Revisiting the determinants of unit prices

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Abstract:

The previous literature's predictions on the determinants of unit price is reviewed. The predictions by the general equilibrium trade theories, which include the heterogeneous firms trade models (Eaton and Kortum (2002), Melitz (2003), Baldwin and Harrigan (2011), among others) are shown not to conform to the majority of the international trade. Quantity, which is not the determinant of unit price in the general equilibrium theories, is shown in fact to be the main determinant of unit price.

Key words: Heterogeneous firms trade model, Unit price, Price discrimination, Quantity discount

JEL Classification: F14

INTRODUCTION

The aim of this paper is to provide evidence against the recent literature on the determinants of unit prices in international trade. In particular, it shows that general equilibrium trade theories, including heterogeneous firms trade models, do not explain well unit prices. Price discrimination models appear more appropriate to explain the majority of trade transactions.

Studies on unit prices are pioneered by several authors. Schott (2004) has documented a large difference in product prices within the most disaggregated level of product classification. Schott (2008) shows that the US consumers pay less for "Made in China" than for "Made in OECD" for similar goods. Fontagné, Gaulier, and Zignago (2008), analysing unit prices of HS 6-digit products of 200 countries, finds that the developed countries' products are not directly competing with the developing countries' products. Hummels and Klenow (2005) show that richer countries export higher quantities at modestly higher prices. Hummels and Skiba (2004) show that exporters charge destination-varying prices that covary positively with shipping costs and negatively with tariffs, and thus confirming the Alchian-Allen hypothesis.

Baldwin and Harrigan (2011) review the testable hypothesis on the incidence of zeros, i.e. inexistent trade, and on the determinants of unit prices predicted by various trade models and show no single model perfectly explains actual trade prices. They find that US export prices at the HS 10-digit level are increasing in distance to foreign markets and suggests a quality-augmented Melitz model to back up this result. Helble and Okubo (2008) and Kneller and Zhihong (2008) find similar results for EU15 countries and China, respectively. While the above mentioned papers pool all the trade data, Johnson (2009) convincingly showed that the pooling in Baldwin and Harrigan (2011) was not justified. He checks if quality is "homogeneous" (meaning there is no difference in quality and thus firms compete only in prices) or heterogeneous (meaning quality varies and thus firms compete in quality-adjusted prices) at the SITC 4-digit level and shows that heterogeneous quality is

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dominant. These studies indicate that world trade is highly characterised by quality-goods trade.

All of these previous studies are based on general equilibrium models, thus based on perfectly competitive or monopolistically competitive markets. Quantity or volume is not a determinant of unit price in these models. Using US trade data at the HS 10 digit (replicating Baldwin and Harrigan (2011) empirics), Japanese trade data at the HS 9-digit, and China's trade data at the HS 6-digit, I show that quantity is an important determinant of unit prices. This suggests that the majority of world trade is characterised by oligopolistic markets, where firms engage in price discrimination. More specifically, the substantial negative effect of quantity on unit price indicates that quantity discount is a major determinant of unit price.

Section 1 briefly reviews the predictions on the determinants of unit price of the general equilibrium trade theories. Section 2 describes the data, estimation strategy, and results. A final section concludes.

1. THEORETICAL FRAMEWORK

This section briefly summarises the predictions on the determinants of unit prices by the general equilibrium trade theories. This section mainly draws on Baldwin and Harrigan (2011), and in part on Kneller and Yu (2008).

Table 1: Summary of model predictions

	FOB export price	
	Distance	Importer size
Eaton-Kortum	-	0
Monopolistic competition, CES demand (Krugman)	0	0
Monopolistic competition, Linear demand (Ottaviano-Tabuchi-Thisse)	-	0
Heterogeneous firms, CES (Original Melitz)	-	+
Heterogeneous firms, linear demand (Melitz-Ottaviano)	-	-
Heterogeneous firms, CES demand, quality competition (Quality augmented Melitz)	+	-
Heterogeneous firms, linear demand, quality competition (Quality augmented Melitz-Ottaviano)	Quality sorting +/-	Quality sorting +/-
	Efficiency sorting -	Efficiency sorting -

Source: Baldwin and Harrigan (2011), Kneller and Yu (2008)

Predictions of the general equilibrium trade theories on the determinants of unit price are summarised in Table 1. Here, the FOB[2] export price is not the unit price of a variety at *firm level*, but the unit price of a particular good (at disaggregated HS code) *averaged across firms*.

In the Eaton-Kortum (2002) model, since trade costs are fully passed on to suppliers under perfect competition, the average FOB price is decreasing in bilateral distance. In this model, each exporting nation has a constant probability of being the supplier of any given good. Consequently, a country's export price is a random draw from a distribution of marginal cost. Thus, there is no correlation between importer size[3] and FOB export price.

In the monopolistic competition model with CES demand (Krugman (1980)), because of the Dixit-Stiglitz constant mark-up pricing, producers charge the same FOB price regardless of distance. And consumers buy some of every variety with a finite price. Thus, the FOB price for each variety should be uncorrelated either with distance or importer size.

In the monopolistic competition model with linear demand (Ottaviano, Tabuchi and Thisse (2002)), firms face a linear demand, so the elasticity of demand rises as firms move up the demand curve. This means that the markup falls as greater trade costs drive consumption down. In other words, producers absorb some of the trade costs, so the FOB prices should be lower for more distant markets. Since the FOB price is affected only by trade costs and the firms are atomistic, there should be no correlation between the FOB prices and market size.

The last four models in the table all feature firm heterogeneity. In the heterogeneous firms trade model with CES demand (Melitz (2003)), the Dixit-Stiglitz structure links the value of sales directly to operating profits, so the beachhead cost (Baldwin (1988)) means that only sufficiently competitive firms export. Moreover, distance-linked iceberg trade costs imply that a firm's competitiveness is diminished in more distant markets, so export status displays a distance-marginal cost gradient. The threshold degree of competitiveness necessary to sell in markets rises with the market's distance, so the average competitiveness of firms servicing a particular market rises with distance. To further clarify the argument, it is probably worthwhile emphasising that if we had the true product-level data, i.e. data on the prices and sales by particular firms of particular products in particular destination markets, we would find no correlation between distance and the FOB price. The Dixit-Stiglitz constant mark-up pricing would imply that the FOB prices at the firm level are identical across destinations. Thus, firm-level data should reveal no correlation between FOB prices and distance. The selection of products however would generate a negative distance-average-price relationship. For a distant market, only sufficiently-low-marginal-cost firms (varieties) can export. For a near market, not only low marginal cost firms (varieties) but also less competitive firms (varieties) are able to export. Thus, the FOB price of a good (say, HS 10-digit) averaged across (exported) varieties for a distant market is lower than that for a near market.

In the heterogeneous-firms trade model with linear demand (Melitz and Ottaviano(2008)), there are two effects in terms of the average FOB price. One is the price discrimination effect. Since more intense competition lowers the price-axis intercept of the linear residual demand curve, firms charge lower FOB price (i.e., lower mark-up) for larger markets. Namely, there is a negative correlation between the FOB price and the importer size at the

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[2] FOB means "Free On Board". Essentially, FOB prices include neither transportation costs (freight) nor insurance costs.

[3] "Importer size" and "Market size" are used interchangeably for the same meaning.

firm level. The relation between the FOB price and trade cost is the same with the case of Ottaviano, Tabuchi and Thisse (2002)), i.e., negative correlation. The other is the selection effect. The choke price implied by the quasi-linear preferences substitutes for the fixed costs of Melitz's (2003) model in shutting off the trade of high-cost varieties. Both the price discrimination effect and the selection effect work in the same direction. So, there should be negative correlation between the FOB price and trade cost and between the FOB price and the importer size.

In the heterogeneous-firms trade model with the CES demand and quality competition (Baldwin and Harrigan (2011)), consumers appreciate quality and high quality is associated with high marginal cost and the advantage of high quality more than offsets the disadvantage of high marginal cost. Thus, the predicted signs are opposite to the case of the original Melitz model. The difference between the original Melitz (2003) model and Baldwin and Harrigan (2011) model lies in the determinants of competitiveness. In the original Melitz (2003) model, price is the sole basis of competition, i.e. market entry thresholds can be written in terms of a maximum price. In Baldwin and Harrigan (2011)'s "Quality Melitz model", competitiveness depends upon quality-adjusted price, so market-entry thresholds are defined in terms of quality-adjusted price; lower quality-adjusted prices (unobserved) are associated with higher unadjusted (observed) prices, so firms only export the most expensive goods to the most distant markets. The highest quality, i.e. highest-price products, travel the furthest.

Finally, in what I call the "Quality-augmented Melitz-Ottaviano" model, which is due to Kneller and Yu (2008), it is assumed that consumers care both about quantity and quality and higher quality is associated with higher marginal cost, as in Baldwin and Harrigan (2011). To better understand the predictions of this model, I deem it worthwhile summarising the predictions of Melitz-Ottaviano (2008) model and see how the predictions change as we incorporate quality. As mentioned above, in the Melitz-Ottaviano (2008) model, there are two effects. One is the price discrimination effect. The larger the market, the tougher the competition, the lower FOB price (lower mark-up) a firm charges. The farther the market, the lower FOB price (lower mark-up) a firm need to charge because greater trade costs drive consumption down. Note a *firm* price discriminates across destination markets depending on the trade cost and the market size. The other is the selection effect. Since consumers care only about the quantity they consume, only sufficiently-low-priced varieties can be exported. So, in the Melitz-Ottaviano (2008) model, the higher the trade costs, the lower the export cut-off marginal costs. The larger the market size, the tougher the competition, the lower the marginal cost should be to survive as exporters. Therefore, both at the level of firms (price discrimination effect) and at the level of HS code, for which the exporting firms' FOB prices are averaged (selection effect), the effects of the trade cost and the market size on the FOB price work in the same direction. There will be a negative correlation between them. Kneller and Yu (2008) incorporate consumer preferences on quality into Melitz-Ottaviano (2008) and assume, as in Baldwin and Harrigan (2011) and Johnson (2009), that consumers care both quantity and quality and that marginal cost is a monotonically increasing function of quality. Thus, the *quality-adjusted* price determines the demand of a firm's variety. This assumption about quality appreciation of consumers changes the predictions of the signs. First, for the price discrimation effect, there is no change from the original Melitz-Ottaviano (2008) prediction. At the *firm level*, a firm charges a lower price for more distant markets and/or larger markets. The difference comes in the selection effect. In the "Quality augmented Melitz-Ottaviano" model, consumers care both about quantity and quality. When the quality elasticity is greater than one, namely when the disadvantage of higher marginal cost is more than off-set by the consumers' appreciation of the higher quality, only sufficiently high marginal cost (= low quality-adjusted price) variety can be exported. Because of the quality elasticity greater than one, a low quality-adjusted price means a high marginal cost. Thus, the export marginal cost cut-off is higher the larger the trade cost and/or the market size. Namely, under the "quality sorting" in Kneller and Yu (2008)'s terminology, in which the quality elasticity is greater than one, the price discrimination effect and the selection effect work in opposite directions, which renders the total effect ambiguous. On the other hand, under the "efficiency sorting", in which the quality elasticity is less than one (i.e., the disadvantage of high marginal cost is not more than off-set by the advantage of high quality), there will be a negative correlation between the trade cost and the FOB price and between the market size and the FOB price.

Due to the general equilibrium nature of all the models summarised above, there is no role for quantity to determine the FOB price.

However, the use of quantity discounts in industry is widespread (Monahan (1984)). There are several advantages of larger individual orders. One is related to production cost saving. Larger individual orders make possible the manufacturing cost saving because larger orders will mean longer production runs and fewer manufacturing set-ups and order processing (Monahan (1984)). Besides this cost saving effect argued in management science literature, the price discrimination theory in economics literature argues that if some consumers gain higher utility than others from the same product, firms can increase profits by engaging in quantity discount (Armstrong (2008), Tirole (1986)). Moreover, in terms of the FOB price, there is in-land (domestic) transportation/shipping cost saving for larger orders. The FOB price includes packaging and domestic transportation costs. The mode of transportation changes depending on the lot sizes. For example, for chemical commodity products, large orders are delivered by bulk transportation, i.e., the products are loaded into ship tanks directly, while, for small volume orders, products are packed into drums and then these drums are loaded into containers, which eventually are loaded into ocean-going-ships. Thus, drum/container shipping is much more costly than bulk shipping.

Thus, if the general equilibrium theories could explain the majority of the international trade, once we control for the effect of distance and market size on the FOB price, the coefficient estimate of quantity should turn out to be statistically insignificant in the framework of these models.

2. DATA, EMPIRICAL MODEL AND RESULTS

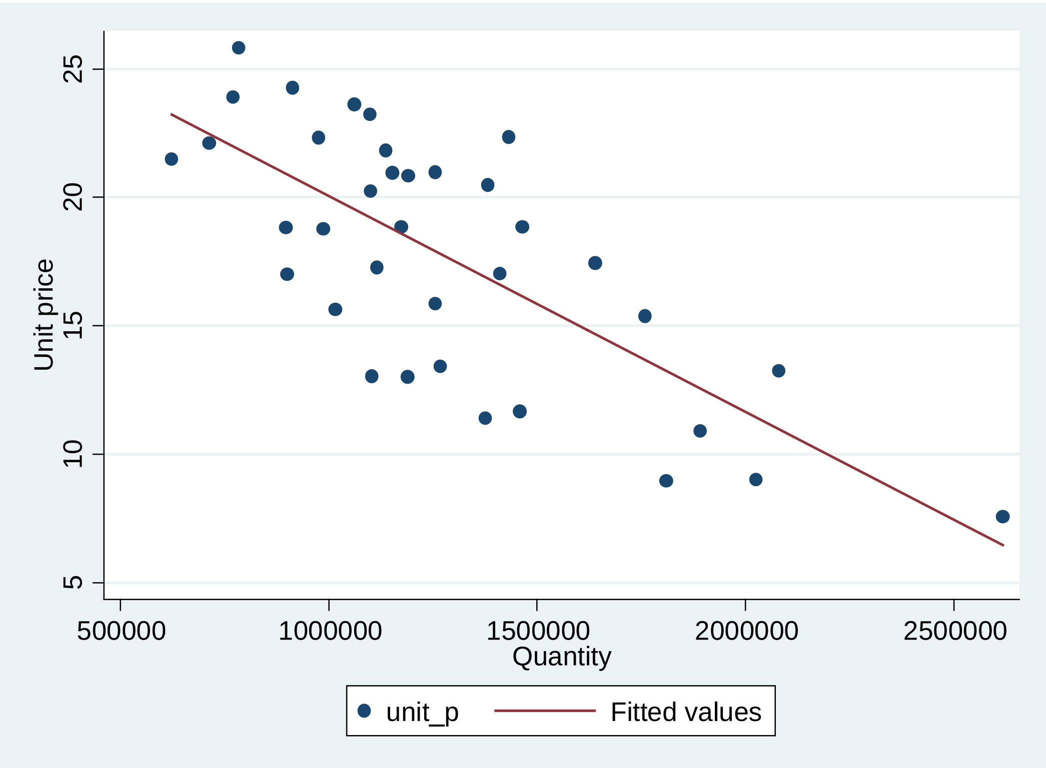
In this section, I first provide evidence of a high correlation between quantity and the FOB price. Following the convention of the literature, as a proxy for the FOB price, I use unit price, which is calculated as export value divided by export quantity (volume). Second, I replicate the empirics of Baldwin and Harrigan, which use the US data at the HS 10-digit level. I show that once I put quantity, which turns out to be statistically significant, in the estimation model the distance variable now shows significantly *negative* (i.e., the sign is flipped from the positive coefficient of Baldwin and Harrigan (2011)). Third, I apply the same analysis to Japanese exports data at the HS 9-digit and Chinese exports data at the HS 6-digit. The same sign flip of coefficient estimates is documented. These findings indicate that price discrimination in the form of quantity price discount is prevalent in international trade.

Quantity – Unit price correlation

To see if quantity discount is in action, the ideal is to check whether a particular product of a particular firm sells to a particular destination at lower unit price the larger the sales quantities. Since I do not have access to firm level trade data, in order to come as close as possible to this ideal case, I have checked the HS 9-digit monthly exports from Japan to China for three years (2005-2007). To minimize the possibility of the reverse causation from low unit price to large quantity (as the price of a product goes down, the sales quantity goes up.), it is better to do the analysis for a short period of time during which a product's price does not change much. On the other hand, we need a sufficiently large number of observations to see the correlation between quantity and unit price. For these reasons, monthly data are preferred because it enables us to have a larger number of observations within a shorter time period. I have taken Japan's trade data because they are freely available at the monthly level and at highly disaggregated level (HS 9-digit). I have taken the data of three years from 2005 to 2007, which gives me 36 observations at maximum. I have chosen the year 2007 as the last year of the sample in order to avoid the unusual trade collapse due to the economic crisis starting from 2008. Figure 1 shows, as an example, the scatter plot of 36 observations of the HS 9-digit product 852990900, i.e. Parts for radio/tv transmit/receive equipment, nes, other than tuners for tv receivers or radio receivers. The minimum quantity is 500,000 kilograms with unit price of 25,000 yen per kilogram, while the maximum quantity is 2,500,000 kilograms with the unit price of around 10,000 yen per kilogram. There is a clear negative correlation between the quantity and the unit price.

To see if the negative correlation between quantity and unit price is a common phenomenon for many products, I have checked correlation coefficients of quantity and unit price for Japan's monthly exports from 2005 to 2007 not only for China but also for the US, Germany, France and the UK, which are Japan's major export destinations. Namely, I have checked the correlation coefficient of a particular HS 9-digit product exports to a particular destination in the three year period (2005-2007). Out of 19766 cases, 16994 show the negative correlation coefficients, which represent 86%. Indeed, quantity discount seems to be in action.

Figure 1: Scatter plot of Unit price and Quantity: HS 9-digit product, 852990900



US trade data

I use the 2005 US trade data, which is used for Baldwin and Harrigan (2011). First, I replicate the regressions run by Baldwin and Harrigan (2011).

$$p_{j,d} = \beta_0 + \beta_1 \log\left(DIST_d\right) + \beta_2 \log\left(GDP_d\right) + \beta_3 \log\left(GDPCAP_d\right) + \tilde{\beta}_4 J + \varepsilon_{j,d}$$

where $p_{j,d}$ is the log of the FOB unit value index of product j to destination country d, $DIST_d$ is the bilateral distance from the US and destination country d, and GDP_d is the destination-country GDP; $GDPCAP_d$ is the corresponding GDP per capita. J is a vector of product dummies. ε_d is an iid error.

Then, I run the same regression, adding the quantity variable. Table 2 shows the regression results. The first column shows the replication of Baldwin and Harrigan (2011). The third column is the case of including quantity as an explanatory variable. The sign of the coefficient estimate of distance in the first column is positive and shows a rather large number of 0.315. However, the third column shows that the coefficient estimate of the quantity variable is negative and very highly statistically significant. If the unit price is explained in the general equilibrium models listed in Section 1, there should not be any significant effect of quantity on the unit price once the unit price is controlled by the other explanatory variables. The magnitude of coefficient estimate is rather high at -0.398 and moreover, the sign of distance gets flipped from the first column to the third column. The second column and the fourth column include product dummies.

Table 2: US exports at HS 10 digit in 2005 (Replication of Baldwin and Harrigan (2011))

	(1)	(2)	(3)	(4)
	OLS 1	OLS 2	OLS 3	OLS 4
Log of distance	0.315^{***}	0.230^{***}	-0.0634^{***}	-0.0628^{***}
	(41.18)	(46.39)	(-10.98)	(-15.50)
Log of GDP	-0.0354^{***}	-0.0279^{***}	0.154^{***}	0.133^{***}
	(-12.12)	(-14.40)	(68.79)	(80.81)
Log of GDP per capita	0.112^{***}	0.0862^{***}	0.0515^{***}	0.0591^{***}
	(26.38)	(31.65)	(16.47)	(27.64)
Log of quantity			-0.398^{***}	-0.286^{***}
			(-303.01)	(-256.55)
Constant	-1.049^{***}	-0.266^{***}	1.783^{***}	1.189^{***}
	(-12.17)	(-4.73)	(27.82)	(26.74)
Product dummy	No	yes	no	yes
R-squared	0.0194	0.620	0.469	0.767
Number of observations	108535	108535	108535	108535

t statistics in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

In the above regression, there might be an endogeneity problem of reverse causality between quantity and unit price. Commonly used instrumental variables are lagged variables. Since the data used in the above regression is for a single year, using the US export data of multiple years, from 1989-2006, I run the same regression as robustness checks. Now, we have time subscript t.

$$p_{j,t,d} = \beta_0 + \beta_1 \log\left(DIST_d\right) + \beta_2 \log\left(GDP_{j,t,d}\right) + \beta_3 \log\left(GDPCAP_{t,d}\right) + \tilde{\beta}_4 D + \varepsilon_{j,t,d}$$

where D is a vector of year dummies.

Table 3 shows the results. The first four columns are analogue to the previous regressions using 2005 trade data. The fifth column represents the instrumental variable regression using one time lagged quantity as the IV for quantity. The sixth column is IV with product dummies.[1] There are no qualitative differences between the OLS and IV cases.

[1] Product dummies for the OLS are at HS 10-digit, which can be feasible using STATA's command of "areg, absorb( )". However, for the instrumental variable regression, since there is no "absorb" option, we need to explicitly generate dummy variables in the data set. Generating product dummies at HS 10-digit exceeds the capacity limit of STATA. Thus, I generate product dummies at HS 4-digit instead.

Table 3: US data 1989-2006, HS 10 digit

	(1)	(2)	(3)	(4)	(5)	(6)
	OLS 1	OLS 2	OLS 3	OLS 4	IV 1	IV 2
Log of distance	0.278***	0.208***	-0.0594***	-0.0523***	-0.0444***	-0.000427
	(153.55)	(176.00)	(-44.56)	(-54.60)	(-29.60)	(-0.37)
Log of GDP	-0.0150***	-0.0184***	0.161***	0.132***	0.157***	0.111***
	(-21.28)	(-39.06)	(303.78)	(333.69)	(245.05)	(213.54)
Log of GDP per capita	0.0826***	0.0703***	0.0442***	0.0573***	0.0524***	0.0659***
	(79.03)	(103.64)	(58.49)	(107.93)	(57.40)	(95.38)
Log of quantity			-0.407***	-0.293***	-0.397***	-0.246***
			(-1258.40)	(-1043.00)	(-810.95)	(-527.62)
Constant	-1.353***	-0.432***	1.548***	1.035***	1.443***	1.390*
	(-65.26)	(-31.62)	(102.18)	(96.03)	(80.45)	(2.27)
Product dummy	no	yes	no	yes	no	yes
R-squared	0.0238	0.597	0.491	0.753	0.477	0.705
Number of observations	1727692	1727692	1727692	1727692	1199347	1199347

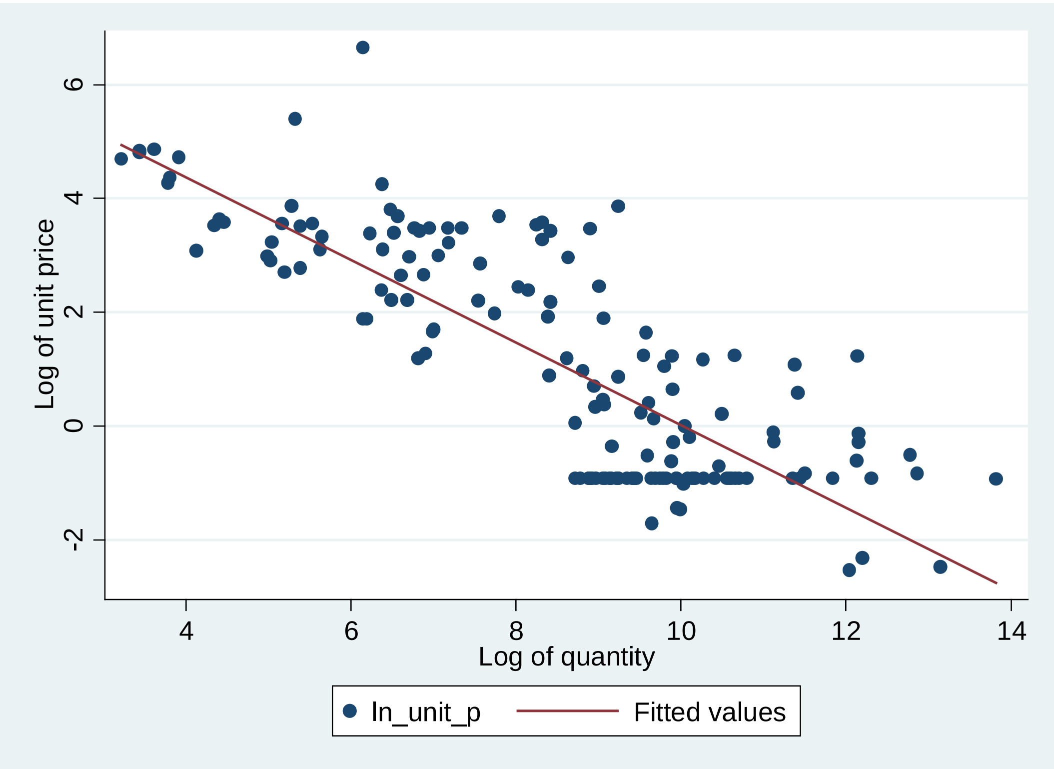
t statistics in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

For the sake of brevity, coefficient estimates of year dummies and product dummies are not printed.

As another check, I run regression *for each* HS10-digit product and see the coefficient estimates of the quantity variable. Since I have kept HS 10-digit products with unit expressed in Kilograms as in Baldwin and Harrigan (2011), I get regression results for 4909 HS 10-digit products. Out of the 4909 products, we get statistically significant negative coefficient estimates for 4322 products. As an example, I have taken HS 5002000000: Raw silk. Log of quantity and log of unit price are plotted with a regression line superimposed on the figure in Figure 2. There is a clear negative correlation between the two.

Figure 2: Plot of Quantity and Unit price of HS 5002000000: Raw silk of US exports



Japan trade data

To check if we get the above finding using other trade data, I perform the same regression using Japan's export data at the HS 9-digit from 1988 to 2009. We obtain qualitatively equivalent results with the case of the US exports. Namely, the quantity variable show highly statistically significant negative coefficients. The signs of the coefficients of distance get flipped once we control for quantities.

Table 4: Regression results using Japan’s export data 1988-2009 at HS 9-digit

	(1)	(2)	(3)	(4)	(5)
	OLS 1	OLS 2	OLS 3	OLS 4	IV
Log of distance	0.336***	0.208***	-0.117***	-0.226***	-0.239***
	(157.14)	(168.72)	(-73.76)	(-220.11)	(-147.34)
Log of GDP	-0.0982***	-0.00191***	0.128***	0.165***	0.189***
	(-134.15)	(-5.03)	(231.86)	(448.82)	(308.20)
Log of GDP per capita	0.0799***		0.0424***	0.0495***	0.0498***
	(81.98)		(59.60)	(114.76)	(67.38)
Log of quantity			-0.466***	-0.321***	-0.448***
			(-1583.35)	(-1350.85)	(-1191.43)
Constant	0.146***	-0.283***	2.328***	1.340***	3.896*
	(5.38)	(-18.77)	(117.38)	(111.27)	(2.13)
Product dummy	no	yes	no	yes	yes
R-squared	0.0229	0.696	0.480	0.815	0.591
Number of observations	2855482	2859623	2855482	2855482	2097222

t statistics in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

For the sake of brevity, coefficient estimates of year dummies and product dummies are not printed.

China trade data (Kneller and Yu (2008):)

In this sub-section, I replicate Kneller and Yu (2008), which investigates the determinants of unit price using China's exports data. While Kneller and Yu (2008) uses the HS 8-digit data, I use HS 6-digit data, because China's HS 8-digit data are expensive to obtain. There seems to be little need to worry about the use of the HS 6-digit instead of the HS 8-digit. Baldwin and Ito (2011) shows that for the type of the regression equation we are estimating, the results using the HS 8-digit are similar to the results using the HS 6-digit data. Kneller and Yu (2008) show that the signs of coefficients on the distance variable and the market size variable differ across the HS 2-digit industries with the majority of cases being positive coefficients for both variables, which is not in line with any of the existing theories' predictions.

To explain their finding, they propose what I call the "Quality-augmented Melitz-Ottaviano" model, the model in the last row of Table 1 in Section 1. Table 5 is the list of HS 2-code industry groups of Kneller and Yu (2008). Table 6 shows the regression results without including the quantity as an explanatory variable. In the original Kneller and Yu (2008) estimation, 12 industry groups out of 19 show positive/positive signs. When we include quantity in the estimation, that number reduces to two, while 17 out of 19 industry groups show negative/positive signs. The inclusion of the quantity variable drastically changes the results in line with the above cases of the US and Japan.

Table 5: HS 2-digit Industries and their Description

HS Code	Description
1-5	Live animals and animal products
6-14	Vegetable products
15	Fats oils and waxes
16-24	Food products, beverages & tobacco
25-27	Mineral products
28-38	Chemicals
39-40	Plastics and rubber
41-43	Leather, fur etc.
44-46	Wood and Wood products
47-49	Wood pulp, paper and paper articles
50-63	Textiles
64-67	Footwear, headwear etc.
68-70	Glass, glassware, stone and ceramics
71	Pearls, precious metals and jewellery
72-83	Base metals
84-85	Machinery, mechanical, electrical equipment
86-89	Vehicles, aircraft and transportation equipment
90-92	Clocks, watches and specialist instruments
94-96	Other manufactured goods

Table 6: Regression results, China HS 6-digit exports without the quantity variable

Industry description	**Distance**	**Market size**	**HS6 codes**	**Obs.**
	Positive	**Positive**		
Live animals and animal products	0.189***	0.075***	117	3552
Vegetable products	0.248***	0.049***	180	9819
Food products, beverages & tobacco	0.113***	0.010	143	8703
Mineral products	0.227***	0.017*	90	5155
Chemicals	0.186***	0.059***	646	54273
Plastics and rubber	0.046***	0.007	166	21130
Wood and Wood products	0.104**	0.026**	59	5430
Wood pulp, paper and paper articles	0.103***	0.045***	103	9303
Textiles	0.031***	0.064***	729	86628
Footwear, headwear etc.	0.006	0.073***	51	10391
Glass, glassware, stone and ceramics	0.056***	0.058***	117	17019
Base metals	0.044***	0.069***	451	53827
	Positive	**Negative**		
Fats oils and waxes	0.070	-0.008	30	781
	Negative	**Negative**		
Vehicles, aircraft and transportation equipment	-0.595***	-0.019	110	10617
Other manufactured goods	-0.124***	-0.016**	112	26087
	Negative	**Positive**		
Leather, fur etc.	-0.118***	0.121***	54	6037
Pearls, precious metals and jewellery	-0.014	0.206***	18	1009
Machinery, mechanical, electrical equipment	-0.527***	0.036***	663	87674
Clocks, watches and specialist instruments	-0.454***	0.121***	177	22036

Regression results: China HS 6-digit exports with the quantity variable

Industry description	**Distance**	**Market size**	**HS6 codes**	**Obs.**
	Positive	**Positive**		
Vegetable products	0.030	0.109***	180	9818
Mineral products	0.094***	0.070***	90	5154
	Negative	**Positive**		

Live animals and animal products	-0.074**	0.147***	117	3551
Fats oils and waxes	-0.067	0.039**	30	780
Food products, beverages & tobacco	-0.104***	0.081***	143	8702
Chemicals	-0.063***	0.214***	646	54272
Plastics and rubber	-0.012	0.082***	166	21129
Leather, fur etc.	-0.110***	0.228***	54	6036
Wood and Wood products	-0.198***	0.211***	59	5429
Wood pulp, paper and paper articles	-0.031**	0.100***	103	9302
Textiles	-0.051***	0.120***	729	86627
Footwear, headwear etc.	-0.006	0.172***	51	10390
Glass, glassware, stone and ceramics	-0.110***	0.145***	117	17018
Pearls, precious metals and jewellery	-0.405***	0.389***	18	1008
Base metals	-0.079***	0.172***	451	53826
Machinery, mechanical, electrical equipment	-0.504***	0.346***	663	87673
Vehicles, aircraft and transportation equipment	-0.325***	0.313***	110	10616
Clocks, watches and specialist instruments	-0.398***	0.372***	177	22035
Other manufactured goods	-0.151***	0.265***	112	26086

CONCLUDING REMARKS

This paper reviews the trade literature's predictions on the relation between unit prices (FOB price) and distance / importer market size. Quantity, which is intrinsically not a determinant of unit price in general equilibrium models, is shown to be a major determinant of unit price.

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