lines for different qualities. Separability in production allows firms to make independent decisions of entry, quality choice, and price to each market. As in all this literature, firms are heterogeneous in capability/caliber λ.

To work out the full solution of the model, note that firms jointly choose the quality of capital, labor and material inputs to minimize costs $c = w^S + w^K + w^M$, subject to the quality production function (6) and the wage schedules (7). The optimal choice of quality is

$$\theta_j^* = (\alpha)^{\frac{a}{1-a}} \lambda_j^{\frac{1}{1-a}} J, \tag{8}$$

where $a = \xi^S\sigma^S + \xi^K\sigma^K + \xi^M\sigma^M$ and we assume that $a < 1$ (to get an interior solution for θ) and $J = [(\xi^S\sigma^S)^{\xi^S\sigma^S}(\xi^K\sigma^K)^{\xi^K\sigma^K}(\xi^M\sigma^M)^{\xi^M\sigma^M}]^{1/(1-a)}$. The solutions for optimal labor

quality S, material inputs quality M and capital sophistication K are

$$(9) \quad S_j^* = (\xi^S \sigma^S)^{\xi^S} (\alpha)^{\frac{\xi^S}{1-a}} (\lambda_j)^{\frac{1}{1-a}} J^{\xi^S},$$

$$(10) \quad M_j^* = (\xi^M \sigma^M)^{\xi^M} (\alpha)^{\frac{\xi^M}{1-a}} (\lambda_j)^{\frac{1}{1-a}} J^{\xi^M},$$

and

$$(11) \quad K_j^* = (\xi^K \sigma^K)^{\xi^K} (\alpha)^{\frac{\xi^K}{1-a}} (\lambda_j)^{\frac{1}{1-a}} J^{\xi^K},$$

Ultimately, the choices of input quality are a function of firm features such as productivity or caliber λ. As in all the literature, we assume firms face a fixed costs of entering the domestic market and an additional fixed cost of entering the foreign market. This defines two productivity cutoff λ_{min} and λ_{exp} so that firms with productivity $\lambda < \lambda_{min}$ cannot afford to enter any market, firms with productivity $\lambda_{min} < \lambda < \lambda_{exp}$ produce for the domestic market, and firms with productivity $\lambda > \lambda_{exp}$ produce for both the domestic and the export markets. In the upper-left graph of Figure 1, we highlight the average quality produced by firms with different productivities. As it can be seen, firms that enter the export market produce higher average quality. At low productivity levels, average quality tracks the quality demanded at the domestic market. There is a discrete jump at the cutoff λ_{exp}, and then average quality is just the average of the quality demanded domestically and abroad.

We can also see in Figure 1 that exporters hire more skilled labor, purchase more and better material inputs and adopt a higher sophistication of technology. We plot the optimal choice of S (upper-right panel), K (lower-left panel) and M (lower-right panel) as a function of λ for the domestic market and for the foreign market. As with optimal quality, the average skill increases in λ as exporters hire, on average, more skilled workers. Similar statements can be made for the cases of material inputs and capital sophistication.

We now turn to the evidence provided by our regression analysis using the Enterprise Surveys.

3.3 Skill Utilization

To study whether exporters demand relative more skilled over unskilled workers than non-exporters, we adopt the following variant of regression model (1)

$$(12) \quad s_{ij} = \delta E_{ij} + \phi_j + u_{ij},$$

where now the dependent variable s_{ij} is some measure of the utilization of skilled labor relative to unskilled labor. All other variables are defined as above.

Our main results are reported in Table 4. In column 1, we measure the correlation between exporting and the ratio of skilled to unskilled production employment.[5] This correlation is always positive and statistically significant across developing countries. Worldwide, for instance, an exporter has 0.91 more skilled workers per unskilled worker, indicating that exporters hire roughly one skilled worker more, per unskilled workers, than non-exporters. This result holds on average in each continent as well. In Eastern Europe, the coefficient is 1.99, in Africa, 0.74, in Latin America, 0.65, and in Asia, 1.04.

In column 2, the dependent variable is the share of the work-force with completed high-school. This information is not available for all surveys, and consequently our analysis is less detailed than before. Nevertheless, we confirm that exporting is positively correlated with this measure of skill utilization. Worldwide, on average, the proportion of the workforce of an exporting firm that has completed high-school is 4 percent higher than for non-exporters. It is interesting to note that the share of completed high-school workers is actually 5 percent higher in Europe, Latin America and Asia, while the correlation is not statistically significant in Africa.

In columns 3 and 4, we investigate whether exporters demand specific skills from high-rank employees. Concretely, we look first at the quality (i.e., education) of managers. In column 3, we find that, on the average (worldwide) exporting firm, managers are 17 percent more likely to have College Education that at a non-exporter. This correlation is strong statistically and very robust across continents. In Latin America, for instance, the

[5] According to these definition, skills can be acquired formally in colleges, universities or technical schools, or on the job.

coefficient is 0.25, in Asia, 0.13, and in Africa 0.19. In column 4, we explore the probability that a manager has Post-Graduate Education. We find that, on average, the probability that the manager of an exporting firm has a Post-Graduate degree is 12 percent higher compared to non-exporters. This correlation also holds in Latin America (18 percent), Asia (8 percent), and Africa (13 percent).

3.4 Sophistication of Technology

To investigate the premia in machine sophistication, the regressions are the same as before, except that we change the dependent variables. Results are also reported in Table 4. In column 5, we correlate export status with the firm's capital labor ratio. We find that this correlation is positive and statistically strong everywhere (on average, in Europe, in Latin America, in Asia, and in Africa.). In column 6, we look at the correlation with the probability of having ISO-certified product, and we find that it is much higher at exporting firms than at non-exporting firms. Worldwide, on average, exporters are 24 percent more likely to have ISO certification than non-exporters. The link appears stronger in Asia (27 percent) and Latin America (16 percent) than in Africa (20 percent) or Europe (21 percent). But the association is always statistically very significant.

For a subset of countries, we also have information of the adoption of new technologies (column 7) and R&D spending (column 8). Exporters are 11 percent more likely to incorporate new technologies than non-exporters. Similarly, R&D spending is 5 percent higher at exporting firms, on average.

3.5 Imports and Imports of Intermediate Inputs

The Enterprise Surveys allow us to explore the role of better inputs because firms are asked whether they purchase inputs from aboard. In general, for developing countries, imported inputs are of higher quality than domestic inputs (Kugler and Verhoogen, 2012; Manova and Zhang, 2012). We can thus study whether exporters tend to purchase imported inputs, and whether they tend to spend a higher fraction of resources on imported inputs. The regression model is the same as before, with changed dependent variables.

Results are in Table 5. We first investigate whether exporters are more likely to be importers too (Bernard, Jensen, Redding, and Schott, 2007). They indeed are. In column 1, we find that an exporter is 27 percent more likely to be an importer as well. This is a very strong and robust correlation. It is observed in Europe (20 percent premium), Latin America (22 percent premium), Asia and Africa (31 percent premium). In column 2, we examine if this correlation operates for imports of intermediate inputs. It does, also very strongly. We look at the correlation between exporting and the share of inputs used by the firm that are imported. On average, exporters have 14 percent higher imported inputs than non-exporters. This correlation is very robust. A European exporter has 14 percent higher imported inputs, Latin American exporters, 10 percent higher imported inputs, Asian exporters, 16 percent higher imported inputs, and African exporters, 19 percent higher imported inputs. The influence of foreign factors in this mechanism is also reflected in the correlation between exporting and foreign firm ownership. In columns 3 and 4, we see that exporting firms have a much higher foreign firm participation. These links hold on average worldwide, and on average within each continent.

3.6 Productivity

We now turn to the correlation between productivity and exporting in the Enterprise Surveys. As we discussed in the literature review, firm productivity is one of the key better performance variables associated with exporting. The evidence in favor of this link is overwhelming, and it is not surprising that we find strong correlations in our data. We build three direct and indirect measures of firm productivity. First, we calculate labor productivity, which is value added per worker. Second, we measure TFP from OLS regressions of output on factor usage. Third, we use (log) sales as an indicator of productivity, as in Verhoogen (2008), Bustos (2011) and many others. We then regress these variables on the firm export status, as before. Results are in the last three columns of Table 5.

Labor productivity is much higher for exporters (column 5). This holds for the worldwide average, for all regions, and for most countries. Productivity as measured by total factor productivity is also higher at exporters. In column 6, we estimate TFP using standard OLS

regressions of outputs on factor use. The OLS-TFP premium is, on average, 10 percent. This premium is 8 percent in Europe, 13 percent in Latin America, 10 percent in Asia, and 7 percent in Africa. All these estimates are statistically significant. Since TFP estimated with OLS may be subject to well-known biases, we report in column 7 results based on TFP estimates using the econometric model of Ackerberg, Caves and Frazer (2015), which is a recent improvement over the corrections initially suggested by Olley and Pakes (1996). ACF-TFP offers larger productivity premium than OLS-TFP does. For instance, the world average premia is 19 percent (compared with 10 percent). This holds more generally for subset of countries: the premia are 24 percent in Africa, 18 percent in Latin America, and 20 in Asia. Only among European firms were we unable to estimate a statistically significant productivity premium. As a final robustness check, we regress log sales on exporting dummies (column 8). Sales are also much larger for exporting firm. On average, the sales premium is 1.86, but it can be as large as 2.06 in Latin America or 1.89 in Asia, to as low as 1.54 in Europe or 1.49 in Africa.

For our purposes, this correlation between exporting and productivity is useful for several reasons. Productivity is a clear indicator of firm performance, and consequently these correlations confirm the notion that exporters perform better, in general, than non-exporters. Also, much of the modern literature on trade with firm heterogeneity relies on productivity differences to explain firm decisions and the observation that exporters are more productive is consistent with this view. Finally, higher factor productivity and sales at exporting firms are consistent with the observation that exporters earn more profits than non-exporters. As such, they can afford to pay higher wages. This could happen because of an inherent complementarity with the other mechanisms explored above (skill use, imported inputs, technology, R&D, investment, ownership) or because of additional mechanisms. That is, more productive firms can pay higher wages, ceteris paribus (that is, even conditional on skill utilization, imported inputs use, technology adoption and so on). This could occur under fair wages hypothesis, bargaining of profit sharing between firms and workers (Egger and Kreickemeier, 2009; Egger and Kreickemeier, 2010; Egger and Kreickemeier, 2012; Amiti and Davis, 2011).

4 Assessing the Export Wage Premium

In this section, we perform two experiments to explain the estimated export wage premia. The first experiment is the estimation of a hybrid model of the wage premia. The second experiment is based on cross-country analysis.

4.1 Explaining the Premia

In the first experiment, we run a hybrid model where we estimate the export premium for wages conditional on the variables that capture the mechanisms. Our goals are to test whether the mechanisms make sense and, in addition, to explore how much of the export premium can be accounted for by them. Concretely, our expanded regression model is

$$(13) \quad y_{ij} = \delta E_{ij} + \mathbf{m}'_{ij}\gamma + \phi_j + u_{ij},$$

where all variables are defined as above and $\mathbf{m}_{ij}$ are measures of the mechanisms, as in the discussion of the previous section. We include measures of skill utilization, technology, imported inputs, and productivity. We explore two specifications, "some controls" and "full controls." In the "some controls" specification, we include in $\mathbf{m}$ the ratio of skilled workers, the capital to labor ratio, the percentage of imports of intermediate inputs, and labor productivity. In the "full set of controls" specification, we keep the ratio of skilled workers, the capital to labor ratio, the percentage of imports of intermediate inputs, and labor productivity and we add iso certification, foreign ownership, and log sales. We add controls sequentially.

Results for the wage export premium are in Table 6. In both specifications, we observe that, as we add mechanisms $\mathbf{m}$, the wage premium *declines*. Controlling for skill composition alone (columns 2 and 6) does not affect the wage premium by much. Adding skill composition and technology together has sizeable effects on the wage premium. For instance, on average, the wage premium drops from 31 percent to between 21 and 18 percent in the "some control" and "full controls" specifications, respectively. If we further add imported inputs, the wage premium drops to between 17 and 11 percent, respectively. Finally, and most importantly,

when we add measures of firm productivity, the wage premium disappears entirely. In this case, exporters and non-exporters would pay more or less the same wage, conditional on all the mechanisms.

4.2 Cross-Country Correlations

While we work with 61 countries, the evidence so far is based on cross-firm correlations within a country. Here, we exploit the cross-country correlations in the data as well. We correlate the wage premia reported in Table 2 with the premia corresponding to each of the four mechanisms estimated in Tables 3 and 4. The scatter plots and linear fits are reported in Figure 2.

In Panel A, we find a positive correlation between the wage export premia and the skill utilization premia. A similar positive correlation is found in Panel B (the sophistication of machine premia) and in Panel C (the productivity premia). These results suggests that countries with higher skill utilization export premia, higher machine sophistication export premia, and higher productivity export premia are countries with higher wage export premia. In the case of imported inputs, the correlation is much weaker (and it is actually slightly negative). Overall, thus, these results support the argument that the mechanisms outlined by the literature (skills, machine sophistication, input quality and productivity) are major determinants of the wage premia prevalent in the data.

5 Conclusions

The motivating fact behind this paper is the potential wage gains from exports in developing countries. The argument is that export markets bring about opportunities for firms and that successful exporting firms translate some of the benefits of exports to workers via employment and wage premia. Using comparable data for 61 developing and low-income countries, we document the prevalence of the export wage premia worldwide. With an extensive literature review, we identify four major drivers of the wage premia: exporting firms hire more skilled workers, utilize more sophisticated machines, buy higher quality material inputs, and are

more productive than non-exporting firms. Our empirical analysis confirms the worldwide prevalence of these mechanisms and, furthermore, establishes a strong link to the estimated wage premia.

While the existence of a wage export premia is well-known, our results provide additional evidence for a wide range of lower income countries uncovered by most of the current literature. In turn, our study of the mechanisms sheds lights on how exporting firms behave and how export opportunities abroad can be beneficial for workers at home. This should matter for our understanding of the boosters that allow for, and of the constraints that prevent, the realization of the gains from trade in general and of exports in particular.

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Table 1
Enterprise Survey
Coverage of Exporting Firms

Country	Year	Exporting Firms		
		sample size	share exporters	average exports
All countries			0.34	0.53
Europe			0.32	0.46
Bulgaria	2007	497	0.45	0.57
Hungary	2005	271	0.52	0.43
Macedonia	2009	103	0.71	0.64
Moldova	2009	107	0.4	0.67
Romania	2009	107	0.33	0.73
Russia	2012	858	0.17	0.19
Ukraine	2008	368	0.29	0.5
Africa			0.28	0.53
Angola	2010	122	0.08	0.15
Botswana	2006	112	0.21	0.37
Burundi	2006	102	0.05	0.31
Congo D.Rep.	2006	149	0.08	0.38
Egypt	2004	954	0.24	0.37
Ethiopia	2002	417	0.07	0.53
Ghana	2007	292	0.22	0.31
Guinea	2006	135	0.2	0.24
Ivory Coast	2009	175	0.16	0.46
Kenya	2007	396	0.43	0.32
Madagascar	2005	210	0.34	0.83
Mali	2007	234	0.12	0.38
Mauritius	2009	161	0.42	0.57
Morocco	2004	838	0.6	0.82
Mozambique	2007	207	0.04	0.53
Namibia	2006	104	0.33	0.39
Nigeria	2007	948	0.03	0.28
Senegal	2007	156	0.14	0.4
South Africa	2003	554	0.61	0.23
Tanzania	2006	272	0.15	0.25
Uganda	2006	307	0.17	0.37
Zambia	2007	237	0.1	0.15
Zimbabwe	2011	317	0.16	0.27

Column (1): number of plants in the survey. Column (2): share of exporting firms. Column (3) average export participation in total sales, conditional on exporting.

Table 1
Enterprise Survey
Coverage of Exporting Firms
(cont.)

Country	Year	Exporting Firms		
		sample size	share exporters	average exports
Latin America			0.36	0.34
Argentina	2010	671	0.55	0.25
Brazil	2003	1575	0.31	0.25
Chile	2004	688	0.43	0.38
Colombia	2010	633	0.46	0.23
Costa Rica	2005	296	0.31	0.39
Dominican Rep.	2010	113	0.36	0.53
Ecuador	2003	329	0.29	0.31
El Salvador	2003	465	0.45	0.47
Guatemala	2003	435	0.37	0.44
Honduras	2003	428	0.35	0.6
Jamaica	2010	109	0.28	0.34
Mexico	2010	1062	0.34	0.28
Nicaragua	2003	452	0.26	0.52
Panama	2006	124	0.29	0.38
Paraguay	2006	199	0.27	0.44
Peru	2010	619	0.47	0.4
Uruguay	2010	234	0.44	0.47
Asia			0.36	0.69
Azerbaijan	2009	109	0.18	0.35
Bangladesh	2002	980	0.43	0.9
China	2003	1309	0.25	0.5
India	2000	855	0.29	0.87
Indonesia	2003	667	0.43	0.7
Kazakhstan	2005	244	0.14	0.28
Mongolia	2009	130	0.25	0.55
Nepal	2009	125	0.23	0.46
Pakistan	2002	910	0.18	0.85
Philippines	2003	665	0.39	0.78
Sri Lanka	2004	404	0.7	0.88
Thailand	2004	1385	0.62	0.62
Uzbekistan	2008	120	0.28	0.37
Vietnam	2005	1145	0.48	0.66

Column (1): number of plants in the survey. Column (2): share of exporting firms. Column (3) average export participation in total sales, conditional on exporting.

Table 2
Summary Statistics

Country	Skill Ratio	Capital Labor	ISO Cert.	Importer	Share Imported Inputs	Foreign Own.	Majority Foreign Own.	TFP
All countries	1.64	8.59	0.22	0.51	0.27	0.12	0.09	-0.06
Europe	3.17	9.97	0.23	0.58	0.34	0.09	0.07	0.63
Bulgaria	3.01	8.21	0.32	0.57	0.43	0.10	0.07	0.07
Hungary	3.26		0.27	0.66	0.34	0.17	0.14	
Macedonia	2.70	12.42	0.39	0.79	0.59	0.17	0.13	1.63
Moldova	2.81	9.99	0.19	0.64	0.46	0.21	0.16	-2.31
Romania	3.40	9.30	0.46	0.66	0.42	0.20	0.16	5.02
Russia	2.84	10.33	0.17	0.60	0.29	0.04	0.02	0.31
Ukraine	2.97	9.26	0.15	0.41	0.28	0.09	0.07	1.63
Africa	1.67	8.84	0.15	0.52	0.31	0.15	0.11	-0.30
Angola	2.10	12.51	0.24	0.61	0.27	0.30	0.16	-5.45
Botswana	1.13	10.26	0.14	0.82	0.56	0.47	0.37	0.87
Burundi	0.57	13.76	0.05	0.77	0.43	0.23	0.22	-0.89
Congo D.Rep.	1.08	13.47	0.07	0.58	0.30	0.31	0.27	0.07
Egypt	2.05	3.48	0.09	0.32	0.17	0.04	0.03	0.05
Ethiopia	1.13	2.79	0.02	0.66	0.45	0.04	0.03	-0.81
Ghana	2.23	15.22	0.07	0.46	0.22	0.07	0.05	0.07
Guinea	1.83	13.86	0.05	0.65	0.43	0.11	0.10	-0.43
Ivory Coast	0.68		0.05	0.31	0.23	0.27	0.23	
Kenya	1.67	13.05	0.17	0.59	0.32	0.17	0.13	-0.00
Madagascar	0.66	8.60	0.08	0.58	0.49	0.39	0.32	0.65
Mali	1.43	12.35	0.05	0.41	0.23	0.03	0.03	0.51
Mauritius	1.00	11.60	0.13	0.55	0.49	0.11	0.09	-5.97
Morocco	2.55	3.52	0.08	0.80	0.60	0.19	0.13	0.56
Mozambique	1.03	10.19	0.16	0.19	0.12	0.15	0.12	-0.65
Namibia	1.71	11.24	0.28	0.83	0.60	0.26	0.19	0.53
Nigeria	1.36	11.60	0.09	0.28	0.10	0.01	0.01	0.09
Senegal	1.38	13.88	0.08	0.42	0.24	0.08	0.07	0.19
South Africa	2.08	5.06	0.42	0.69	0.23	0.19	0.15	-1.68
Tanzania	1.44	14.54	0.20	0.49	0.25	0.15	0.10	-0.24
Uganda	1.37	15.03	0.13	0.38	0.22	0.18	0.14	0.68
Zambia	1.20	16.02	0.14	0.47	0.27	0.17	0.14	0.45
Zimbabwe	0.94	10.00	0.32	0.58	0.28	0.21	0.03	0.27

Variables: ratio of skilled to unskilled production workers (Column 1); log capital to labor ratio (Column 2); Indicator variable for ISO-certified products (Column 3); Indicator variable for imported inputs (Column 4); Percentage of inputs that are imported (Column 5); Indicator variable for some percentage of foreign ownership (Column 6); Indicator variable for more than 50 percent of foreign ownership (Column 7); Total factor productivity (Column 8).

Table 2
Summary Statistics
(cont.)

Country	Skill Ratio	Capital Labor	ISO Cert.	Importer	Share Imported Inputs	Foreign Own.	Majority Foreign Own.	TFP
Latin America	1.26	8.84	0.20	0.64	0.30	0.10	0.08	-0.01
Argentina	1.47	10.08	0.39	0.82	0.30	0.15	0.14	0.32
Brazil	1.56	2.88	0.19	0.44	0.11	0.05	0.04	0.07
Chile	1.34	9.53	0.31	0.53	0.20	0.16	0.10	0.13
Colombia	1.03	16.09	0.34	0.74	0.33	0.11	0.07	0.26
Costa Rica	1.00	1.74	0.09	0.48	0.30	0.08	0.07	-1.48
Dominican Rep.	1.27	12.06	0.24	0.75	0.50	0.21	0.19	0.99
Ecuador	1.78	1.83	0.16	0.71	0.40	0.12	0.08	-0.90
El Salvador	0.94	3.39	0.05	0.55	0.35	0.09	0.06	0.59
Guatemala	0.43	3.55	0.03	0.54	0.31	0.09	0.08	-0.58
Honduras	0.60	3.62	0.05	0.47	0.30	0.12	0.09	-0.97
Jamaica	1.59	13.46	0.20	0.76	0.42	0.16	0.06	-0.13
Mexico	1.32	11.60	0.24	0.63	0.23	0.10	0.07	-0.34
Nicaragua	0.78	3.66	0.03	0.56	0.34	0.10	0.08	-0.71
Panama	0.89	8.99	0.16	0.77	0.46	0.15	0.13	0.11
Paraguay	0.72	17.09	0.09	0.83	0.47	0.13	0.08	5.31
Peru	1.22	9.95	0.27	0.84	0.39	0.13	0.08	-0.00
Uruguay	1.28	11.54	0.21	0.92	0.54	0.10	0.08	-1.75
Asia	1.65	8.08	0.29	0.38	0.22	0.13	0.08	-0.04
Azerbaijan	6.11	8.08	0.38	0.42	0.21	0.21	0.16	1.55
Bangladesh	3.48	4.50		0.61	0.48	0.03	0.02	-0.09
China	0.18	4.59	0.49	0.21	0.06	0.18	0.10	
India	1.74	4.93		0.16	0.07	0.04	0.01	0.10
Indonesia	1.80	8.93	0.22			0.17	0.15	-0.79
Kazakhstan	3.50		0.09	0.36	0.23	0.06	0.04	
Mongolia	2.02	14.63	0.20	0.66	0.40	0.12	0.08	0.89
Nepal	1.00	11.76	0.16	0.66	0.44	0.03	0.02	-2.94
Pakistan	2.93	12.97	0.17	0.16	0.09	0.01	0.01	-1.89
Philippines	2.27	4.29	0.16	0.52	0.35	0.24	0.17	0.97
Sri Lanka	3.37	5.28		0.53	0.40	0.20	0.13	-1.10
Uzbekistan	2.63	14.41	0.20	0.36	0.15	0.28	0.11	-1.49
Vietnam	4.67	10.55	0.38	0.56	0.36	0.12	0.10	0.08

Variables: ratio of skilled to unskilled production workers (Column 1); log capital to labor ratio (Column 2); Indicator variable for ISO-certified products (Column 3); Indicator variable for imported inputs (Column 4); Percentage of inputs that are imported (Column 5); Indicator variable for some percentage of foreign ownership (Column 6); Indicator variable for more than 50 percent of foreign ownership (Column 7); Total factor productivity (Column 8).

Table 3
Wage Export Premia Across Developing Countries

Country	All Sectors	Selected Industries	With Controls All	With Controls Selected
All countries	0.31***	0.28***	0.25***	0.23***
Europe	0.20***	0.21***	0.17***	0.18***
Bulgaria	0.23***	0.18***	0.18***	0.15***
Hungary	0.09**	0.10***	0.05	0.07**
Macedonia	0.46**	0.61*	0.4	0.56
Moldova	0.67***	0.85***	0.64***	0.74**
Romania	0.15*	0.07**	0.11	0.05**
Romania	0.12	0.1	0.22	0.14
Russia	0.26**	0.40***	0.23***	0.34***
Ukraine	0.21**	0.20*	0.20*	0.21
Africa	0.22***	0.19***	0.18***	0.15***
Angola	0.16	0.26	0.54**	0.63*
Botswana	0.1	-0.06	0.05	-0.1
Burundi	0.41*	0.83***	0.36	0.85***
Congo D.Rep.	0.21	0.70***	0.14	0.68***
Egypt	0.19**	0.1	0.16**	0.08
Ethiopia	0.63*	1.10**	0.62*	1.06**
Ghana	0.06	-0.03	0.03	-0.03
Guinea	0.14	-0.05	0.07	-0.17
Ivory Coast	0.77**	1.03***	0.64*	0.76***
Kenya	0.07	0.04	0.07	0.05
Madagascar	0.2	0.21	0.13	0.12
Mali	0.57***	0.57***	0.55***	0.55***
Mauritius	0.37	0.1	0.24	-0.01
Morocco	0.1	-0.01	0.05	-0.04
Mozambique	0.55***	0.35	0.44***	0.34
Namibia	0.35*	-0.26***	0.36**	-0.25*
Nigeria	0.40***	0.34***	0.38***	0.30***
Senegal	0.42	0.49	0.39	0.45
South Africa	0.32***	0.29***	0.28***	0.23***
Tanzania	-0.08	0.21	-0.15	0.16
Uganda	0.35***	0.39***	0.23***	0.24***
Zambia	0.47***	0.47***	0.45**	0.45**
Zimbabwe	0.07	-0.05	0.02	-0.13

Column (1): Wage Premium (percentage difference in wages of exporters and non-exporters, controlling for country-industry-year interaction effects) for all firms. Column (2): Wage premium for plants in Textiles, Garments, Food, Beverages, and Metals and Machinery. Columns (3) and (4): same as (1) and (2), but controlling for foreign ownership.

Table 3
Wage Export Premia Across Developing Countries
(cont.)

Country	All Sectors	Selected Industries	With Controls All	With Controls Selected
Latin America	0.38***	0.34***	0.33***	0.29***
Argentina	0.31***	0.35***	0.18**	0.23***
Brazil	0.51***	0.50***	0.44***	0.43***
Chile	0.26	-0.07	0.23	-0.06
Colombia	0.42***	0.36***	0.32***	0.31***
Costa Rica	0.45***	0.51	0.41***	0.54
Dominican Rep.	0.17	0.21	0.1	0.18
Ecuador	0.21	0.14	0.17	0.03
El Salvador	0.39***	0.39***	0.36***	0.35***
Guatemala	0.19	0.11	0.21**	0.15
Honduras	0.41***	0.47***	0.35***	0.36***
Jamaica	0.32***	0.26	0.27***	0.25
Mexico	0.44***	0.52***	0.37***	0.46***
Nicaragua	0.1	0.03	0.02	-0.05
Panama	0.24	-0.02	0.25	-0.04
Paraguay	0.06	0.56	0.07	0.64***
Peru	0.52***	0.61***	0.41***	0.51***
Uruguay	0.51***	0.38***	0.47***	0.37***
Asia	0.30***	0.29***	0.21***	0.22***
Azerbaijan	0.09	0.12	0.07**	0.04
Bangladesh	0.1	0.05	0.09	0.04
China	0.42***	0.43***	0.31***	0.40***
India	0.05	-0.02	0.02	-0.03
Indonesia	0.33**	0.49***	0.23	0.39**
Kazakhstan	0.19**	0.17**	0.18**	0.14
Mongolia	0.44*	0.75***	0.36	0.55**
Nepal	0.09	0.02	0.02	0.02
Pakistan	0.28*	0.08	0.27*	0.09
Philippines	0.62***	0.69***	0.45***	0.51***
Sri Lanka	0.36**	0.34*	0.27*	0.24
Thailand	0.29***	0.26***	0.20***	0.16***
Uzbekistan	0.19	0.2	0.15	0.25
Vietnam	0.08	0.06	-0.01	-0.04

Column (1): Wage Premium (percentage difference in wages of exporters and non-exporters, controlling for country-industry-year interaction effects) for all firms. Column (2): Wage premium for plants in Textiles, Garments, Food, Beverages, and Metals and Machinery. Columns (3) and (4): same as (1) and (2), but controlling for foreign ownership.

Table 4
Skill Utilization and Machine Sophistication
Exporting Firms' Premium

Country	Skill Utilization				Machine Sophistication			
	ratio skilled workers	share high school	manager with college	manager with pos-grad	capital labor ratio	ISO Certf.	New Tech.	R&D Spenging
All countries	0.91***	0.04***	0.17***	0.12***	0.44***	0.24***	0.11***	0.05***
Europe	1.99***	0.05***	–	–	0.45***	0.21***	0.04	0.16***
Bulgaria	0.95	–	–	–	0.26	0.17***	–	–
Hungary	1.08	0.05***	–	–		0.13***	0.04	0.16***
Macedonia	1.72***	–	–	–	1.21***	0.37**	–	–
Moldova	1.29*	–	–	–	0.95***	0.37***	–	–
Romania	4.37*	–	–	–	0.54	0.09	–	–
Russia	2.71***	–	–	–	0.39***	0.22***	–	–
Ukraine	3.20***	–	–	–	0.94***	0.26***	–	–
Africa	0.74***	0.01	0.19***	0.13***	0.17***	0.20***	0.15***	0.04***
Angola	1.76	-0.01	–	–	0.25	0.50***	–	–
Botswana	1.63***	–	–	–	0.34	0.1	–	–
Burundi	1.56	–	–	–	0.68	0.41	–	–
Congo D.Rep.	-0.01	–	–	–	0.05	0.20**	–	–
Egypt	0.67	0.04***	0.08***	0.03***	0.28	0.26***	0.17***	0.12***
Ethiopia	-0.05	–	0.22***	–	0.88**	-0.03*	–	0.14*
Ghana	2.46***	–	–	–	0.09	0.11	–	–
Guinea	-0.17	–	–	–	0.21	0.16**	–	–
Ivory Coast	0.75	–	–			0.16	–	–
Kenya	-0.06	–	–	–	0.26***	0.24***	–	–
Madagascar	-0.05	-0.06	0.37	0.14	-0.86	0.16*	0.27**	–
Mali	-0.77***	–	–	–	0.59***	0.31***	–	–
Mauritius	0.25	–	–	–	-0.56	0.18**	–	–
Morocco	1.25**	0.01	0.24***	0.17***	0.07	0.11**	0.19***	0.04***
Mozambique	-0.59***	–	–	–	0.08	0.76***	–	–
Namibia	0.61	–	–	–	0.23*	0.3	–	–
Nigeria	1.01*	–	–	–	0.80***	0.31**	–	–
Senegal	-0.15	–	–	–	-0.23**	0.19	–	–
South Africa	1.28**	0.02	0.24***	0.19***	0.29	0.22***	0.04	0.16***
Tanzania	0.53	–	–	–	1.01***	0.04	–	–
Uganda	0.21	–	–	–	0.70***	0.26***	–	–
Zambia	1.61***	–	–	–	0.27	0.35***	–	–
Zimbabwe	-0.08	-0.03	–	–	-0.39*	0.27***	–	–

Export premium controlling for country-industry-year interaction effects. Variables: ratio of skilled to unskilled production workers (Column 1); Share of workers with high school education or more (Column 2); Manager has a college degree (Column 3); Manager has post-graduate education (Column 4); log capital to labor ratio (Column 5); Indicator variable for ISO-certified products (Column 6); Indicator variable for whether new production technology was introduced in the past 3 years (Column 7); Indicator variable for positive R&D spending (Column 8).

Table 4
Skill Utilization and Machine Sophistication
Exporting Firms' Premium
(cont.)

Country	Skill Utilization				Machine Sophistication			
	ratio skilled workers	share high school	manager with college	manager with pos-grad	capital labor ratio	ISO Certf.	New Tech.	R&D Spenging
Latin America	0.65***	0.05***	0.25***	0.18***	0.52***	0.26***	0.09***	0.05***
Argentina	0.63***	0.10***	–	–	0.66***	0.36***	–	–
Brazil	0.72***	0.04***	0.22***	0.19***	0.61***	0.22***	0.04	0.21***
Chile	0.60*	0.04	0.20***	0.17***	0.73***	0.35***	0.14***	0.13***
Brazil	1.34***	–	–	–	0.67***	0.24***	–	–
Colombia	0.43***	0.04***	–	–	0.42***	0.41***	–	–
Costa Rica	0.89*	0.08***	0.43***	0.30***	0.53***	0.26***	0.14**	0.10**
Dominican Rep	0.52	-0.20***	–	–	0.14	0.22**	–	–
Ecuador	2.41*	-0.05***	0.08*	0.15***	0.77***	0.24***	0.11*	0.12***
El Salvador	0.51***	0.21***	0.35***	0.20***	0.62***	0.09***	0.17**	0.12***
Guatemala	0.11	-0.10***	0.29***	0.16***	0.08	0.01	0.18***	0.15*
Honduras	-0.04	0.15*	0.37***	0.15***	0.30**	0.06***	0.03	0.14***
Jamaica	-0.11	0.03	–	–	0.59*	0.13**	–	–
Mexico	0.39***	0.09***	–	–	0.36***	0.34***	–	–
Nicaragua	0.02	0.08	0.19***	0.14***	0.11	0.02	-0.04	0.08*
Panama	0.93	–	–	–	0.07	-0.01	–	–
Paraguay	0.02	–	–	–	0.74***	0.14**	–	–
Peru	0.22	0.02*	–		0.60***	0.31***	–	–
Uruguay	0.52	0.08	–	–	1.11***	0.27***	–	–
Asia	1.04***	0.05***	0.13***	0.08***	0.50***	0.27***	0.11***	0.07***
Azerbaijan	1.98	–	–	–	-1.03**	0.28***	–	–
Bangladesh	2.62	–	0.06	0.01	0.08	–	–	0.04
China	0.02*	–	0.11***	0.09***	0.61***	0.18**	0.08	0.18**
India	1.38**	–	0.08*	–	0.11	–	–	–
Indonesia	1.11	0.09**	0.28***	0.09***	0.76***	0.19***	0.08**	–
Kazakhstan	3.47***	0.06	–	–	–	0.07***	0.02	0.04*
Mongolia	0.74	–	–	–	0.95**	0.45***	–	–
Nepal	0.6	–	–	–	0.88**	0.08	–	–
Pakistan	1.72**	0.05*	0.27***	0.25***	-0.14	0.45***	–	-0.0018
Philippines	2.25**	–	0.16***	0.12***	0.66***	0.21*	0.16***	0.15***
Sri Lanka	2.57	0.04*	0.06	0.01	0.05	–	–	0.02
Thailand	-0.07	0.04**	0.16***	–	1.22***	0.28***	0.14***	0.14***
Uzbekistan	1.3	–	–	–	-0.31	0.44***	–	–
Vietnam	2.08***	0.0027	0.14***	0.02	0.04	0.25***	0.11**	0.07***

Export premium controlling for country-industry-year interaction effects. Variables: ratio of skilled to unskilled production workers (Column 1); Share of workers with high school education or more (Column 2); Manager has a college degree (Column 3); Manager has post-graduate education (Column 4); log capital to labor ratio (Column 5); Indicator variable for ISO-certified products (Column 6); Indicator variable for whether new production technology was introduced in the past 3 years (Column 7); Indicator variable for positive R&D spending (Column 8).

Table 5
Imported Inputs and Productivity
Exporting Firms' Premium

Country	Imported Inputs				Productivity			
	importer	share imported inputs	foreign	majority foreign	output per worker	TFP OLS	TFP ACF	log sales
All countries	0.27***	0.14***	0.17***	0.13***	0.53***	0.10***	0.19***	1.86***
Europe	0.20***	0.14***	0.15***	0.11***	0.30***	0.08***	-0.09	1.54***
Bulgaria	0.18***	0.17**	0.15***	0.11***	0.31***	0.10***	0.13	1.18***
Hungary	0.35***	0.23***	0.25***	0.22***	0.18***	–	–	1.58***
Macedonia	0.31***	0.15	0.20**	0.16**	0.53**	0.15	-0.57	2.09***
Moldova	-0.01	0.03	0.32***	0.28***	0.17	0.01	-0.67	1.98***
Romania	0.31***	0.35***	0.35**	0.27*	0.11	0.04	-0.09	1.54***
Russia	0.17***	0.05	0.06***	0.03*	0.48***	0.11	0.01	1.52***
Ukraine	0.33***	0.24***	0.14***	0.14***	0.46**	0.15*	-0.42	2.16***
Africa	0.31***	0.19***	0.16***	0.12***	0.32***	0.07***	0.24***	1.49***
Angola	0.43***	0.23***	0.30*	0.11	-1.55**	-0.96	-1.37	-0.49
Botswana	0.20***	0.35***	0.19*	0.20**	0.39*	0.15	0.18	1.57**
Burundi	0.25***	0.36**	0.14	0.18	0.99***	-0.08	0.04	2.74***
Congo D.Rep.	0.13	0.03	0.30*	0.31*	0.26	0.04	0.1	1.1
Egypt	0.44***	0.22***	0.07***	0.04***	0.63***	0.20***	0.94***	1.91***
Ethiopia	-0.02	-0.15***	0.10**	0.10*	0.66**	0.12	0.04	1.76***
Ghana	0.30***	0.23***	0.09	0.05	0.08	0.07	-0.002	0.89
Guinea	0.33***	0.13	0.10**	0.10**	0.2	0.03	-0.06	0.75
Ivory Coast	0.19**	0.09	0.27***	0.22***	–	–	–	–
Kenya	0.29***	0.22***	0.11***	0.07***	0.26	0.04	-0.0013	1.93***
Madagascar	0.19*	0.14	0.28***	0.27**	0.21	0.17**	1.02**	1.45***
Mali	0.20**	0.1	0.06*	0.06*	0.34**	-0.05***	-0.14	0.42
Mauritius	0.25***	0.15	0.25***	0.21***	0.52**	0.40***	0.81***	1.85***
Morocco	0.32***	0.30**	0.19***	0.14***	0.06	-0.0008	0.09*	1.13***
Mozambique	0.73***	0.54***	0.34	0.14	1.14***	0.06***	0.5	2.91***
Namibia	0.17**	0.27***	0.34***	0.25***	0.52***	0.02	0.16	1.54***
Nigeria	0.45***	0.17***	0.03	0.03	0.75***	0.11***	0.02	1.49***
Senegal	0.33***	0.18***	0.29***	0.18	0.48***	0.06	0.70***	2.39**
South Africa	0.31***	0.06*	0.12***	0.10**	0.36***	0.06	0.61***	1.45***
Tanzania	0.33***	0.17*	0.22**	0.14**	0.83***	0.31***	0.06	2.06***
Uganda	0.31***	0.13***	0.33***	0.30***	0.76***	0.02	0.1	2.26***
Zambia	0.45***	0.18	0.06	0.09	0.27***	0.01	-0.08	1.48***
Zimbabwe	0.27***	0.15***	0.21***	0.03	-0.12	0.10**	0.01	1.64***

Export premium controlling for country-industry-year interaction effects. Variables: Indicator variable for imported inputs (Column 1); Percentage of inputs that are imported (Column 2); Indicator variable for some percentage of foreign ownership (Column 3); Indicator variable for more than 50 percent of foreign ownership (Column 4); Labor productivity defined as value added per worker (Column 5); Total factor productivity estimated by OLS (Column 6); Total factor productivity estimated with Ackerberg, Caves and Frazer (2015) (Column 7); Log sales (Column 8).

Table 5
Imported Inputs and Productivity
Exporting Firms' Premium
(cont.)

Country	Imported Inputs				Productivity			
	importer	share imported inputs	foreign	majority foreign	output per worker	TFP OLS	TFP ACF	log sales
Latin America	0.22***	0.10***	0.16***	0.12***	0.67***	0.13***	0.18***	2.06***
Argentina	0.18***	0.06***	0.20***	0.17***	0.39***	0.05	0.38*	1.74***
Brazil	0.23***	0.03**	0.09***	0.07**	0.92***	0.16***	0.30***	2.05***
Chile	0.41***	0.14***	0.15***	0.11***	0.52	0.15	-0.22*	2.05***
Colombia	0.17***	0.06***	0.21***	0.13**	0.71***	0.11	0.19	2.17***
Costa Rica	0.40***	0.25***	0.20***	0.17***	0.85***	0.2	0.22	2.52***
Dominican Rep.	0.28***	0.15**	0.18**	0.18**	0.07	0.02	-0.08	1.30***
Ecuador	0.11**	0.13***	0.15***	0.10**	0.68	0.20**	0.21	1.83***
El Salvador	0.35***	0.27***	0.12***	0.09***	0.68***	0.12	0.63***	1.98***
Guatemala	0.41***	0.31***	0.16***	0.14***	0.42**	0.18***	0.36***	1.94***
Honduras	0.27***	0.22***	0.20***	0.12	0.68***	0.18***	0.69***	2.36***
Jamaica	-0.08	-0.02	0.22***	0.02	0.68**	0.01	0.03	1.93***
Mexico	0.31***	0.14***	0.18***	0.16***	0.66***	0.08	0.17**	2.33***
Nicaragua	0.10*	0.05	0.14***	0.12***	0.28**	0.1	0.53***	1.31***
Panama	0.23***	0.16***	0.13***	0.05	0.19	0.09	0.18	2.00***
Paraguay	0.05*	-0.06	0.14**	0.09**	0.96***	0.14	-0.19	2.13***
Peru	0.10***	0.03	0.19***	0.14***	0.63***	0.05	0.28***	1.98***
Uruguay	0.03	0.07	0.14**	0.09**	0.59**	0.03	-0.26	1.62***
Asia	0.31***	0.16***	0.19***	0.14***	0.54***	0.10***	0.20***	1.89***
Azerbaijan	0.32***	0.20*	0.03	-0.0023	-0.2	-0.13	0.6	1.40***
Bangladesh	0.15***	0.1	0.03	0.03	0.06	0.01	-0.01	0.47
China	0.38***	0.13***	0.29***	0.20***			–	2.03***
India	0.13***	0.06***	0.03***	0.0017	0.15	0.18***	0.20**	0.88***
Indonesia	0.53***	0.27***	0.27***	0.26***	1.35***	0.17***	0.27**	4.02***
Kazakhstan	0.51***	0.30***	0.16***	0.04	0.47		0.76*	1.83***
Mongolia	0.04	-0.14*	0.27***	0.19**	1.03***	0.2	0.22	1.54***
Nepal	0.29*	0.27***	0.06	0.03	0.09	0.06	-0.52***	1.93***
Pakistan	0.15***	0.04*	0.02	0.02	0.66***	0.40***	0.65***	1.55***
Philippines	0.48***	0.40***	0.38***	0.30***	0.89***	0.07	0.09	2.60***
Sri Lanka	0.15	0.12	0.16**	0.12**	0.6	0.13*	0.39	1.28*
Thailand	0.32***	0.16***	0.28***	0.15**	0.68***	0.07**	0.27***	1.77***
Uzbekistan	0.23	0.05	0.34***	-0.04	0.36	0.07	0.33	2.23***
Vietnam	0.25***	0.14***	0.15***	0.12***	0.26***	0.11	0.42***	1.36***

Export premium controlling for country-industry-year interaction effects. Variables: Indicator variable for imported inputs (Column 1); Percentage of inputs that are imported (Column 2); Indicator variable for some percentage of foreign ownership (Column 3); Indicator variable for more than 50 percent of foreign ownership (Column 4); Labor productivity defined as value added per worker (Column 5); Total factor productivity estimated by OLS (Column 6); Total factor productivity estimated with Ackerberg, Caves and Frazer (2015) (Column 7); Log sales (Column 8).

Table 6
Explaining the Wage Premium

Country	No Controls	Some Controls				Full Set of Controls			
		Labor	Technology	Imports	Productivity	Labor	Technology	Imports	Productivity
All countries	0.31***	0.31***	0.21***	0.17***	0.04***	0.31***	0.18***	0.11***	-0.02*
Europe	0.20***	0.20***	0.11**	0.07	0.01	0.20***	0.05	-0.01	-0.09*
Bulgaria	0.23***	0.22***	0.18**	0.17**	0.08	0.22***	0.16**	0.1	0.01
Macedonia	0.46**	0.48**	0.28*	0.06	0.06	0.48**	0.18	-0.02	-0.19
Moldova	0.67***	0.65***	0.43	0.45*	0.46*	0.65***	0.37	0.45	0.39
Romania	0.12	0.11	0.16	0.21	0.03	0.11	0.15	0.36	0.25
Russia	0.26**	0.24**	0.16**	0.14*	0.02	0.24**	0.14*	0.11	-0.06
Ukraine	0.21**	0.27**	-0.04	-0.17	-0.13	0.27**	-0.28	-0.42	-0.35
Africa	0.22***	0.22***	0.17***	0.14***	0.05*	0.22***	0.11***	0.07**	-0.01
Angola	0.16	0.34*	0.93**	0.64*	0.80***	0.34*	1.10***	0.91***	1.21***
Botswana	0.1	0.14	0.09	0.05	-0.07	0.14	0.06	0.0017	-0.07
Burundi	0.41*	0.3	-0.16	-0.23	-0.68*	0.3	-0.59***	-0.62***	-0.82**
Congo D.Rep.	0.21	0.21	0.21	0.19	0.09	0.21	0.14	0.1	0.05
Egypt	0.19**	0.19**	0.12	0.03	-0.13	0.19**	0.02	-0.06	-0.20**
Ethiopia	0.63*	0.63*	0.55	0.55	0.33	0.63*	0.56	0.55	0.31
Ghana	0.06	0.04	0.01	0.08	0.0035	0.04	-0.03	0.05	-0.03
Guinea	0.14	0.16	0.12	0.03	0.06	0.16	0.17	0.06	0.19
Kenya	0.07	0.07	-0.02	-0.07	-0.13	0.07	-0.11	-0.16	-0.15***
Madagascar	0.2	0.2	0.31	0.31	0.25	0.2	0.14	0.03	0.05
Mali	0.57***	0.56***	0.52***	0.47***	0.37***	0.56***	0.50***	0.45***	0.30**
Mauritius	0.37	0.35	0.32	0.4	0.21	0.35	0.48*	0.44**	0.31
Morocco	0.1	0.1	0.09	0.03	0.03	0.1	0.04	-0.07	-0.13***
Mozambique	0.55***	0.56***	0.41***	0.32***	-0.04	0.56***	0.45**	0.35	-0.06
Namibia	0.35*	0.33	0.2	0.11	0.03	0.33	-0.03	-0.03	-0.1
Nigeria	0.40***	0.40***	0.25***	0.34***	0.06	0.40***	0.22***	0.30***	0.05
Senegal	0.42	0.42	0.54	0.49	0.11	0.42	0.47	0.41	-0.16
South Africa	0.27***	0.27***	0.13***	0.09**	0.05	0.27***	0.08*	0.05	-0.01
Tanzania	-0.08	-0.1	-0.19	-0.25	-0.44***	-0.1	-0.2	-0.26*	-0.45***
Uganda	0.35***	0.35***	0.21***	0.16**	-0.04	0.35***	0.17**	0.08	0.0046
Zambia	0.47***	0.50***	0.35***	0.29	0.21*	0.50***	0.29	0.26	0.17
Zimbabwe	0.07	0.07	0.18	0.14	0.17*	0.07	0.15	0.1	0.15

Wage export premium controlling for plant characteristics. Some controls: ratio of skilled workers, capital to labor ratio, imports of intermediate inputs, labor productivity. Full set of controls: ratio of skilled workers, capital to labor ratio, iso certification, imports of intermediate inputs, foreign ownership, labor productivity, log sales.

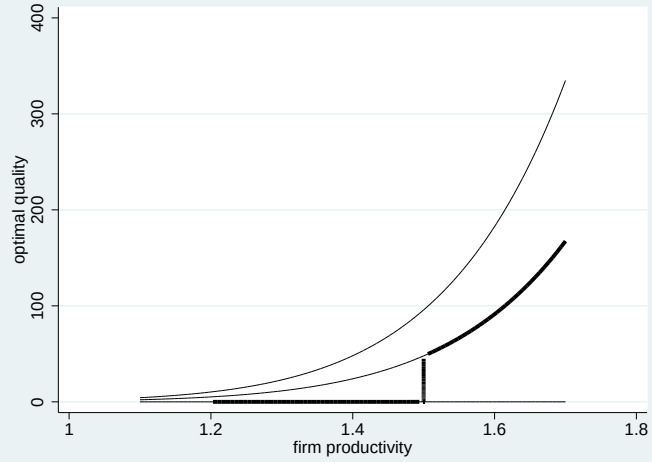
Table 6
Explaining the Wage Premium
(cont.)

Country	No Controls	Some Controls				Full Set of Controls			
		Labor	Technology	Imports	Productivity	Labor	Technology	Imports	Productivity
Latin America	0.38***	0.38***	0.26***	0.22***	0.03	0.38***	0.22***	0.17***	-0.03
Argentina	0.31***	0.30***	0.23***	0.22***	0.16***	0.30***	0.13**	0.09	-0.03
Brazil	0.51***	0.51***	0.38***	0.34***	0.07*	0.51***	0.28***	0.24***	-0.05*
Chile	0.26	0.26	-0.13	-0.16	-0.11***	0.26	-0.06	-0.12	-0.06
Colombia	0.42***	0.42***	0.35***	0.32***	0.11*	0.42***	0.23*	0.15	0.02
Costa Rica	0.45***	0.43***	0.37**	0.30**	0.02	0.43***	0.27	0.23	0.11
Dominican Rep.	0.17	0.20*	0.32**	0.22	0.21	0.20*	0.37**	0.25**	0.09
Ecuador	0.21	0.21	0.1	0.07	1.24***	0.21	0.06	0.04	1.18
El Salvador	0.39***	0.38***	0.29***	0.23**	0.09	0.38***	0.29***	0.20**	0.07
Guatemala	0.19	0.19	0.18*	0.11	0.02	0.19	0.18	0.12	0.01
Honduras	0.41***	0.41***	0.35***	0.29***	0.11	0.41***	0.37***	0.25***	0.07
Jamaica	0.32***	0.32***	0.17*	0.17*	0.07	0.32***	0.20**	0.14	0.01
Mexico	0.44***	0.43***	0.35***	0.28***	0.06	0.43***	0.27***	0.20***	0.01
Nicaragua	0.1	0.1	0.08	0.06	-0.03	0.1	0.08	0.0009	-0.09
Panama	0.24	0.34	0.04	0.03	-0.005	0.34	0.04	0.04	-0.21
Paraguay	0.06	0.06	0.12	0.12	0.11	0.06	0.05	0.06	0.01
Peru	0.52***	0.52***	0.36***	0.32***	0.15**	0.52***	0.30***	0.25***	0.06
Uruguay	0.51***	0.50***	0.20*	0.21	0.12*	0.50***	0.09	0.08	0.04
Asia	0.30***	0.30***	0.18***	0.12***	0.03	0.30***	0.16***	0.05	-0.04
Azerbaijan	0.09	0.08	0.12	0.05	0.08	0.08	-0.01	-0.01	-0.06
Bangladesh	0.1	0.12	0.11	0.1	0.1				
China	0.42***	0.35***	0.10*	-0.02	-0.03	0.35***	0.1	-0.09**	0.07
India	0.05	0.06	0.01	-0.0037	-0.05				
Indonesia	0.33***	0.31***	0.21	0.1	0.01	0.31***	0.1	-0.06	-0.22**
Kazakhstan	0.19*	0.19	0.41*	0.36*	0.17***	0.27	0.47	0.46	0.12
Mongolia	0.44*	0.42	0.2	0.2	-0.01	0.42	0.22	0.18	0.03
Nepal	0.09	0.06	-0.19	-0.27	-0.15	0.06	-0.19	-0.3	-0.27
Pakistan	0.28*	0.26*	0.30**	0.30**	0.16	0.26*	0.30**	0.30**	0.16
Philippines	0.62***	0.62***	0.42**	0.30**	0.14**	0.62***	0.42**	0.18*	0.04
Sri Lanka	0.36**	0.34**	0.30***	0.24***	0.15***				
Thailand	0.29***	0.29***	0.14***	0.09*	-0.06	0.29***	0.12**	0.03	-0.10**
Uzbekistan	0.19	0.14	0.15	0.07	0.23**	0.14	0.32	0.23	0.46
Vietnam	0.16**	0.15*	0.15**	0.11**	0.06	0.15*	0.13**	0.07	-0.02

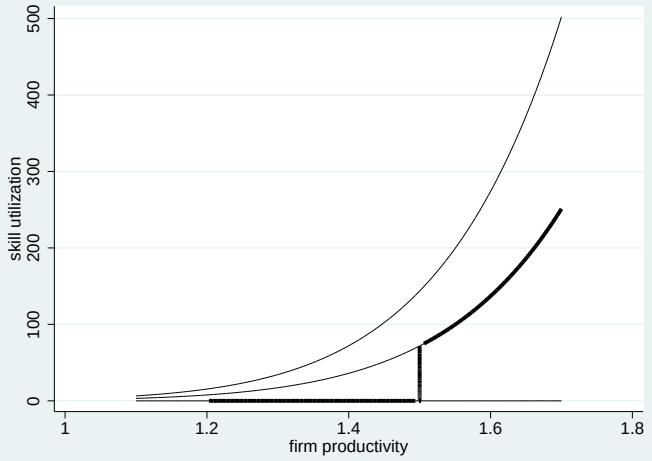
Wage export premium controlling for plant characteristics. Some controls: ratio of skilled workers, capital to labor ratio, imports of intermediate inputs, labor productivity. Full set of controls: ratio of skilled workers, capital to labor ratio, iso certification, imports of intermediate inputs, foreign ownership, labor productivity, log sales.

Figure 1
Optimal Firm Choices
Quality, Skills, Capital Sophistication, Material Input Quality

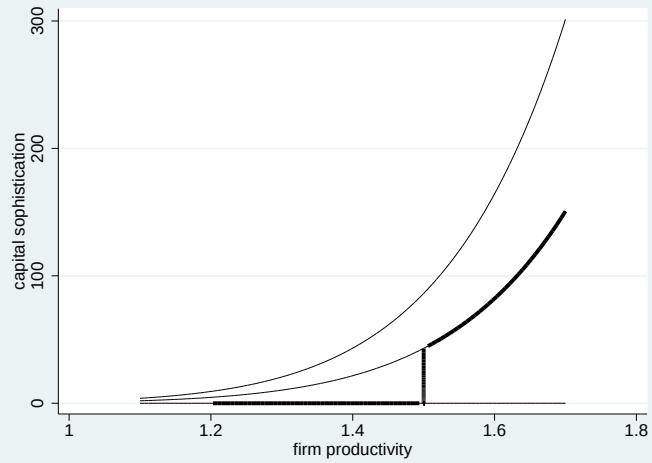
A) Quality θ



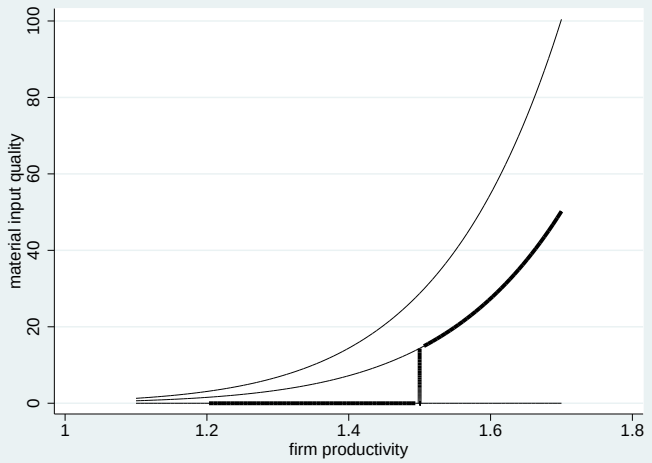
B) Skill Utilization S



C) Capital Sophistication K

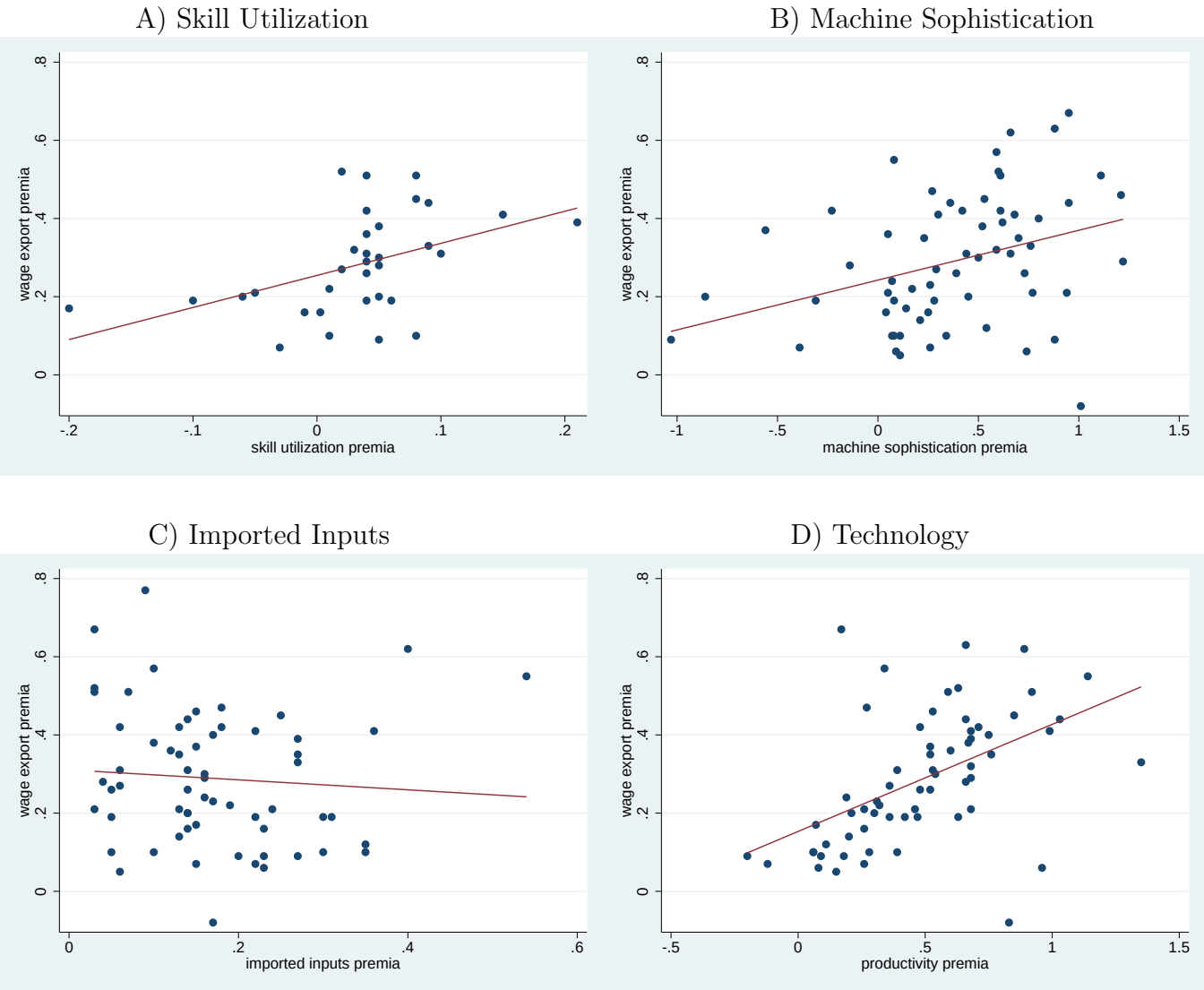


D) Material Input Quality M



Note: Optimal quality, skill utilization, capital sophistication and input quality as a function of productivity. The solid curve represents the average for the domestic and foreign markets. Examples from a numerical solution of the model under the following parameter configuration: $\alpha = 1$, $\sigma^S = 0.5$, $\sigma^K = 0.3$, $\sigma^M = 0.1$, $\xi^S = 1$, $\xi^K = 1$, $\xi^M = 1$.

Figure 2
Wage Export Premia
Cross-Country Analysis



Note: cross-country scatter plots and linear fits of the export wage premia and the skill utilization premia (panel A), the machine sophistication premia (panel B), the imported inputs premia (panel C) and the productivity premia (panel D). Based on coefficients estimated in Tables 1-3.