Income inequality and export prices across countries

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Abstract

This paper provides first firm-level evidence of the links between income inequality and the patterns of trade and export prices. We identify a theoretical mechanism behind these links, which suggests that a more unequal income distribution leads to higher average prices. We test the theory using detailed data for Brazilian exporters and find that the destination countries' first and second moment of the income distribution are important determinants of export prices. Controlling for income per capita, prices are systematically higher in more unequal countries, with this effect being particularly relevant for middle-income countries and holding only for differentiated goods.

Key-words: exports prices, income distribution, product quality, markups.

JEL classification: F12, F14, L11.

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1 Introduction

The relation between income and consumption patterns has attracted a lot of attention in the international trade literature. Virtually every empirical paper studying trade prices predicts a positive relation between a country's income per capita and average trade prices, suggesting that high-income countries consume and produce goods of higher quality.[1] This literature goes back to the Balassa-Samuelson effect, first introduced in 1964 (Balassa (1964) and Samuelson (1964)), showing that consumer prices are systematically higher in richer countries. Yet income per capita might not fully explain the patterns of trade and prices in some economies.[2] Fajgelbaum et al. (2011) derive conditions under which a richer, or more unequal, country has a larger demand for high quality goods. They provide a demand-based explanation for the patterns of trade in goods of different quality. Further recent studies strongly suggest that income inequality within a country should also matter for trade patterns and pricing of traded goods. In many middle income countries, such as China and India, we have observed the emergence of a new class of rich individuals in recent years, who tend to devote a high share of discretionary income to high quality and positional products. Thus, if preferences vary within an economy, income per capita may not capture the consumption patterns of consumers with different marginal utility of income. This channel, namely the role of income inequality in the destination country, has not been given much attention in the empirical literature, with exceptions discussed further below (Latzer and Mayneris (2011) study the effect of income inequality in the *home* country on the patterns of trade).

Understanding the above channel is important because it allows economists to better predict the patterns of trade (in terms of quality differentiation) and prices of goods, and thereby contribute to our understanding of the international ramifications from economic development. Income inequality is rising in many countries, either because the number (or wealth) of rich individuals is increasing, and/or because the poor are falling behind.[3] For instance, China has experienced a tremendous increase in per capita income over the last decades. This tends to lead to higher demand for high quality goods and thus higher prices of imported goods. Simultaneously, China's distribution of income has become much more unequal, driven in part by an increase in the number of rich individuals (see, for instance,

[1]Hummels and Klenow (2005) and Hallak (2006) show that prices increase with exporter and importer income per capita, respectively, and suggest that countries with higher income produce and consume products of higher quality. Similar evidence is found at the firm-level (see Manova and Zhang (2012) and Bastos and Silva (2010b)), and using a structural approach as Khandelwal (2010) and Hallak and Schott (2011).

[2]The fact that the Balassa-Samuelson effect might not explain trade prices for all countries was discussed for instance by Rogoff (1996). He showed that the effect only holds if we compare poor with rich countries, but does not hold within groups of countries.

[3]A study by Chen and Ravallion (2007) reveals that poverty has fallen since 1981 in many countries in Latin America, the Middle East and North Africa, but not enough to reduce the total number of poor. Income inequality has also risen in most OECD countries, as shown by a recent report from OECD (2011).

Chen and Ravallion (2007)). Changes in income inequality could decrease or increase product prices and demand for quality, depending on how the quantity and quality in different consumption categories change with income inequality. Hence the net effect from rising income inequality is a priori unclear.

This paper provides first firm-level evidence about the link between income inequality and the patterns of trade and export prices, and identifies a theoretical mechanism behind the link. We show theoretically and empirically that more income inequality in a destination country leads to higher average prices of traded goods, and this phenomenon is particularly relevant for middle income countries. The idea behind the theoretical mechanism is based on a simple demand composition effect. When preferences are nonhomothetic, poor individuals buy only necessities and cannot afford to buy quality differentiated goods that are traded internationally. By contrast, middle income and richer individuals can afford quality goods of low and high quality, respectively. An increase in inequality (measured by the Gini coefficient), implies for constant average income and given incomes by type (rich, middle income, and poor) that people with preference for high quality good replace middle income households who consume lower quality at cheaper prices and pushes some of those even into no purchase at all. The average price of the differentiated good, calculated on the number of consumers who buy the differentiated good at all, therefore increases.

We also discuss the role of markups for the distribution of prices, and show that under reasonable conditions the demand composition effect prevails. The general theoretical mechanism is particularly likely to operate for middle income countries where very poor and rich individuals live at the same time. For very poor societies even the richest individuals may not be able to afford high quality goods, and thus in our model the average price of the differentiated good is independent of the income distribution. By contrast, in very rich societies all individuals are able to afford quality differentiated goods, which at least weakens or even overturns the relationship between inequality and average price.

Using detailed data for Brazilian manufacturing exporters, with information at the firm and product level by destination country, we establish new stylized facts and test the theoretical prediction. In particular, we find that the second moment of the income distribution in the destination country is an important determinant of export prices. Export prices are systematically higher in high income destinations and, controlling for income, prices are higher in destinations with a more dispersed income distribution. These results hold only for differentiated goods, and in particular for varieties with high vertical differentiation. Results suggest that both markups and product quality are adjusted to market conditions, and in particular to serve more distant, richer, and more unequal markets.

Moreover, we find that results are particularly important for middle-income economies, which experienced several changes in the composition of income groups in the last years and an increase in the number of rich individuals. As discussed in Dalgin et al. (2008), when the income expansion path is curved, the income distribution becomes a determinant of aggregate demand. With a curved income-expansion path, rich individuals buy proportionately more high quality goods. Moreover, firms may charge even higher markups for those goods: as individuals get wealthier, they are willing to pay more for high quality goods. Thus, we interpret our results in terms of the existing literature on quality-to-market and markup pricing. In particular, Simonovska (2013) and Verhoogen (2008) present theoretical predictions consistent with our main findings, that exporters may adjust markups and product quality depending on market conditions.

Using product prices to explain the consumption pattern under non-homothetic preferences and differences in product quality is not novel in the literature. Yet, we show for the first time empirical evidence at the firm level of the importance of income inequality within a country for demand patterns, and find a theoretical link that explains this fact. Using firm-level data, we are able to use a high level of product disaggregation, to track firm behavior, and to control for supply-side unobserved heterogeneity.[4]

Our paper is related to a large literature relating export prices and destination country characteristics. Many of those studies find a strong positive relationship between the price of the good and the country's level of income and income per-capita (Hallak (2006, 2010), Hummels and Klenow (2005) and Fieler (2011)), and attribute higher prices to higher quality. However, these papers focus on income per capita, and do not discuss the role of income distribution within a country.

Bekkers et al. (2012) study the effect of importer income per capita on traded prices, and test the predictions of three different theories using the effect of income inequality on prices. Using aggregate data on import prices, they find empirical support for the hierarchic demand model, and contradict the quality and ideal variety theories. As individuals become richer, more goods become indispensable, which decreases the price elasticity of these goods and raises markups. Thus, through the reduction in the price elasticity, they find that an increase in income inequality increases market prices. These empirical results differ from models incorporating demand for quality, such as Fajgelbaum, Grossman, and Helpman (2011), who show that, under certain conditions, richer, or more unequal, countries have a larger demand for high quality goods. Bekkers et al. (2012) suggest that their results do not falsify the

[4]Even though empirical evidence at the aggregate level is robust, prices aggregated to the country level might fog some important unobserved characteristics related to the firm, product, and market, not related to the quality of the good or to markup pricing.

quality theory, but that the markup effect explains a great part of the variation in prices. We discuss the role of markups in determining the price variation across importing countries, and show that both quality and markups explain our results. When prices are endogenous and average costs are decreasing in inputs, the effect of income inequality on prices is reinforced by the markup effect: both higher quality and higher markups explain higher prices in more unequal destinations.[5]

Our paper is also related to a new and rapidly growing literature on the firm-level sources of price variation across destination markets.[6] Some relevant contributions are Bastos and Silva (2010b), Manova and Zhang (2012), Kugler and Verhoogen (2011) and Martin and Méjean (2010), which study the sources of price variation across and within firms. Bastos and Silva (2010b) show evidence of quality differentiation due to distance to the destination country, while Manova and Zhang (2012) test empirically different models from the literature. They find within-firm effects that cannot be reconciled with heterogeneous firms models and suggest that firms adjust not only markups but also product quality for richer and more distant destination markets. Kugler and Verhoogen (2011) use data for Colombian firms and supply strong evidence that input quality and plant productivity are complementary in generating output quality. Martin and Méjean (2010) use firm-level data for France to demonstrate that quality upgrading of French firms may be a result of competition from low-wage countries (in particular from Chinese). Our empirical results confirm the predictions from the empirical literature regarding distance and income per capita for differentiated goods and show novel predictions for income inequality. Moreover, our results hold for differentiated goods, while non-differentiated goods follow a different pattern, which can be explained by a cost-competence versus quality-competence model, as in Eckel et al. (2011).

The remainder of the paper is organized as follows. Section 2 presents the theoretical framework. Section 3 describes the data and shows descriptive statistics. Section 4 presents the main empirical results. Section 5 concludes.

[5]When prices are endogenous, the effect of income inequality on prices can go in either way, since it depends on how prices change when the middle class shrinks and the number of rich increases. Although, following standard monopolistic competition models with average costs decreasing in inputs, more inequality leads to higher prices.

[6]Even though firm heterogeneity is a stylized fact, the empirical analysis of firm-level price variation across destination markets is a new and rapidly growing literature. Theoretically, two main types of models explain exporters' performance: (i) Efficiency sorting models, such as Melitz (2003) and Melitz and Ottaviano (2008), which attribute better export performance to firms with higher productivity and lower marginal costs; (ii) Quality sorting models, such as Baldwin and Harrigan (2011), Antoniades (2008), and Fajgelbaum, Grossman, and Helpman (2011), which add the quality dimension to models with heterogeneous firms and explain why large productive exporters pay higher wages, use better inputs and have marginal costs increasing in quality.

2 Theory

We consider a small open economy with two goods: a homogenous good and a differentiated good, which comes in two varieties/qualities $i = L, H$, called low L and high H. The homogenous good is the numeraire whose price is normalized to one. The prices of the differentiated good are q_H and q_L, with $q_H > q_L > 0$. For now we assume that the prices are set in the world market, but later we discuss how changes in demand for differentiated goods could affect pricing decisions of firms when prices are endogenously determined. To simplify matters we assume that the economy produces only the numeraire good, which is exported, and imports the differentiated good (although this is not essential for the argument below). The homogenous good is produced under constant returns to scale with labor as only input. All markets are perfectly competitive.

The society consists of a continuum of individuals (whose size is normalized to one) who share identical preferences but differ in their skill/ability. The latter is described in more detail below. An individual has non-homothetic preferences over the numeraire good and the differentiated good. We assume that the individual buys at most one unit of each quality, but may purchase any number of the homogenous good. We postulate the following utility function

$$u = c(1 + v), \tag{1}$$

where c is the number of units of the homogenous good and $v = (1-\delta_H)\delta_L v_L + (1-\delta_L)\delta_H v_H \geq 0$ is an utility index for consumption of the differentiated good.[7] $v_i > 0$ is the benefit of consuming the differentiated good of quality i, and δ_i is a dummy variable taking the value of one if the individual buys quality i, and zero if quality i is not bought.

Letting y refer to income, the budget constraint of a consumer can be written as

$$c + \sum_i \delta_i q_i \leq y. \tag{2}$$

Conditions (1) and (2) have immediate implications: First, a consumer never buys both types of the differentiated good at the same time ($\delta_L = \delta_H = 1$), as the purchase of each is costly, but the joint purchase does give strictly lower utility than consuming only the numeraire good.[8] Second, individuals with incomes less or equal to q_L do not buy the differentiated good because consumption of the numeraire good would be zero. Utility is positive if and only if $c > 0$. We can therefore focus on the following cases: i) no purchase

[7]The utility function could be generalized to $u = h(c)(1 + v)$, with the function $h(c)$ being increasing, concave and $h(0) = 0$.

[8]We could allow for some positive benefit when consuming both qualities, as long as the benefit is sufficiently small relative to the prices of quality.

of the differentiated good, and utility is simply $u(c) = y$, and ii) purchase of one unit of a differentiated goods, leading to utility $u(c) = (y - q_i)(1 + v_i)$ when quality $i = H, L$ is consumed. The optimal consumer choice can now be derived by comparison of these three utility levels.

To characterize optimal consumer behaviour we introduce the following two income thresholds

$$\begin{aligned} y^* &= \frac{q_L(1+v_L)}{v_L} \\ y^{**} &= \frac{q_H(1+v_H) - q_L(1+v_L)}{v_H - v_L}. \end{aligned} \tag{3}$$

In the following we assume that the condition

$$\frac{q_H}{q_L} > \frac{v_H}{1+v_H}\frac{1+v_L}{v_L} \tag{4}$$

holds, which implies $y^{**} > y^*$. When a consumer with income between y^* and y^{**} exists, the low quality good is purchased in equilibrium. The optimal consumption decision regarding the differentiated good is given by:

$$\begin{array}{lll} \delta_L = \delta_H = 0 & \text{if} & y < y^* \\ \delta_L = 1, \delta_H = 0 & \text{if} & y^* \leq y < y^{**} \\ \delta_L = 0, \delta_H = 1 & \text{if} & y^{**} \leq y, \end{array} \tag{5}$$

We simply refer to the three cases as no purchase, low quality, and high quality purchase. The three income ranges shown in (5) are called poor, middle income, and rich.

Next we turn to production and individual heterogeneity. The production of the numeraire good is using labor only and exhibits constant returns to scale. This implies that the wage per unit of labor is unity. Individuals differ in the effective units of labor x they own and supply, where x can be interpreted as productivity or skill. Let $F(x)$ be the cumulative distribution function of skills with support $[\underline{x}, \overline{x}]$. With a unit wage the distribution of incomes is the same as the distribution of skills, and thus the maximum and minimum incomes are identical to the maximum and minimum of skills.

We are now in a position to state aggregate demand for the differentiated good in terms of the distribution of skills and income. As shown in (5), there are three types of consumers regarding the purchase of the differentiated good, which are ordered by income. Let n_j be the fraction of society that corresponds to the three income classes in (5)

$$\begin{aligned} n_P &= F(y^*) \\ n_M &= F(y^{**}) - F(y^*) \\ n_R &= 1 - F(y^{**}), \end{aligned} \tag{6}$$

where $j = P, M, R$ refers to poor, middle class, and rich. Poor individuals consume only the homogenous good, the middle class buys the low quality good, and only the rich buy the high quality good.

We assume that the average income y_j in each of the three classes j is independent of the distribution of the class strength n_j.[9] This holds trivially if there are only three skill levels, one each in the three segments or classes. The assumption may also hold when the density is continuous and stritly positive for all possible values of x. For example, when the density of skills $f^j(x) = k^j$ is constant within each segment j, the class strength is $n_j = k^j(y^u - y^l)$, where y^u and y^l refer to the upper and lower bound of income in each class. In this case average income in each income group can be stated as

$$y_p = \frac{\underline{y} + y^*}{2}, \quad y_M = \frac{y^* + y^{**}}{2}, \quad y_R = \frac{\overline{y} + y^{**}}{2}.$$

The independence of average income in each class y_j and size of each class n_j allows us to compare economies which differ only in the distribution of class sizes without making an analysis of average incomes per class necessary.

The purpose of our analysis is to establish a link between income inequality and average (import) price of the differentiated good, holding overall average income constant. Recall that we assume for now that prices of the differentiated goods are set in the world market and thus our result is completely driven by the demand side of the model, i.e., the composition of households in the three income groups.

We define three variables to prove our main result. First, we denote average (and total) income as

$$Y = \sum_j n_j y_j \in [y_P, y_R], \tag{7}$$

recalling $\sum_j n_j = n = 1$. Second, the average price of the differentiated good is determined

[9] To see the role of this assumption, consider, for example, the case of poor individuals. Average income of a poor person is given by $y_P = \int_{\underline{y}}^{y^*} f(y)ydy/n_P$, and thus in general depends on n_P.

by the purchases of the two groups that consume the differentiated good and equals

$$q = \frac{n_M q_L + n_R q_H}{n_M + n_R} \in [q_L, q_H], \tag{8}$$

assuming that either n_M or n_R (or both) is strictly positive. Finally, we need a concept of income inequality. Society consists of three groups. Let p_k be the cumulative fraction of households up to group k, and z_k its cumulative income share. The Gini coefficient G for this economy[10] takes the value

$$\begin{aligned} G &= 1 - 2\sum_{k=1}^{3}\left(\int_{p_{k-1}}^{p_k}\left[\left(\frac{z_k - z_{k-1}}{p_k - p_{k-1}}\right)(p - p_{k-1}) + z_{k-1}\right]dp\right) \\ &= (n_P + n_M)\left(1 - \frac{n_P y_P}{Y}\right) - (1 - n_P)\left(\frac{n_p y_P + n_M y_M}{Y}\right) \in [0,1], \end{aligned} \tag{9}$$

where $p_0 = 0, p_1 = n_P, p_2 = n_P + n_M, p_3 = 1$ and $z_0 = 0, z_1 = n_P y_P/Y, z_2 = (n_P y_P + n_M y_M)/Y$ and $z_3 = 1$.

2.1 The Main Result

We now establish the main result of our model by comparing two different countries that differ only in the Gini coefficient due to a different distribution of class sizes. We assume also that the threshold levels y^* and y^{**} are inside of the support of incomes $[\underline{y}, \overline{y}]$.

Proposition 1. Consider two countries A and B that are identical in all respects including the overall average income ($Y^A = Y^B$) and the average income in each class ($y_j^A = y_j^B$, $j = P, M, R$), except for the distribution of class sizes n_j^c, $c = A, B$. If country A has the more unequal distribution of incomes compared to country B, that is $G^A > G^B$, then the average price of the imported differentiated good in A is higher than in B: $q^A > q^B$.

Proof: We prove the result in two steps. Our proof exploits the property that G and q are continuous and monotonic in n_R and hence we can rely on differentiation. Our first result establishes a link between the changes in the number of rich individuals and average price.

Lemma 1. $sign(dq) = sign(dn_R)$.

Proof of Lemma 1: Constant average income together with the adding up constraint

[10] The Gini coefficient equals the area between the diagonal in a Lorenz diagramm and the Lorenz curve relative to the area under the diagonal. In the case of three groups the Lorenz curve is piecewise linear with three segments. The slope of the Lorenz curve changes at two values: the cumulative fraction of the population of n_P and $n_P + n_M$. The corresponding income shares are $n_P y_P/y$ and $(n_P y_P + n_M y_M)/y$.

$\sum_j n_j = 1$ imply via differentiation of (7)

$$dn_M = \frac{(y_P - y_R)}{y_M - y_P} dn_R =: k dn_R, \tag{10}$$

where $k = \frac{y_P - y_R}{y_M - y_P} < -1$. Hence, the number of rich and middle class individuals cannot move in the same direction without affecting average income.

The change in the average price follows from differentiation of (8) to give

$$dq = \frac{(q_H - q_L)(n_M dn_R - n_R dn_M)}{(n_M + n_R)^2}. \tag{11}$$

Condition (11) implies that the average price increases when the relative change of rich individuals dn_R/n_R is larger than the relative change of middle income individuals dn_M/n_M. Plugging (10) into (11) to eliminate dn_M and collecting terms gives

$$dq = \frac{(q_H - q_L)(n_M - k n_R)}{(n_M + n_R)^2} dn_R, \tag{12}$$

which proves the Lemma because $q_H > q_L$ by assumption and $k < 0$.

Lemma 1 demonstrates a positive correlation between the number of rich and the average price. The result is established by making use of constant average income.

Our second step establishes a positive correlation between the changes of the size of the rich class and the Gini coefficient.

Lemma 2. *$sign(dG) = sign(dn_R)$.*

Proof of Lemma 2: Differentiating (9), substituting $dn_P = -d(n_M + n_R)$ and (10), and then collecting terms gives

$$\begin{aligned} dG &= \left[\left(1 - \frac{2n_P y_P}{Y}\right) + \left(1 - \frac{n_R y_R}{Y}\right)\right] dn_P + \left(1 - \frac{n_P y_P}{Y}\right) dn_M + (1 - n_P) dn_R \\ &= \frac{[y_R - (2+k) y_M] n_M}{y} dn_R, \end{aligned}$$

which proves the Lemma because $k < -1$ and $y_M < y_R$.

Together Lemmas 1 and 2 imply that a simultaneous increase in the number of rich leads to an increase in inequality and the average price of the differentiated good, that is $sign(dG) = sign(dq)$. This completes the proof of our main result.

Proposition 1 is silent about the causal relationship between the three variables of interest (G, q, n_R). In our view the natural way of thinking about the relationship is that a change in the composition of households by income is the cause of observed adjustments in average price and income inequality.

2.2 Endogenous Pricing and Economic Development

In this section we consider two important extensions of the base model. In the first one we deal with endogenous pricing of the differentiated good in order to shed role on markups. The second extension discusses the relationship between average income (and the support of incomes) and the average price, which allows us to predict more precisely for which type of countries our prediction is most likely to hold.

Endogenous Pricing

So far we assumed that the prices of quality goods are exogenously given in order to emphasize the demand composition effect. In practice prices may vary with demand, as firms adjust to a new environment. It is therefore important to elaborate on endogenous price adjustments, as markups play a role in the empirical part of our paper.

To analyze the role of endogenous prices, recall that we established a positive correlation beween inequality, average price, and the number of rich. Suppose that the size of the rich class increases. Then, condition (10) shows that the number of middle class households must fall to keep average income constant. The total change in average price can be represented by the sum of i) the change in the number of individuals (the composition effect), as shown in (11), and ii) the additional effect from endogenous pricing. The latter can be written as

$$\frac{dq}{dn_R} = \frac{n_M \frac{dq_L}{dn_M} \frac{dn_M}{dn_R} + n_R \frac{dq_H}{dn_R}}{n_M + n_R}, \tag{13}$$

where $dn_M/dn_R = k < 0$ is derived via (10). We implicitly assume that the number of rich and middle class households affect prices of quality goods only directly, that is, the pricing decision of high quality producing firms depends only on the number of high quality consumers but not on those consuming low quality (and analogously for low quality producing firms). This assumption keeps the analysis tractable and makes for a straightforward interpretation.

We do not fully specify the supply side and thus the pricing decision of firms. Rather, we offer some general insights based on (13). First, we note that the two effects in the numerator of (13) are likely to go in opposite direction, as $sign(dq_L/dn_M) = sign(dq_H/dn_R)$ seems a natural assumption, and $dn_M/dn_R < 0$. The sign of dq_L/dn_M and dq_H/dn_R can be linked to the slope of the supply curve, and their magnitudes are critical for the overall effect arising from endogenous pricing.

We now wish to establish a sufficient condition for (13) to be positive, which in turn reinforces the demand composition effect we identified above. In this case the average price unambiguously rises with the number of rich households. When we assume $n_M \geq n_R$ and $0 > dq_H/dn_R \geq dq_L/dn_M$, we can simplify the numerator in (13) as follows:

$$n_M \frac{dq_L}{dn_M} \frac{dn_M}{dn_R} + n_R \frac{dq_H}{dn_R} \geq \frac{dq_L}{dn_M}(kn_M + n_R) > 0.$$

The condition that prices fall with the quantity consumed is consistent with results from models of monopolistic competition and models with external economies of scale, where average costs are falling with output. We summarize our results as follows.

Proposition 2. Suppose that the size of the rich class increases. If $n_M \geq n_R$ and $0 > dq_H/dn_R \geq dq_L/dn_M$, markup price adjustments reinforce the positive demand composition effect on prices.

By contrast, when the supply curve is upward sloping ($dq_H/dn_R, dq_L/dn_M > 0$), as in standard models with decreasing returns to scale, the reduction in the middle class would tend to lower the average price when the number of middle class households is larger than the number of rich households. This would not necessarily overturn our general conclusion, as the demand composition effect pushes in the opposite direction, but it would reduce its strength.

Prices and Economic Development

The fact that the differentiated good (of either high or low quality) is not always purchased due to a lack of income is the basis for the main mechanism at work. So far we assumed a situation where all types of consumption (no, low and high quality) are present. This need not be the case. Societies differ in terms of average income and the distribution of incomes which suggests that the effect of income inequality on average price of the import good depends on average income. Changes in average income could be modelled by different distributions of income over a given support or by shifts in the support (or both). Here we focus on shifts in the support in order to capture distinct consumption patterns of the differentiated good. We argue that our main result is a good explanation for middle income countries, but less so for very poor or very rich countries (assuming now again exogenous prices of differentiated goods). In very poor societies many households will be restricted to the purchase of absolute necessities, and thus only the numeraire good is consumed by the majority of individuals. As income per capita and the highest incomes grow, some individuals are able to afford the low quality good, but not the most expensive variety. We call this a poor society. With further development the number of consumers buying the high quality good eventually becomes positive and rises with growth of all incomes. Most likely, when average income is very high, all individuals buy the differentiated good (either high or low), which we refer to as a rich society.

More formally, a society is called poor if $\overline{y} < y^{**}$, which implies that there is no individual who purchases the high quality good (i.e., $n_R = 0$; but some may buy the low quality version of the differentiated good). A middle income society is defined by $\underline{y} < y^* < y^{**} < \overline{y}$. In this case there are households in each segement/class, that is $n_P, n_M, n_R > 0$, and this corresponds to the case considered in the base model. Finally, we define a rich society to be one in which each household buys one unit of the differentiated good ($n_P = 0$), that is $y^* < \underline{y} < y^{**} < \overline{y}$. (A super rich society could be defined for the situation where $n_P = n_M = 0$, and thus all households consume the high quality good).

Our main results is as follows.

Proposition 3. When societies differ in the support of the income distribution, the effect of inequality on average import prices of the differentiated goods is zero in very poor societies, with $\overline{y} < y^{**}$, positive in middle income economies, with $\underline{y} < y^* < y^{**} < \overline{y}$, and ambiguous in very rich societies, with $y^* < \underline{y} < y^{**} < \overline{y}$. Regardless of the sign, the absolute size of the effect in rich societies is smaller than in middle income countries.

To demonstrate these claims let us first analyze poor societies, where no one is able to afford the high quality good, but some purchase the low quality good. In this case the average price is

$$q = \frac{n_M q_L}{n_M} = q_L, \tag{14}$$

and thus is invariant to the number of rich and middle income households.

A more complex situation arises in rich societies, where the average price is given by

$$q = \frac{n_M q_L + n_R q_H}{n_M + n_R} = n_R(q_H - q_L) + q_L, \tag{15}$$

because by assumption $n_M + n_R = 1$. In contrast to the base model we cannot vary the number of rich people without changing class incomes y_M and y_R, because without such changes average income in society would not be constant. Any changes in class incomes, however, would not impact the average price, which depends only n_R (and prices of quality). We thus have a more tenuous relationship between income inequality and import prices. With only two income groups and $n_P = 0$, the Gini coefficient in (13) can be written as $G = n_M - n_M y_M / Y = n_R(1 - n_R)(y_R - y_M)/Y$. Holding Y constant, G rises if and only if $dy_R > dy_M$ (without imposing a sign on the change in n_R). Thus, there exist changes in exogenous incomes and the number of rich such that the Gini coefficient increases or decreases. We conclude that the positive correlation between income inequality and import prices, which we found in the base model for middle income countries, does not necessarily hold for rich societies. We can say a bit more, when we assume that a positive correlation exists, as in the base model. In a rich society, an increase in the number of rich people affects average price as follows

$$\frac{dq}{dn_R} = q_H - q_L.$$

By contrast in a middle income society, the effect is given by (12). Both derivatives have the term $q_H - q_L$ in common. We now demonstrate that the size of the effect in the middle income society is larger. To see this it is sufficient to prove that in a middle income society (where $n_M + n_R < 1$)

$$n_M - kn_R > n_M + n_R > (n_M + n_R)^2,$$

which holds because $k < -1$.

3 Data and descriptive statistics

3.1 Brazilian firm-level data

We use a three-dimensional firm-level data for all Brazilian manufacturing exporters in the year 2000. The data contains values and quantities exported by firm, product, and destination country.

The data comes from the Brazilian customs declarations for merchandize exports that is collected for every exporting firm by the Foreign Trade Secretariat (SECEX). All export values are reported in U.S. dollars (USD) free on board (f.o.b.). For the purposes of this paper, we use only manufacturing exporters. The precise steps to build the SECEX exports data are described in the Appendix.

Firms in the *SECEX export data* are identifyed by the unique CNPJ tax number. Brazilian products are coded according to the 8-digit NCM classification of goods (NCM-SH *Nomenclatura Comum do Mercosul*, Sistema Harmonizado). The first 6 digits of the NCM correspond to the HS (international Harmonized System), which is the international standard for the classification of goods.[11]

The variable average unit prices ($Uprice_{fcg}$) is defined as $Uprice_{fcg} = \frac{Value_{fcg}}{Quant_{fcg}}$, where $Value$ represents total sales of firm f, product g to destination country c and $Quant$ is the total quantity exported of product g by firm f to country c.

Firm-level 8-digit products are classified according to the Rauch (1999) classification of

[11] Since the first six digits coincide with the 6-digit HS classification, it is possible to match the HS and NCM classification with the SITC classification (Standard International Trade Classification). Thus, the data can be matched with the Rauch (1999) classification of goods and the NBER-UN World trade data. Moreover, the similarity in classification between NCM and HS allows better comparison to the literature.

goods.[12]

Table 1 shows the variation in prices ($Uprice_{fcg}$) in terms of standard deviations. The standard deviation of log prices across destinations is on average 0.10 for a firm-product pair (fg). For comparison, the second part of Table 1 presents the deviation of prices within product-country pairs across firms. The variation across firms is higher, as one would expect from the trade literature with firm heterogeneity previously discussed. As expected, the price variation comes mostly from differentiated goods [13], and the variation is smaller within the European Union.

As an illustration for the price variation, Figure 1 shows the Kernel density of firm-product price variation across destinations computed in year 2000. As an example, it shows the Kernel density for the textile industry.[14] Figure 1 shows that the within firm-product price dispersion across countries is not negligible and contains both positive and negative price deviations. In terms of average standard deviation for all industries, it represents 0.107 for a firm-product pair. This variation in prices is only conditional on firm-product pairs and does not (necessarily) mean quality variation. We are interested in the causes of this price variation, studied throughout the paper.

Table 1: Variation in export prices - standard deviation

	Obs	**Mean**	**Std. Dev.**	**Min**	**Max**
Variation in export prices across destinations within firm-product pairs					
Standard deviation of prices across destinations:					
Total trade	54619	**0.1073**	0.2180	0	1.5677
Differentiated goods	45271	0.1099	0.2201	0	1.5677
Reference priced goods	4623	0.0754	0.1814	0	1.4623
Homogeneous goods	1203	0.0607	0.1331	0	1.0653
Only european countries *(total trade)*	9562	0.0614	0.1642	0	1.5159
Variation in export prices across firms within country-product pairs					
Standard deviation of prices across firms:					
Total trade	43525	**0.2106**	0.3211	0	1.5955
Differentiated goods	34314	0.2268	0.3282	0	1.5955
Reference priced goods	5304	0.1097	0.2476	0	1.5301
Homogeneous goods	924	0.1048	0.2089	0	1.5032
Only european countries *(total trade)*	6419	0.1527	0.2835	0	1.5052

[12] Rauch (1999) uses the 4-digit SITC classification (issued by the United Nations) to aggregate the trade data in three groups of commodities: (i.) w, homogeneous (organized exchange) goods: goods traded in an organized exchange; (ii.) r, reference priced: goods not traded in an organized exchange, but which have some quoted reference price, as industry publications; and (iii.) n differentiated: goods without any quoted price. With this classification, goods are divided in 349 reference priced goods, 146 homogeneous goods and 694 differentiated goods. As shown in Bastos and Silva (2010a), the Rauch (1999) classification of goods is well suited for capturing quality differentiation.

[13] Those values in Table 1 are smaller than the ones reported in Manova and Zhang (2012), respectively, 0.46 and 0.90 for the variation across destinations and across firms.

[14] Price deviation represents the price gap of good g exported by firm f to country c with respect to the mean price of fg to all countries. All prices are free on board (f.o.b.).

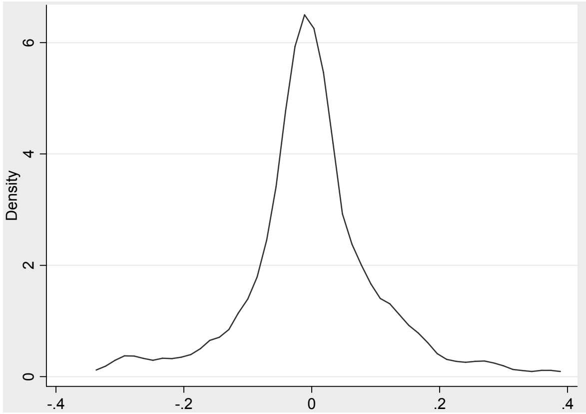

Figure 1: Kernel density: firm-product price variation across destination countries. Year 2000 for the textile industry.

3.2 Country-level variables and world trade data

Income inequality data: Data on income inequality (Gini coefficient and income deciles) comes from the UNO-WIDER (United Nations World Institute for Development Economics Research).[15] The main variable of interest is the Gini coefficient, $Gini_c$, measured on a scale of 0 to 100. For the purposes of this paper, information on disposable income was preferred, when available. According to a recent study by Aguiar and Bils (2011), consumption inequality has largely tracked income inequality in the last years and may explain variations in income inequality. Detailed information on the construction of the index is available in the Appendix to this Chapter. As a robustness check to our results, we use the deciles of the income distribution, also available at UNO-WIDER.

Spatial data and country codes: The bilateral gravity regressors come from the CEPII - Centre d'Etudes Prospectives et d'Informations Internationales. The main variable of interest is distance to Brazil, $Dist_c$. The same source gives the international *cty* country codes.

World trade elasticities: Data on import demand elasticities ($Sigma_{c,s}$) from Broda, Greenfield, and Weinstein (2006). The elasticities are estimated at the 3-digit HS for 73 countries in the world.

World export and import data, bilateral flows: Data on bilateral imports and exports come from NBER-UN yearly bilateral trade data (`www.nber.org/data`), documented by Feenstra, Lipsey, Deng, Ma, and Mo (2005). The NBER-UN trade data gives an accurate measure of trade flows by sector SITC2 (defined as sector s)[16], since the values are mainly reported by the importing country - which is a better measure due to the differences between c.i.f. (cost, freight and insurance) and f.o.b. prices (s.Feenstra, Lipsey, Deng, Ma, and Mo (2005)). Using the world trade data, we calculate different measures of market power of Brazilian firms, as

[15] Data available at `http://www.wider.unu.edu/research/Database/en_GB/wiid/` .

[16] The NBER-UN data uses the Standard International Trade Classification (SITC 2 - Division), 4 digits.

well as a proxy for production in the destination country and a measure of the importance of each sector in each country. All variables are described in Table 8.

Income per capita: Data on GDP per capita ($CGDP_c$) comes from the Penn World Table (PWT 6.2 for 188 countries. The version 6.2 uses the year 2000 as the base year).

The main explanatory country variables are described in Table 2. Countries are divided according to the tertile of the income distribution.

Figure 2 shows the correlation between income per capita and the Gini coefficient. One could argue that the Gini coefficient does not provide much additional information to prices when controlling for income per capita. Although, for the sample of countries used in this paper[17], the correlation between the Gini coefficient and the income per capita is -0.193 for rich countries, and 0.149 for poor countries. This result is not surprising: according to the Kuznets curve (see Kuznets (1955)), there is a natural cycle of inequality and income per capita, leading to an inverted u-shaped curve (with Gini on the Y axis and income per capita on the X axis).

Table 2: Main explanatory variables, according to the tertile of the income distribution

Variable	**Mean**	**Std. Dev.**	**Min.**	**Max.**	**N**
First tertile of the distribution of $CGDP_c$					
GDP_c	329,513,308	1,003,365,021	2,606,171	5,052,199,936	31
$CGDP_c$	2,635.498	1,383.968	513.906	4,732.128	31
$Dist_c$	8,881.426	4,478.001	2,380.92	18,396.479	31
$Gini_c$	44.687	9.625	26	62.5	31
Second tertile of the distribution of $CGDP_c$					
GDP_c	198,419,970	283,274,398	2,040,752	1,352,476,032	30
$CGDP_c$	8,201.286	2,102.586	4,753.42	11,430.188	30
$Dist_c$	8,400.192	4,163.122	1,134.65	16,409.975	30
$Gini_c$	42.53	10.179	24.3	57.8	30
Third tertile of the distribution of $CGDP_c$					
GDP_c	714,360,206	1,786,852,465	5,536,964	9764,800,512	30
$CGDP_c$	24,095.87	6,835.66	13,616.582	48,217.272	30
$Dist_c$	10,338.795	2,393.837	6,343.316	18,821.258	29
$Gini_c$	32.767	6.627	24.8	57.5	30

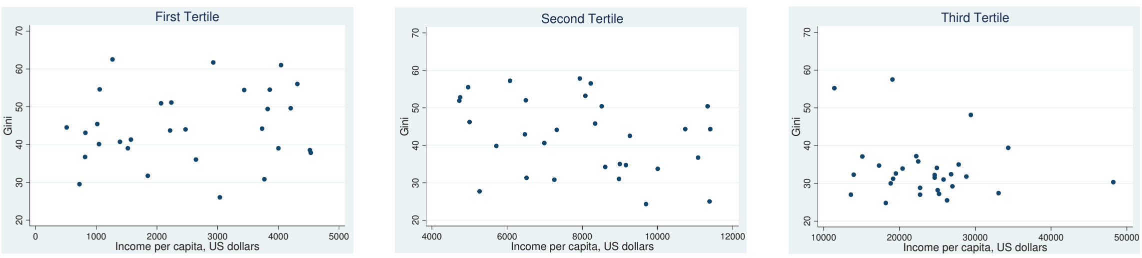

Figure 2: Gini and income per capita for different tertiles of income per capita

The Appendix to descriptive statistics contains a thorough description of the main variables and the prediction according to the literature. Table 8 in the Appendix presents a brief

[17]The sample used in this paper includes all destination countries of Brazilian exports, for which there is available information on the Gini coefficient. A detailed description is found in the Appendix.

summary of the variables.

4 Empirical Analysis

This section presents the econometric approach and the main empirical results following the predictions from the theoretical model. We show that prices are systematically higher in high income and more unequal destination countries. These results hold only for differentiated goods, and are magnified for products with higher scope for quality differentiation. Results hold both within and across firms, and are particularly important for middle-income countries.

4.1 Econometric specification for cross-section analysis

We use *fixed effects transformation* as the methodology to study the determinants of f.o.b. prices across destination countries by firm-product pairs. From the linear unobserved effects model $Y_{cgf} = \mathbf{X}_{cgf}\beta + \delta_{gf} + u_{cgf}$, the averages of firm f and product g over C countries follow:

$$\underbrace{C^{-1}\sum_{c=1}^{C} Y_{cgf}}_{\bar{Y}_{gf}} = \underbrace{C^{-1}\sum_{c=1}^{C} \mathbf{X}_{cgf}}_{\bar{X}_{gf}}\beta + \delta_{gf} + \underbrace{C^{-1}\sum_{c=1}^{C} u_{cgf}}_{\bar{u}_{gf}} \tag{16}$$

where $Y_{cgf} = luprice_{cgf}$ represent log unit values $(\frac{Value_{fcgt}}{Quant_{fcgt}})$ and $\mathbf{X}_{cgf}$ is the vector of control variables described in Table 8.

In terms of deviations from the mean, $\ddot{Y}_{cgf} = Y_{cgf} - \bar{Y}_{gf}$, it follows:

$$\ddot{Y}_{c(gf)} = \ddot{X}_{c(gf)}\beta + \ddot{u}_{c(gf)} \tag{17}$$

For linear models, the within estimator from equation 17 is equivalent to the least-squares dummy-variable estimator (LSDV) and allows to control for all firm-product unobserved heterogeneity. Thus, the LSDV and the fixed effects transformation may be used interchangeably once the standard errors are clustered in the correct way, given the sample dimensions.[18] Errors are clustered by destination country.

[18] The only difference between the two estimators refers to the cluster-robust standard errors because of different small-sample correction. Consider the LSDV model: $Y_{cgf} = \left(\sum_{n=1}^{N} \alpha_{cgf}\mathbf{d}_{n,cgf}\right) + \mathbf{X}_{cgf}\beta + u_{cgf}$, where $n = 1, ..., N$ are N $firm * product$ specific indicator variables, $\mathbf{d}_{n,cgf}$, with $\mathbf{d}_{n,cgf} = 1$ for the nth $firm * product$ pair observation, and *zero* otherwise.
The inference in the least-squares dummy-variable estimator is designed for N fixed and $C \to \infty$, while in the within estimator C is fixed and $N \to \infty$. See Cameron and Trivedi (2010).

4.2 Price variation across destination countries: homogeneous versus differentiated goods

This section presents the results for the main proposition of the theoretical model. We expect that countries with a more unequal income distribution pay higher average prices for differentiated goods. We show results within and across firms for homogeneous and differentiated goods. The results follow the within estimator from equation 17, in logs if applicable. We confirm the predictions from our model in Tables 3 and 4.

First we show within firm effects across destinations. We show that differentiated goods (Table 3) follow different patterns if compared to homogeneous goods (Table 4). In particular, income inequality within a country ($Gini_c$) has a positive and significant effect on prices in all specifications shown in Table 3, for differentiated goods. Firm-product average prices are higher in richer countries (measured by the income per capita) and, controlling for income per capita, the effect of income inequality on prices is positive and significant. In the benchmark specification in Column (2), the magnitude of the Gini coefficient, measured from 1 to 100, means that 1 percentage increase in the income inequality leads to an increase in prices of differentiated goods by 0.44%. For income per capita, results mean that a 1% increase in the income per capita leads to an increase in export prices of 4.56%. Thus, prices are systematically higher not only in richer destinations, but also in more unequal destinations. As expected, there is no effect of income or income inequality on prices for homogeneous goods (Table 4), goods without scope for vertical differentiation.

Second, in Table 5 we show that results hold not only within firms but also across firms. Moreover, the magnitude of the coefficient of inequality is much larger across firms than within firms, which is consistent with firms being heterogeneous. In our benchmark specification in Table 5 Column (2), 1 percentage increase in income inequality leads to an increase in prices of 0.95%, compared to a 0.44% price increase in Table 3. Across firms, we believe that the quality component of price variation across destination is higher, while the markup component may be larger within firms.

Assuming for a moment that the results from Tables 3 and 5 reflect quality variation across destinations, results could be interpreted as a market-specific quality differentiation. If country A has a higher share of wealthy individuals (given in the model by n_R) than country B, with a high willingness to pay for quality, the demand for high quality products in country A will be higher. Thus, average prices in country A (shown in equation 8) will be higher, which confirms the main prediction from our model. Our model also adds an interpretation for variable markups. With downward sloping supply curves (which is consistent with monopolistic competition and external economies of scale), markups are adjusted such that more unequal countries pay higher prices. Thus, firms may adjust markups and quality to more unequal destinations.

In the next section, we discuss whether this result holds for all countries and discuss competing hypotheses to the product quality and markup hypotheses.

Our results are consistent with trade models with non-homothetic preferences. If preferences are non-homothetic, consumers in wealthier countries have a lower marginal utility of income and are willing to pay more for high quality products. Thus, income per capita will determine the choice for quality, which will be embodied in the price charged by firms. This result has been shown for average income, e.g., by Manova and Zhang (2012), Verhoogen (2008) and Bastos and Silva (2010b).

At the aggregate level, Bekkers et al. (2012) confirm the result that higher income leads to higher average prices. They use the second moment of the income distribution (income inequality) to differentiate three competing models and find empirical support for a hierarchic demand model: as individuals become richer, more goods become indispensable, which decreases the price elasticity of these goods and raises markups. Thus, they find support for market prices decreasing with income inequality, which is the opposite from what we find. Bekkers et al. (2012) suggest that their results do not fasify the quality theory, but rather stress the importance of markups. Fajgelbaum et al. (2011) build a model with different quality levels and variable markups and discuss that prices are unambiguously higher for higher quality products, but that the effect of markups on prices can go in either way. According to their predictions, more income inequality leads to more demand for high quality products, which is inline with our results. In our model, when prices are endogenous, the effect of markups on prices can go in either way, depending on the shape of the supply curve, but prices are, by assumption, higher for products with higher quality. Empirically, we find that higher income inequality leads to higher prices. We interpret this finding as a result both of demand for high quality (once inequality increases) and of higher markups if firms have decreasing average costs (downward sloping supply curve).[19] The advantages of the firm-level approach, used in this paper, are to have a higher level of product disaggregation (8-digit product), to be able to track firm behavior, and to control for the supply-side unobserved heterogeneity.

At the aggregate level for trade flows, Francois and Kaplan (1996) have shown that income distribution, and in particular income inequality, has an important effect on trade flows.

[19]If firms have upward sloping supply curves, our empirical results for income inequality would mean that the quality effect outweighs the markup effect.

They find that, in developing countries, the share of imports of manufactured goods from developed countries increases with the inequality of the developing country. Dalgin et al. (2008) use a gravity approach and show that income distribution helps explaining import demand. They construct a classification of luxury goods and show that the difference in import demand of luxuries versus necessities varies with income inequality. This results are inline with our quality interpretation.

The results for distance to destination and the market size shown in Tables 3 and 5 confirm the predictions from the literature (see Manova and Zhang (2012) and Bastos and Silva (2010b)). Consider first the predictions for differentiated goods. For distance $Dist_c$: with per unit transaction costs, the relative price of the high quality products decreases with distance (Alchian and Allen (1964) effect). Thus, the highest quality is shipped to distant countries.[20] The prediction for market size (GDP_c) may be related to the toughness of the market: as the market grows large, competition gets tougher and leads to lower prices (i.e., firms may adjust markups). As shown below, competition and market power are considered in different ways.[21]

The predicted income effect for differentiated goods can not be explained only by higher markups because of greater market power, since the variable $Mktshare_{fcg}$ (Column (3), Table 3) controls for the firm's market share, as also shown in Manova and Zhang (2012). Controlling for the firm-product market share in a specific country, the results for GDP per capita remain robust. One important concern with this measure of market share is the high correlation between prices and $Mktshare_{fcg}$. Thus, we use alternative measures to control for market power, shown in columns (4) and (5).

Column (4) adds $ShareImp_{c,s}$ a proxy for production in country c using the NBER-UN World Trade data. It controls for the importance of sector s_i in the total imports from country c. Column (5) adds $ShareExp_{c,s}$, which controls for the importance of sector s_i in total exports of destination country c, as a proxy for production in country c. Moreover, $ln(Nfirms)_{cg}$ controls for the number of firms selling the same product in each market as a proxy for competition. The coefficients for income per capita and income inequality remain significant in all specifications.

The results are also robust controlling for the *elasticity of substitution* measured by Broda, Greenfield, and Weinstein (2006), as shown in column (7).

For homogeneous goods, the patterns of distance and market size are the opposite com-

[20] In the literature of price variation *across firms*, the argument of the quality sorting literature is that more productive firms sell higher quality, and high observed prices indicate high competitiveness; thus, marginal costs increase in distance, as argued in Verhoogen (2008) and Baldwin and Harrigan (2011).

[21] Heterogeneous firms models with linear demand (see Melitz and Ottaviano (2008)) predict that markups decrease as the market sizes increases, since competition gets tougher.

pared to the results for differentiated goods, as we show in Table 4. For $Dist_c$, higher distances imply lower prices. This prediction could be a result of more productive firms being the only ones that make it to export to more distant markets. Since more productive firms have lower marginal costs for non vertically differentiated products, they charge lower prices. For GDP_c, the positive effect may be a result of economies of scale, as long as firms have higher revenues in those markets.

Table 3: Variation in export prices within firm-product pairs across countries for Differentiated goods

Dependent variable: $ln(uprice)_{fcg}$	(1)	(2)	(3)	(4)	(5)	(6)	(7)
$Gini_c$	0.00175**	0.00444***	0.00507***	0.00354***	0.00346***	0.00399***	0.00444***
	(0.000804)	(0.00112)	(0.00112)	(0.00113)	(0.00113)	(0.00111)	(0.00112)
$ln(CGDP)_c$		0.0456***	0.0482***	0.0316*	0.0310*	0.0426***	0.0452***
		(0.0161)	(0.0161)	(0.0164)	(0.0164)	(0.0162)	(0.0161)
$ln(Dist)_c$		0.0478***	0.0275*	0.0466***	0.0477***	0.0764***	0.0473***
		(0.0135)	(0.0141)	(0.0139)	(0.0139)	(0.0168)	(0.0135)
$ln(GDP)_c$		-0.0218***	-0.0169***	-0.0278***	-0.0288***	-0.0282***	-0.0216***
		(0.00595)	(0.00601)	(0.00667)	(0.00663)	(0.00621)	(0.00596)
$Mktshare_{fcg}$			0.122***				
			(0.0262)				
$ShareImp_{c,s}$				-1.680			
				(1.094)			
$ShareExp_{c,s}$					-0.544		
					(1.025)		
$ln(Nfirms)_{cg}$						0.0275***	
						(0.0106)	
$Sigma_{c,s}$							0.000129
							(0.000218)
Constant	2.911***	2.387***	2.375***	2.637***	2.648***	2.264***	2.391***
	(0.0371)	(0.206)	(0.206)	(0.223)	(0.223)	(0.212)	(0.206)
Firm-product FE	Y	Y	Y	Y	Y	Y	Y
Observations	82,716	82,716	82,716	82,716	82,716	82,716	62,055
R-squared	0.924	0.926	0.926	0.928	0.928	0.926	0.926
Number of countries	90	90	90	90	90	90	62
Number of products	3226	3226	3226	3226	3226	3226	2780
Number of firms	6186	6186	6186	6186	6186	6186	4560

NOTES:

1. The standard errors are clustered at the country level.
2. The R-squared reported refer to the LSDV estimator, which includes the firm-product FE. The within effect of the estimations using fixed effects transformation is, on average, 0.03 and, thus, similar to (although strictly greater than) the within effect reported in Bastos and Silva (2010b) in their working paper.
3. Since the focus of the paper is the variation across countries for a firm-product pair, observations for which the number of destinations is less than 2 are removed.

Table 4: Variation in export prices within firm-product pairs across countries for Homogeneous goods

Dependent variable: $ln(uprice)_{fcg}$	(1)	(2)	(3)	(4)	(5)	(6)	(7)
$Gini_c$	0.000149		0.000149	0.000165	0.000208	0.000321	-0.000260
	(0.00185)		(0.00185)	(0.00187)	(0.00197)	(0.00196)	(0.00195)
$ln(CGDP)_c$			0.00591	0.00566	-0.00481	-0.00303	0.00828
			(0.0159)	(0.0155)	(0.0171)	(0.0167)	(0.0158)
$ln(Dist)_c$		-0.0723**	-0.0718**	-0.0711**	-0.0613*	-0.0615*	-0.0798**
		(0.0314)	(0.0341)	(0.0343)	(0.0346)	(0.0346)	(0.0346)
$ln(GDP)_c$		0.0185***	0.0175***	0.0172***	0.00803	0.00818	0.0208***
		(0.00613)	(0.00600)	(0.00653)	(0.00600)	(0.00586)	(0.00714)
$Mktshare_{fcg}$				-0.00724			
				(0.0514)			
$ShareImp_{c,s}$					-0.428		
					(1.285)		
$ShareExp_{c,s}$						-1.062**	
						(0.536)	
$ln(Nfirms)_{cg}$							-0.0169
							(0.0129)
Constant		5.343***	5.298***	5.300***	5.514***	5.491***	5.332***
		(0.277)	(0.374)	(0.374)	(0.383)	(0.385)	(0.377)
Firm-product FE	Y	Y	Y	Y	Y	Y	Y
Observations	2,107	2,107	2,107	2,107	1,872	1,872	2,107
R-squared	0.983	0.983	0.983	0.983	0.984	0.984	0.983
Number of countries	74	74	74	74	74	74	74
Number of products	158	158	158	158	158	158	158
Number of firms	521	521	521	521	521	521	521

NOTES:
1. The standard errors are clustered at the country level.
2. The R-squared reported refer to the LSDV estimator, which includes the firm-product FE.
The within effect of the estimations using fixed effects transformation is, on average, 0.03 and, thus, similar to (although strictly greater than) the within effect reported in Bastos and Silva (2010b) in their working paper.
3. Since the focus of the paper is the variation across countries for a firm-product pair, observations for which the number of destinations is less than 2 are removed.

4.3 Are the effects asymmetric across groups of countries?

Table 3 has shown a positive and significant effect of income inequality of the destination country on export prices. To facilitate the analysis, we divide the destination countries according to the tertiles of the distribution of the income per capita. As shown in Table 2, average income for the first, second, and third tertiles are, respectively, 2,635, 8,201, and 24,096 US dollars.

Results for the different tertiles of income are shown in Table 6. Results give further support to our quality hypothesis. We find that the results are captured by middle income countries. The fact that results are not significant for the first tertile of income (poor countries) is not contradictory: for those countries, what matters is the income per capita (shown in Table 6 with a significant $CGDP_c$) rather than the income inequality. As our theoretical model predicts, poor individuals can not afford consuming the differentiated good and will purchase only the numeraire. In an extension from the model in equation (14), we show that, in extremely poor societies, the composition of income groups will not affect average prices.

Table 5: Variation in export prices within product pairs across firms and countries for Differentiated goods

Dependent variable: $ln(uprice)_{fcg}$	(1)	(2)	(3)	(4)	(5)	(6)	(7)
$Gini_c$	0.00516***	0.00949***	0.00971***	0.00809***	0.00806***	0.00939***	0.0124***
	(0.000906)	(0.00103)	(0.00103)	(0.00108)	(0.00108)	(0.00104)	(0.00148)
$ln(CGDP)_c$		0.0292**	0.0307**	0.00955	0.0107	0.0284**	0.0513***
		(0.0125)	(0.0127)	(0.0138)	(0.0138)	(0.0127)	(0.0198)
$ln(Dist)_c$		0.0963***	0.0852***	0.0880***	0.0880***	0.103***	0.124***
		(0.0137)	(0.0159)	(0.0144)	(0.0144)	(0.0198)	(0.0183)
$ln(GDP)_c$		-0.0137**	-0.0111*	-0.0328***	-0.0325***	-0.0150**	-0.00782
		(0.00535)	(0.00575)	(0.00659)	(0.00660)	(0.00624)	(0.00727)
$Mktshare_{fcg}$			0.0390				
			(0.0299)				
$ShareImp_{c,s}$				1.158			
				(1.313)			
$ShareExp_{c,s}$					-0.872		
					(1.072)		
$ln(Nfirms)_{cg}$						0.00730	
						(0.0139)	
$Sigma_{c,s}$							0.000115
							(0.000157)
Constant	2.351***	1.320***	1.320***	1.960***	1.951***	1.298***	0.649**
	(0.0411)	(0.174)	(0.174)	(0.197)	(0.197)	(0.179)	(0.267)
Product FE	Y	Y	Y	Y	Y	Y	Y
Observations	27,210	27,211	27,212	27,213	27,214	27,215	20,935
R-squared	0.893	0.894	0.894	0.895	0.895	0.894	0.897

NOTES:
1. The standard errors are clustered at the country level.
2. The R-squared reported refer to the LSDV estimator, which includes the firm-product FE.

In our sample, poor countries (in the first tercile of the distribution) have an average income of 2,635 dollars. If the share of low income individuals is large enough, the consumption by further income groups will be too small to generate enough consumption of the differentiated good. For the third tertile of the income distribution, results for the $Gini_c$ are not significant. As we show in an extension from our theoretical model, changes in income in rich countries may lead to ambiguous results on prices. Moreover, we show conditions under which the absolute size of the effect is always smaller in rich countries than in middle-income countries. Empirically, one reason why results are not significant for rich coutnries may be the fact that, for those economies, there is very little variation in the Gini coefficient, as shown in Figure 2. Thus, the effect may be less precisely estimated.

Similar results hold dividing the sample in three groups: developing with income below the median, developing with income above the median, and developed (all with income above the median). In this case, results are positive and significant only for the group of developing countries with income above the median. See the results in Table 11 in the Appendix.

Many facts may explain our results. As discussed in Dalgin et al. (2008), when the income expansion path is curved, income distribution becomes a determinant of aggregate demand. Many middle-income economies experienced a sharp increase in the number of rich. With curved income-expansion paths, the *new rich* will buy proportionately more high quality goods than before. Moreover, firms may charge even higher markups for those goods: as individuals get wealthier, they tend to devote a higher share of income to brands, luxury, and positional goods, and will be willing to pay more for those goods.

For middle income and rich countries, anecdotal evidence supports the fact that increase in inequality is driven by the rich. In most rich economies, increases in income inequality have been associated with the rise in income of the 20% wealthiest, as is the case of the United States (i.e., the rich are getting richer). In most middle income countries, income inequality has been associated with the increase in the number of rich.[22]

Table 6: Variation in export prices within firm-product pairs across countries for the tertiles of the income per capita

Dependent variable:	**First Tertile**		**Second Tertile**		**Third Tertile**	
$ln(uprice)_{fcg}$	(1)	(2)	(3)	(4)	(5)	(6)
$Gini_c$	-0.00215	-0.00128	0.00431**	0.00457**	0.000762	0.00121
	(0.00473)	(0.00481)	(0.00209)	(0.00209)	(0.00556)	(0.00553)
$ln(CGDP)_c$	0.165**	0.165**	0.00812	0.00480	0.201	0.192
	(0.0745)	(0.0743)	(0.0649)	(0.0650)	(0.122)	(0.122)
$ln(Dist)_c$	0.0990*	0.0741	0.0648**	0.0550*	-0.0965	-0.103
	(0.0530)	(0.0545)	(0.0273)	(0.0286)	(0.152)	(0.153)
$ln(GDP)_c$	-0.0907***	-0.0847***	-0.0450***	-0.0440***	-0.0206	-0.0143
	(0.0260)	(0.0262)	(0.0120)	(0.0121)	(0.0227)	(0.0228)
$Mktshare_{fcg}$		0.112*		0.0641		0.0867
		(0.0665)		(0.0526)		(0.0729)
Constant	2.488***	2.509***	2.945***	3.009***	2.505	2.473
	(0.944)	(0.943)	(0.731)	(0.733)	(1.655)	(1.655)
Firm-product FE	Y	Y	Y	Y	Y	Y
Observations	18,290	18,290	43,328	43,328	21,098	21,098
R-squared	0.953	0.953	0.947	0.947	0.959	0.959

NOTES:
1. The standard errors are clustered at the country level.
2. The R-squared reported refer to the LSDV estimator, which includes the firm-product FE.

4.4 Are the effects asymmetric across groups of products?

We have shown that our results for the first and second moment of the income distribution hold only for differentiated goods. Among differentiated goods, we are also interested in asymmetric effects across products with lower or higher scope for vertical differentiation.

Khandelwal (2010) characterizes industries according to the scope for quality differentiation. Industries are classified as long and short quality ladders, i.e., with long and short scope for quality differentiation. We use this classification of industries to analyse whether the effect of income inequality on prices is higher for sectors classified as long quality ladders. Thus, we expect that the effect of $Gini_c$ on prices is magnified for sectors classified as long

[22]This fact may be a further reason why results are not significant for rich countries: instead of having more rich individuals, there is an increase in the wealth for the rich individuals, which are already consumers of high end products.

quality ladders, associated with higher vertical differentiation. Results are shown in Table 7.

Using the interaction term $Gini_c * Ladders$, we show that the effect of income inequality on prices is captured by sectors with high scope for quality differentiation. This result provides further support to the quality hypothesis: for long quality ladders, prices are higher in more unequal countries.

Table 7: Variation in export prices within firm-product pairs across countries for different quality ladders

Dependent variable: $ln(uprice)_{fcg}$	(1)	(2)	(3)
$Ladders * Gini_c$	**0.00129***	**0.00124***	**0.00130***
	(0.000665)	(0.000667)	(0.000668)
$Gini_c$	-0.00199	-0.00120	-0.00115
	(0.00129)	(0.00142)	(0.00142)
$ln(CGDP)_c$		0.0150	0.0155
		(0.0113)	(0.0113)
$ln(Dist)_c$	0.0362***	0.0425***	0.0367***
	(0.00779)	(0.00902)	(0.00959)
$ln(GDP)_c$	-0.00902***	-0.0127***	-0.0113***
	(0.00309)	(0.00406)	(0.00414)
$Mktshare_{fcg}$			0.0345*
			(0.0179)
Constant	3.108***	2.957***	2.956***
	(0.0902)	(0.145)	(0.145)
Firm-product FE	Y	Y	Y
Observations	56,222	56,222	56,222
R-squared	0.970	0.970	0.970

NOTES:
1. The standard errors are clustered at the country level.
2. The R-squared reported refer to the LSDV estimator, which includes the firm-product FE.

4.5 Robustness checks:

Alternative measures of inequality: An important criticism with respect to the Gini coefficient refers to the fact that it might not capture so well the effects for the tails of the income distribution. Thus, we use the deciles of the income distribution as a robustness checks to our results. The decile groups express the share of total income going to each tenth of the population, ordered according to the size of their income. We use the information from the UN-WIDER, where the shares are expressed as percentages of total income. The tenth decile group includes the richest 10% of the population, while first deciles group includes the poorest 10%. Since our result that income inequality leads to higher markups and more demand for high quality relates to rich individuals, we expect that a higher concentration of income by rich individuals implies greater consumption of high quality products. Table 15 presents the results using the ninth and tenth deciles of the income distrubtion, which express the share of income going to the richest 20% of the population in each country. The higher this share, the higher the concentration of income of rich individuals. We argue that inequality driven by the rich drives consumption of high quality products.

Region/country effects: In order to rule out *region or country effects*, we exclude important trade partners from the sample at a time. Results are shown in Table 12 in the Appendix: results are significant exluding the United States, Argentina, Mercosur as well as the European Union. Thus, results are not specific to countries or regions in the sample.

Intra-firm trade: We show that results are not driven by intra-firm trade. Since information on final consumers is unobservable, we use information on foreign ownership status of firms in the period 1997-2000 as a rough proxy for intra-firm trade. The dummy FDI_f is one if the firm has foreign ownership status, and zero otherwise. More information is found in the data Appendix.

As shown in Table 13 in the Appendix, the effect of $Gini_c$ on prices is not completely captured by the dummy FDI_f, which means that results are not driven by intra firm trade. Moreover, we show that the interaction term $FDI_f * Gini_c$ is positive and significant, which is not a surprising result: firms that receive FDI are in general larger, export to more markets, are more productive and produce higher quality products. As we show in Table 13, firms with foreign ownership do not drive the effects, but the effect is magnified for those firms.

Firm selection in the destination country: Results could be driven by self-selection of exporters in destination markets with more or less income inequality. To rule out this channel, Table 14 shows the effect of inequality on export prices for firms exporting to more than 20 and 30 markets and that export to both developing and developed countries (results in columns (5) to (8)). Moreover, we also show the results only in the top 10 destinations of Brazilian products (top 10 destinations in terms of number of firms exporting to each destination are shown in columns (1) and (2) and top 10 destinations in terms of sales, in columns (3) and (4)). Throughout the specifications, the effect of inequality on prices remains statistically significant.

Variation of prices versus price levels: As an additional result, we look at the effect of inequality on the variance of prices instead of using price levels. The underlying idea is to evaluate whether firms ship a more diverse bundle of products for countries with higher income inequality. We find no effect within the firm, as measured by the variance of prices within a bundle of 4-digit products. However, we find a positive and significant effect of inequality on the variance of prices across firms. Interpreting the results in terms of markups and quality, we could say that quality and markups vary more in more unequal destinations.

Market share, endowment and production effects: As already shown in Table 3, the price variation across countries can not be explained only by the market share $Mktshare_{fcg}$

of Brazilian firms. Moreover, using information on World trade flows by SITC sector, the control variable $ShareImp_{c,s}$ in Table 3 implies that the results are not driven by sectors in which Brazil has a comparative advantage in comparison to other countries; and the control $ShareExp_{c,s}$ implies that the results are also not driven by sectors in which destination country c has a comparative advantage.

Population as a proxy for market size: Instead of using income (GDP) in the baseline estimations, we estimate the effect of market size on prices using the countries' total population in logs ($log(Pop)_c$). Results are robust in all specifications.

Interaction effects: Table 16 shows the results for the interaction between the Gini coefficient and income per capita, and between the Gini coefficient and distance to the destination market. We show that the results of income inequality on prices are magnified for richer and more distant countries.

5 Conclusion

This paper provides first firm-level evidence on the links between income inequality and export prices. We show theoretically and empirically that more income inequality leads to higher average prices of traded goods, which is explained by the average product quality consumed by the different income groups in a country and by markup pricing. The theoretical mechanism is based on a simple demand composition effect and nonhomothetic preferences. Individuals in a country have preferences over homogeneous and differentiated goods, with different levels of quality and different prices associated to them. Poor individuals can only afford consumption of necessities, while middle income and richer individuals can afford quality goods of low and high quality, respectively. We show that an increase in income inequality (from changes in the composition of the income groups in a country) lead to higher average prices. We also extend our analysis to study the role of markups pricing.

In our main result of this paer we show empirical evidence for the first and the second moment of income distribution to have a positive and significant effect on prices. Countries with higher income per capita purchase products at higher prices and, controlling for the income per capita, prices are systematically higher in more unequal countries. These results hold only for differentiated goods, and in particular for products with high scope for quality differentiation. Moreover, our results are particularly important for middle income countries.

We address several issues not mentioned in the firm-price literature before and that might affect price variation across countries. In particular, results are robust to intra-firm trade, the quality ladder length, the elasticity of substitution in different markets, and different measures of market power and the structure of industries in different destination markets.

Our empirical results suggest that the second moment of the income distribution is important to explain the patterns of trade, and that market-specific quality differerentiation, as well as market-specific markup pricing, are important margins of firm-level adjustment.

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A Descriptive Statistics

Table 8: Main control variables x_{gfc}:

$\mathbf{x}_{gfc}$	**Variable description**
Country characteristics:	
GDP_c	GDP of country c (measure of country size)
$Dist_c$	Distance to country c
$CGDP_c$	GDP per capita of c
$Gini_c$	Gini coefficient in c
Firm and market characteristics:	
$Quant_{gfc}$	*Intensive margin*: quantity exported of good g to country c by firm f
$SumRev_f$	Total export revenues of f (measure of firm size)
$Mktshare_{gfc}$	Market share of fg in c with respect to the sum of firms exporting g to c
$ShareImp_{c,s}$	$\frac{Imp_{cs_i}}{\sum_{j\neq i} Imp_{cs_j}}$. Share of imports of c in sector s_i with respect to all sectors $j \neq i$
$ShareExp_{c,s}$	$\frac{Exp_{cs_i}}{\sum_{j\neq i} Exp_{cs_j}}$. Share of exports of c in sector s_i as *proxy for production in* c
$Mktshare_{fc,s}$	Share of imports in s_i from Brazilian firms with respect to total imports from the World
$Nfirms_{gc}$	Number of Brazilian firms selling g in country c (competition measure)
$Sigma_{c,s}$	Import demand elasticities at the 3-digit HS for each country c

$Dist_c$ in Table 8 refers to the distance to the destination country. There is no consensus with respect to the effect of distance on prices. In heterogeneous firms models with linear demand and no product quality differentiation, as Melitz and Ottaviano (2008), a negative relation between prices and distance is predicted, while in heterogeneous firms models with CES (contant elasticity of substitution) prices do not vary with distance to destination. Virtually all empirical firm-level trade models predict a positive relation between prices and distance, both within and across firms (e.g., Manova and Zhang (2012) and Martin (2009)). The empirical literature suggests quality variation: firms export relatively more of their high quality expensive products to more distant destinations, a result already shown across products in Alchian and Allen (1964). [23]

$CGDP_c$ in Table 8 refers to the country's GDP per capita. Many studies have found positive relationship between prices and the country's GPD per capita. Fieler (2011) studies both demand and supply side and find that unit prices increase both with importer and exporter income per capita, i.e., *for the same commodity category, unit prices from the same source country increase with importer income per capita.* This result indicates that countries with higher income produce and consume goods of higher quality Fieler (2011). Although, all those studies are at the country level; recent firm-level studies as the ones mentioned from Manova and Zhang (2012) and Bastos and Silva (2010b) also find positive relation between GDP per capita and prices and attribute this result to variation in quality.

[23] A different strand of literature, the IO literature on reverse dumping, predicts that firms adjust markups to more distant markets, while the IO literature on dumping predicts that prices decrease with distance. In a cross-country perspective, Verboven (1996) and Goldberg and Verboven (2001) find evidence of spatial price discrimination of automobiles across European countries.

B Data Appendix

B.1 SECEX firm-level data for the year 2000: data construction

The Brazilian SECEX exports data contains information on agricultural sector and observations without information on quantities. The procedure to construct the data for the cross-section 2000 follows:

1. If the observation relates to agricultural and mining sector, it was dropped from the sample. The same if the observation refers to commercial intermediates. Thus, only manufacturing firms are considered. This procedure removed 11,192 observations.

2. If the observation contains zero exporting value, it was removed from the sample. As described in Arkolakis and Muendler (2011), these observations correspond to reporting errors or shipments of commercial samples. As in Arkolakis and Muendler (2011), 484 observations are removed.

3. If the observation contains no information on export quantities, it was removed from the sample. This procedure removed 37,903 observations. Without information on quantities, it is not possible to construct unit values, defined as $p_{fcg} = \frac{Value_{fcg}}{Quantity_{fcg}}$, for f the firm, g the product and c the destination country of the f.o.b. exported value $Value_{fcg}$l and quantity $Quantity_{fcg}$. Importantly, the lack of information on quantities is not systematic by sector or type of product. Thus, there is no concern with sample selection. [24].

A product g is defined as a NCM 8-digit product. Table 9 shows examples of products at different levels of disaggregation.

Table 10 presents a brief summary of average number of destinations and number of products by firm. Column 2 shows that firms that export to more than 10 destinations export on average 26.29 different NCM 8-digit products. And, from Column 3, firms that export more than 10 products export to 8.77 destinations on average.

B.2 Methodology for construction of the Gini coefficient:

We use the income inequality data from the WIID2 UNO-WIDER (United Nations World Institute for Development Economics Research). Although, the data contains many duplicate values and missing values for some countries. In case of duplicate values for a country, we

[24] As a robustness check to the results, I reestimate the results after removing extreme unit values. The data trimming removes observations for which the unit value p_{fcg} is either 5 times above or 5 times below the median unit price by product g, as in Khandelwal (2010); Brambilla et al. (2012). This second step drops 19,960 observations 5 times above and 18,184 observations 5 times below the median (for all types of goods). Results remain robust

Table 9: Examples of Products:

Example of 2, 4 and 6-digit products:	
64	Fottwear, gaiters, and the like.
6401	Waterproof footwear, rubber or plastics, bond sole.
6402	Footwear, outer sole and upper rubber or plastic nesoi.
6403	Footwear, outer sole rub, plastic or leather and upper leather.
6404	Footwear, outer sole rub, plastic or leather and upper tex.
6405	Footwear nesoi
640110	Waterproof footwear incorporating a protective metal toe-cap
640191	Waterproof footwear covering the knee
Further example of 6 and 8-digit products:	
630900	Worn clothing and other worn articles.
63090010	Articles of apparel, clothing accessories and parts thereof.
63090090	Other textile materials, used.
Complete list of NCM 8-digit products available at	
http://www.sefaz.mt.gov.br/portal/download/arquivos/Tabela_NCM.pdf.	

Table 10: Average number of destinations and number of products by firm

	Average number of products by number of destinations	Average number of destinations by number of products exported
1	2.83	1.70
2	3.40	2.84
3	4.25	3.84
4	5.04	4.62
5	6.21	5.57
10+	26.29	8.77
Average	4.69	1.70

keep the variables that satisfy the following criteria (in this order):

Step 1. Highest quality rating (variable *Quality* = 1, otherwise 2, 3 or 4). The quality rating in the WIID2 was evaluated according to the following criteria: (a) whether the concepts underlying the observations are known; (b) the coverage of the income/consumption concept; and (c) the survey quality. A observation receives quality rating 1 for observations that satisfy the criteria (a) and (b).

Step 2. Latest *Revision*. The WIID1 was updated to construct the new WIID2 database, which is the most recent and updated revision.

Step 3. Area covered refers to the whole country (variable $AreaCovr = All$).

Step 4. Basic statistical unit is the household (variable $IncSharU = household$, instead of tax unit, person or family).

Step 5. Unit of analysis is the person (variable $UofAnala = person$): in this case, the needs of different sized households have been taken into account [25].

Step 6. Equivalence scale has been adjusted (variable $Equivsc = householdpercapita$). Since the different sized households have been taken into account, in the equivalence scale

[25]In the case in which the unit of analysis is the household, the size of the households and the needs of different sized households have not been taken into account.

the adjustment has been made for the different sized and composed households.

Step 7. Icome definition is *disposable income* (variable $IncDefn = Income, Disposable$). This classification is similar to the one from the Canberra Group on Household Income Statistics with the United Nations Statistics Division [26].

Step 8. Information on currency is available (variable $Curref$ with available information).

Step 9. Income definition is income (variable $IncDefn = Income, ..$).

Step 10. Income definition is gross income (variable $IncDefn = Income, Gross$).

Step 11. Equivalence scale used was the household (variable
$Equivsc = Householdeq, OECDmod$).

This methodology leads to 72 unique Gini coefficients (72 countries) [27]. For countries with missing information for the year 2000, we follow the same steps described above for the years 1999 and 2001, respectively. In this way, the final methodology leads to 98 unique Gini coefficients (103 countries) [28]. When we combine the Gini coefficient with the firm-level data, we exclude destination countries with less than 3 observations in the sample[29].

B.3 Data on foreign ownership status

For the robustness checks conducted to control for intra-firm trade, we use information on the foreign ownership status of Brazilian firms, compiled by Poole (2009). All foreign investments are registered with Brazil's Central Bank (Banco Central do Brasil) and, thus, available in the dataset. Some assumptions were made to construct the dummy from the FDI information. As explained in Poole (2009), an establishment with positive foreign investment stock in t=2001 and positive flows in $t-3$ and $t-4$ is classified as a foreign-owned establishment through the whole period. If the establishment has no stock in t=2001 but positive inflows in other years, the establishment is classiffied as foreign-owned only for the years with positive flows. And, if the establishment has a positive stock in t=2001 but no flows in the years before, it is classified as foreign-owned for the whole period. Two dummies for the foreign ownership status were created, where the main difference is that one of the dummies refers only to the foreign ownership status of the firm, and the other assumes that also subsidiaries of firms receiving inflows are foreign-owned (even if the subsidiary is not

[26] The final report and recommendations from the Canberra Group on household income statistics can be found at `http://www.lisproject.org/links/canberra/finalreport.pdf`

[27] Only for Finnland there were still duplicate values for the year 2000 after all the steps. In this case, the observation was saved if the currency avaialble was in euros $curref ==$ "$EUR02/year$"

[28] The raw data available at `http://www.wider.unu.edu/research/Database/en_GB/wiid/.`

[29] Countries with less than three observations are Armenia, Azerbaijan, Laos, Lesotho, Moldova, Uzbekistan, and Georgia.

classified as having received inflows or with a stock of foreign investment). Throughout this paper the dummy used is the second one. Both dummy variables were constructed using three main data sources from the Brazil's Central Bank: plant-level inflows information from 1996 to 2001, plant-level stock information in the year 2001, and (incomplete) information on the holding company corporate structure. If there was no information on FDI stocks by year, the data allowed for a procedure to infer which establishments were at least partially foreign-owned for each year; see Poole (2009). Further information about the data is available at Poole (2009) [30].

[30] Jennifer Poole kindly provided the information on FDI.

C Robustness checks

Table 11: Variation in export prices within firm-product pairs across countries for the developed and developing countries

Dependent variable:	**Developing country**		**Developing country**		**Developed country**	
$ln(uprice)_{fcg}$	**Below median** $CGDP_c$		**Above median** $CGDP_c$		**Above median** $CGDP_c$	
	(1)	(2)	(3)	(4)	(5)	(6)
$Gini_c$	-0.00140	-0.00120	0.00666**	0.00732***	4.90e-05	0.000448
	(0.00253)	(0.00254)	(0.00285)	(0.00281)	(0.00605)	(0.00602)
$ln(CGDP)_c$	0.199***	0.203***	0.0440	0.0222	0.200	0.191
	(0.0455)	(0.0457)	(0.0989)	(0.0981)	(0.124)	(0.123)
$ln(Dist)_c$	0.0512	0.0203	0.0657***	0.0501*	-0.111	-0.119
	(0.0386)	(0.0409)	(0.0253)	(0.0273)	(0.155)	(0.156)
$ln(GDP)_c$	-0.0761***	-0.0714***	-0.0472***	-0.0465***	-0.0192	-0.0121
	(0.0175)	(0.0175)	(0.0139)	(0.0140)	(0.0243)	(0.0244)
$Mktshare_{fcg}$		0.111**		0.102		0.0982
		(0.0502)		(0.0685)		(0.0750)
Constant	2.333***	2.431***	2.496**	2.757***	2.643	2.612
	(0.575)	(0.574)	(1.017)	(1.009)	(1.690)	(1.691)
Firm-product FE	Y	Y	Y	Y	Y	Y
Observations	26,075	26,075	35,789	35,789	20,852	20,852
R-squared	0.944	0.945	0.957	0.957	0.959	0.959

NOTES:
1. The standard errors are clustered at the country level.
2. The R-squared reported refer to the LSDV estimator, which includes the firm-product FE.

Table 12: Robustness checks: rule out *region effects*

Dependent variable:	Without US		Without Argentina		Without EU		Without Mercosur	
$ln(uprice)_{fcg}$	**(1)**	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**	**(8)**
$Gini_c$	0.00352***	0.00409***	0.00351***	0.00409***	0.00360***	0.00425***	0.00336***	0.00360***
	(0.00113)	(0.00113)	(0.00116)	(0.00116)	(0.00121)	(0.00121)	(0.00120)	(0.00121)
$ln(CGDP)_c$	0.0328**	0.0339**	0.0458***	0.0461***	0.0703***	0.0744***	0.0458***	0.0460***
	(0.0164)	(0.0164)	(0.0171)	(0.0171)	(0.0179)	(0.0179)	(0.0175)	(0.0175)
$ln(Dist)_c$	0.0467***	0.0248*	0.0209	-0.0104	0.0713***	0.0507***	-0.00641	-0.0364
	(0.0138)	(0.0146)	(0.0171)	(0.0180)	(0.0147)	(0.0153)	(0.0238)	(0.0247)
$ln(GDP)_c$	-0.0291***	-0.0249***	-0.0182***	-0.0102	-0.0348***	-0.0303***	-0.0189***	-0.0112
	(0.00659)	(0.00662)	(0.00703)	(0.00714)	(0.00676)	(0.00680)	(0.00716)	(0.00727)
$Mktshare_{fcg}$		0.128***		0.142***		0.132***		0.137***
		(0.0277)		(0.0282)		(0.0296)		(0.0298)
Constant	2.642***	2.672***	2.603***	2.642***	2.237***	2.217***	2.982***	3.019***
	(0.222)	(0.222)	(0.223)	(0.222)	(0.219)	(0.220)	(0.303)	(0.303)
Firm-product FE	Y	Y	Y	Y	Y	Y	Y	Y
Observations	74,361	74,361	68,460	68,460	72,587	72,587	59,572	59,572
R-squared	0.928	0.928	0.929	0.929	0.931	0.931	0.931	0.931

NOTES:
The standard errors are clustered at the country level.
The R-squared reported refer to the LSDV estimator, which includes the firm-product FE.

Table 13: Robustness checks: foreign ownership status

Dependent variable: $ln(uprice)_{fcg}$	(1)	(2)	(3)	(4)	(5)	(6)	(7)
$Gini_c$		0.00350***	0.00409***	0.00278**	0.00268**	0.00305***	0.00350***
		(0.00116)	(0.00116)	(0.00117)	(0.00117)	(0.00115)	(0.00116)
$Gini_c * FDI_f$	0.00672***	0.00553***	0.00604***	0.00669***	0.00671***	0.00516***	0.00556***
	(0.00155)	(0.00176)	(0.00177)	(0.00185)	(0.00185)	(0.00177)	(0.00177)
$ln(CGDP)_c$	0.0277**	0.0413**	0.0436***	0.0261	0.0255	0.0390**	0.0408**
	(0.0128)	(0.0162)	(0.0162)	(0.0165)	(0.0165)	(0.0162)	(0.0162)
$ln(Dist)_c$	0.0371***	0.0472***	0.0258*	0.0461***	0.0471***	0.0711***	0.0466***
	(0.0119)	(0.0135)	(0.0142)	(0.0139)	(0.0139)	(0.0169)	(0.0135)
$ln(GDP)_c$	-0.0182***	-0.0206***	-0.0154**	-0.0265***	-0.0274***	-0.0261***	-0.0204***
	(0.00559)	(0.00596)	(0.00603)	(0.00667)	(0.00663)	(0.00624)	(0.00597)
$Mktshare_{fcg}$			0.129***				
			(0.0263)				
$ShareImp_{c,s}$				-1.611			
				(1.091)			
$ShareExp_{c,s}$					-0.447		
					(1.023)		
$ln(Nfirms)_{cg}$						0.0230**	
						(0.0106)	
$Sigma_{c,s}$							0.000148
							(0.000218)
Constant	2.665***	2.430***	2.422***	2.690***	2.703***	2.325***	2.435***
	(0.144)	(0.206)	(0.206)	(0.223)	(0.223)	(0.212)	(0.206)
Firm-product FE	Y	Y	Y	Y	Y	Y	Y
Observations	82,716	82,716	82,716	82,716	82,716	82,716	62,055
R-squared	0.926	0.926	0.926	0.928	0.928	0.926	0.926

NOTES:

1. The standard errors are clustered at the country level.
2. The R-squared reported refer to the LSDV estimator, which includes the firm-product FE.

Table 14: Robustness checks: Self-selection into destination markets

Dep. variable: $ln(uprice)_{fcg}$	**Exports to top 10 destinations (number of firms)** [1]		**Exports to top 10 destinations (amount of exports)** [2]		**Firms in more than 20 destinations**		Firms in **more than 30 destinations**	
$Gini_c$	0.00757***	0.00738**	0.00433*	0.00476**	0.00647***	0.00731***	0.00771***	0.00854***
	(0.00289)	(0.00290)	(0.00235)	(0.00234)	(0.00128)	(0.00129)	(0.00148)	(0.00149)
$ln(CGDP)_c$	0.161***	0.159***	0.0439	0.0413	0.0735***	0.0764***	0.0683***	0.0713***
	(0.0469)	(0.0470)	(0.0454)	(0.0454)	(0.0181)	(0.0181)	(0.0206)	(0.0207)
$ln(Dist)_c$	0.0849***	0.0768**	0.0735***	0.0616**	0.0656***	0.0429**	0.0822***	0.0617***
	(0.0323)	(0.0328)	(0.0275)	(0.0288)	(0.0162)	(0.0170)	(0.0190)	(0.0200)
$ln(GDP)_c$	-0.0531***	-0.0509***	-0.0293*	-0.0242	-0.0315***	-0.0256***	-0.0287***	-0.0235***
	(0.0132)	(0.0133)	(0.0161)	(0.0164)	(0.00719)	(0.00730)	(0.00822)	(0.00831)
$Mktshare_{fcg}$		0.130*		0.118*		0.132***		0.117***
		(0.0694)		(0.0616)		(0.0308)		(0.0340)
Constant	1.385***	1.418***	2.435***	2.410***	2.020***	1.995***	1.909***	1.880***
	(0.439)	(0.441)	(0.444)	(0.443)	(0.243)	(0.243)	(0.279)	(0.279)
Observations	44,612	44,612	42,292	42,292	34,093	34,093	24,523	24,523
R-squared	0.956	0.956	0.951	0.951	0.889	0.889	0.881	0.881
Firm-product FE	Y	Y	Y	Y	Y	Y	Y	Y

NOTES:

The standard errors are clustered at the country level.

The R-squared reported refer to the LSDV estimator, which includes the firm-product FE.

[1] All firms that export to the top 10 destinations of exporters, measured as the number of firms that export to the destination.

[2] All firms that export to the top 10 destinations of exporters, measured as the amount of exports in US dollars.

Table 15: Robustness checks: Results using the ninth and tenth deciles of the income distribution

Dependent variable: $ln(uprice)_{fcg}$	(1)	(2)	(3)	(4)	(5)	(6)	(7)
$Deciles_c$	0.00203**	0.00353***	0.00402***	0.00359***	0.00352***	0.00335**	0.00353***
	(0.00101)	(0.00134)	(0.00135)	(0.00134)	(0.00134)	(0.00134)	(0.00134)
$ln(CGDP)_c$		0.0249	0.0240	0.0259	0.0252	0.0251	0.0243
		(0.0181)	(0.0181)	(0.0181)	(0.0181)	(0.0181)	(0.0181)
$ln(Dist)_c$		0.0430***	0.0199	0.0425***	0.0433***	0.0629***	0.0423***
		(0.0147)	(0.0155)	(0.0147)	(0.0147)	(0.0187)	(0.0147)
$ln(GDP)_c$		-0.0301***	-0.0259***	-0.0291***	-0.0301***	-0.0336***	-0.0300***
		(0.00713)	(0.00717)	(0.00720)	(0.00714)	(0.00726)	(0.00713)
$Mktshare_{fcg}$			0.134***				
			(0.0303)				
$ShareImp_{c,s}$				-1.435			
				(1.128)			
$ShareExp_{c,s}$					-0.202		
					(1.054)		
$ln(Nfirms)_{cg}$						0.0183	
						(0.0123)	
$Sigma_{c,s}$							0.000147
							(0.000233)
Constant	2.833***	2.742***	2.799***	2.723***	2.737***	2.613***	2.749***
	(0.0534)	(0.240)	(0.240)	(0.240)	(0.240)	(0.253)	(0.240)
Firm-product FE	Y	Y	Y	Y	Y	Y	Y
Observations	72,941	70,544	70,544	70,544	70,544	70,544	70,544
R-squared	0.928	0.929	0.929	0.929	0.929	0.929	0.929

NOTES:
1. The standard errors are clustered at the country level.
2. The R-squared reported refer to the LSDV estimator, which includes the firm-product FE.
3. Since the focus of the paper is the variation across countries for a firm-product pair,
all observations for which the number of destinations is less than 2 are dropped.

Table 16: Robustness checks: Interaction effects

Dependent variable: $ln(uprice)_{fcg}$	(1)	(2)	(3)	(4)	(5)	(6)
$Gini * ln(CGDP)$	0.00272**	0.00239**	0.00242**			
	(0.00113)	(0.00102)	(0.00102)			
$Gini * ln(Dist)$				0.00406***	0.00527***	0.00516***
				(0.00136)	(0.00131)	(0.00132)
$Gini_c$	-0.0225**	-0.0178*	-0.0181**	-0.0326***	-0.0415***	-0.0406***
	(0.0102)	(0.00914)	(0.00913)	(0.0114)	(0.0110)	(0.0111)
$ln(CGDP)_c$	-0.115**	-0.0673	-0.0693	0.00503	0.0346**	0.0341**
	(0.0521)	(0.0475)	(0.0474)	(0.0179)	(0.0165)	(0.0164)
$ln(Dist)_c$	0.0493***	0.0610***	0.0621***	-0.150**	-0.192***	-0.185***
	(0.0185)	(0.0148)	(0.0147)	(0.0610)	(0.0606)	(0.0606)
$ln(GDP)_c$	-0.0292***	-0.0353***	-0.0364***	-0.0200***	-0.0247***	-0.0259***
	(0.00737)	(0.00725)	(0.00719)	(0.00691)	(0.00668)	(0.00663)
$Mktshare_{fc,s}$	-0.0468			-0.0497		
	(0.0445)			(0.0422)		
$ShareImp_{c,s}$		-1.609			-2.008*	
		(1.095)			(1.098)	
$ShareExp_{c,s}$			-0.454			-0.885
			(1.025)			(1.035)
Constant	4.041***	3.552***	3.577***	4.495***	4.613***	4.579***
	(0.486)	(0.468)	(0.467)	(0.528)	(0.528)	(0.528)
Firm-product FE	Y	Y	Y	Y	Y	Y
Observations	82,716	82,716	82,716	82,716	82,716	82,716
R-squared	0.929	0.928	0.928	0.929	0.928	0.928

NOTES:
1. The standard errors are clustered at the country level.
2. The R-squared reported refer to the LSDV estimator, which includes the firm-product FE.