Fighting Gravity: Goods and Services Traders Against Distance*

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Abstract

This paper uses micro data from Belgium to understand the effect of distance on both goods and services trade. Distance plays a stronger negative effect on services than on goods trade mostly because of a reduction in the number of firms and to a lesser extent because of less services and lower sales per service. However, controlling for the selection of firms into foreign markets, service traders export and import on average more than goods traders in more distant destinations because the average values per service product are significantly higher. Over time, the differential effect of distance is stable, meaning that its negative effect on exports and imports varied symmetrically for both goods and services.

Keywords: Distance, Services, Goods, Trade.
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1 Introduction

2 Data Description and Stylized Facts

Fact 1: *Distance plays a negative role on aggregate exports especially on the firm margin for both goods and services trade*

I run a simple gravity on aggregate bilateral Belgian exports of goods and services separately:

$$Exp_{ct} = \alpha_0 + \alpha_1 Dist_c + \alpha_2 GDP_{ct} + \epsilon_{ct} \quad (1)$$

where: Exp_{ct} is exports of either goods or services, Dist_c is the log distance of Belgium from the destination, GDP_{ct} is the GDP of the destination at time t.

Table 1: Aggregate Gravity

Panel a: Goods						
	(1)	(2)	(3)	(4)	(5)	(6)
	Exp_{ct}	# Firms_{ct}	# Prod_{ct}	Dens_{ct}	# Trans_{ct}	Avg. Exp_{ct}
Dist_c	-0.864^a	-0.627^a	-0.296^a	0.249^a	-0.177^a	-0.012
	(0.021)	(0.030)	(0.015)	(0.021)	(0.017)	(0.017)
GDP_{ct}	0.941^a	0.611^a	0.331^a	-0.305^a	0.221^a	0.084^a
	(0.011)	(0.008)	(0.007)	(0.007)	(0.006)	(0.007)
Observations	1,932	1,932	1,932	1,932	1,932	1,932
R-squared	0.863	0.823	0.698	0.655	0.420	0.069
Panel b: Services						
	Exp_{ct}	# Firms_{ct}	# Prod_{ct}	Dens_{ct}	# Trans_{ct}	Avg. Exp_{ct}
Dist_c	-0.858^a	-0.785^a	-0.311^a	0.306^a	0.018	-0.086^a
	(0.042)	(0.028)	(0.017)	(0.016)	(0.014)	(0.022)
GDP_{ct}	0.854^a	0.592^a	0.353^a	-0.343^a	0.111^a	0.141^a
	(0.019)	(0.012)	(0.007)	(0.007)	(0.007)	(0.010)
Observations	1,613	1,613	1,613	1,613	1,613	1,613
R-squared	0.671	0.746	0.631	0.636	0.125	0.106

Note: Robust standard errors in parentheses. ^{a} p<0.01, ^{b} p<0.05, ^{c} p<0.1

From Table 1, it looks like the negative effect of distance is quite similar for both goods and services. Disentangling total exports into number of firms, average number of products per firm, density (number of firm-products effectively served out of all the possible combinations), number of transactions per firm-product effectively served and average exports per transaction, I find that most of the negative effect is on the number of firms. Moreover, this is especially true for services. This is in part compensated by a larger size of the transaction per firm-product for services. Finally, there are also differences in terms of transaction number and size (**but I cannot really say something because I have the number of transactions but not the client margin**).

Fact 2: *Distance plays a more negative role for services than for goods exports*

To check whether these differences across goods and services are statistically significant, I append the two datasets and I run a gravity equation with an interaction of the GDP and distance variable with a dummy identifying service flows and destination-year FE. Analytically:

$$Exp_{cst} = \alpha_0 + \alpha_1 Dist_c + \alpha_2 GDP_{ct} + \alpha_3 Dist_c * Serv_s + \alpha_4 GDP_{ct} ** Serv_s + \lambda_{ct} + \upsilon_{cst} \quad (2)$$

Table 2: Differential Gravity

	(1) Exp_{ct}	(2) # $Firms_{ct}$	(3) # $Prod_{ct}$	(4) $Dens_{ct}$	(5) # $Trans_{ct}$	(6) Avg. Exp_{ct}
$Dist_c$	-	-	-	-	-	-
GDP_{ct}	0.910^a	0.553^a	0.299^a	-0.309^a	0.601^a	-0.233^a
	(0.062)	(0.040)	(0.028)	(0.028)	(0.038)	(0.048)
$Dist_c$*$Serv_s$	-0.061^c	-0.186^a	-0.050^a	0.090^a	0.175^a	-0.090^a
	(0.036)	(0.023)	(0.016)	(0.016)	(0.022)	(0.027)
GDP_{ct}*$Serv_s$	-0.072^a	0.008	0.060^a	-0.075^a	-0.085^a	0.020^c
	(0.015)	(0.010)	(0.007)	(0.007)	(0.009)	(0.012)
$Serv_s$	-1.707^a	-0.831^a	-1.774^a	1.503^a	-1.531^a	0.927^a
	(0.372)	(0.239)	(0.165)	(0.170)	(0.228)	(0.285)
Observations	3,542	3,542	3,542	3,542	3,542	3,542
R-squared	0.908	0.925	0.903	0.887	0.610	0.429

Note: Standard errors clustered at the destination level in parentheses. ^{a} p<0.01, ^{b} p<0.05, ^{c} p<0.1

Table 2 shows that distance plays a small but more negative effect on services than on goods. This is mostly explained by a lower number of firms serving services in distant destinations. The effect on the number of products is also negative, meaning that service exporters tend to sell less services with respect to the number of products sold by goods exporters in distant destinations. However, this is a bit mechanical because the aggregation of the service categories (37 types of services) is higher than for goods (90 products at CN 2-digit). Instead, the exports per product-destination are higher for services than for goods. This is an indication that conditional on selection service exporters sell more than goods exporters in more distant destinations.

I did the same for imports and results look very similar, except that the differential effect turns negative for the intensive margins as well. Over time, I did not observe major changes in the differential effect of distance (but I have to re-check carefully all the tables that I have).

Fact 3: *Service Exporters are different than goods exporters.*

To check whether goods and services exporters are different, I regress a number of firm characteristics agains dummies identifying firms that export both goods and services, firms that export only services and industry dummies. The reference category is therefore represented by firms that export only goods. The results of table 3 show that firms that export both are bigger than firms that export only services or goods in all dimensions. Service exporters tend to be smaller than goods exporters in terms of employment, capital, value added and value of intermediate inputs, but they are bigger in terms of intangible capital and wage bill. Moreover, they are more productive and skill intensive (in terms of W/L) but less capital intensive. Therefore, it looks like service exporters are smaller but on average more performant than goods exporters.

The idea is now to check whether these differences vary depending on the distance of the exports market served. More specifically, if conditional on distance service exporters in a certain destination are bigger and more productive than goods exporters. Or similarly, if the differences across goods and services exporters vary depending on distance. Moreover, I would like to check whether these differences vary over time. Not done yet.

Table 3: Exporters Characteristics

	(1) Employment	(2) Value Added	(3) Capital	(4) Int. Capital	(5) Wage Bill	(6) Intermediates	(7) VA/L	(8) K/L	(9) W/L
Bi Exporter	1.074^a	1.311^a	1.391^a	1.133^a	1.124^a	1.816^a	0.160^a	0.318^a	0.081^a
	(0.016)	(0.018)	(0.021)	(0.043)	(0.019)	(0.017)	(0.009)	(0.016)	(0.007)
Service Exporter	-0.035^a	-0.025^c	-0.315^a	0.249^a	0.176^a	-0.689^a	0.050^a	-0.325^a	0.184^a
	(0.013)	(0.014)	(0.016)	(0.038)	(0.016)	(0.013)	(0.007)	(0.013)	(0.005)
Observations	179,479	186,593	186,584	54,085	170,272	176,876	173,965	174,780	169,267
R-squared	0.215	0.185	0.206	0.103	0.182	0.174	0.092	0.085	0.100

Note: Standard errors clustered at the firm level in parentheses. ^{a} p<0.01, ^{b} p<0.05, ^{c} p<0.1

Fact 4: *Service exporters sell more than goods exporters in distant destinations.*

To understand better how distance affects exports conditional on firm selection, I regress firm level exports of firm i of product p (or service s) to country c at time t on distance and GDP together with firm-year FE.

$$Exp_{ict} = \alpha_0 + \alpha_1 Dist_c + \alpha_2 GDP_{ct} + \lambda_{it} + \upsilon_{ict} \tag{3}$$

The regressions are run separately for: exports of goods from bi-exporters (panel a), exports of goods of pure goods exporters (panel b), exports of services from bi-exporters (panel c) and exports of services from pure services exporters (panel d). Results in Table 4 show that distance plays a weaker negative effect on services with respect to goods.

Moreover, this is true both across firms (panel b and d) and within firms (panel a and c). Disentangling total exports into the number of products or services, the number of transactions per product (service) and the average exports per transactions, I observe that distance plays a more negative role for the average transaction size especially for goods. In other words, the average exports per product (i.e. summing the number of transactions and the transaction size) tend to decrease with distance more for goods than for services.

Table 4: Firm-Level Gravity

Panel a: Goods Exports, Bi-Exporters					**Panel b: Goods Exports, Pure Goods Exporters**				
	(1)	(2)	(3)	(4)		(5)	(6)	(7)	(8)
	Exp_{ict}	# $Prod_{ict}$	# $Trans_{ict}$	Avg. Exp_{ict}		Exp_{ict}	# $Prod_{ict}$	# $Trans_{ict}$	Avg. Exp_{ict}
$Dist_c$	-0.408^a	-0.046^a	-0.176^a	-0.186^a	$Dist_c$	-0.407^a	-0.075^a	-0.084^a	-0.248^a
	(0.006)	(0.002)	(0.005)	(0.004)		(0.037)	(0.010)	(0.024)	(0.020)
GDP_{ct}	0.320^a	0.039^a	0.177^a	0.104^a	GDP_{ct}	0.259^a	0.051^a	0.108^a	0.100^a
	(0.006)	(0.002)	(0.005)	(0.003)		(0.024)	(0.008)	(0.018)	(0.016)
Constant	-2.299^a	0.000	0.684^a	-2.983^a	Constant	-0.912^b	0.225^b	1.088^a	-2.224^a
	(0.088)	(0.026)	(0.074)	(0.042)		(0.367)	(0.104)	(0.304)	(0.195)
Observations	610,435	610,435	610,435	610,435	Observations	11,809	11,809	11,809	11,809
R-squared	0.459	0.424	0.406	0.459	R-squared	0.709	0.699	0.649	0.573
Panel c: Service Exports, Bi-Exporters					**Panel d: Service Exports, Pure Service Exporters**				
	(9)	(10)	(11)	(12)		(13)	(14)	(15)	(16)
	Exp_{ist}	# $Serv_{ist}$	# $Trans_{ist}$	Avg. Exp_{ist}		Exp_{ist}	# $Serv_{ist}$	# $Trans_{ist}$	Avg. Exp_{ist}
$Dist_c$	-0.246^a	-0.036^a	-0.185^a	-0.026	$Dist_c$	-0.259^a	-0.027^a	-0.179^a	-0.052^a
	(0.031)	(0.007)	(0.015)	(0.020)		(0.010)	(0.002)	(0.006)	(0.006)
GDP_{ct}	0.254^a	0.045^a	0.117^a	0.091^a	GDP_{ct}	0.199^a	0.022^a	0.116^a	0.061^a
	(0.029)	(0.006)	(0.014)	(0.018)		(0.008)	(0.002)	(0.004)	(0.005)
Constant	-3.052^a	-0.213^a	0.898^a	-3.737^a	Constant	-2.516^a	-0.003	0.778^a	-3.290^a
	(0.395)	(0.068)	(0.184)	(0.254)		(0.087)	(0.014)	(0.051)	(0.048)
Observations	11,809	11,809	11,809	11,809	Observations	133,610	133,610	133,610	133,610
R-squared	0.552	0.486	0.632	0.561	R-squared	0.435	0.402	0.490	0.510

Note: Standard errors clustered at the firm level in parentheses. ^{a} p<0.01, ^{b} p<0.05, ^{c} p<0.1

Thanks to the presence of bi-exporters, I can test the significance of this difference. More specifically, I can check whether the exports of services react differentially from the exports of goods to distance within the same firm. This is possible by focusing on bi-exporters, appending the goods and service flows and regressing exports against distance, GDP and their interaction with a dummy identifying service flows.

$$Exp_{isct} = \alpha_0 + \alpha_1 Dist_c + \alpha_2 GDP_{ct} + \alpha_3 Dist_c * Serv_s + \alpha_4 GDP_{ct} * Serv_s \lambda_{ict} + \upsilon_{isct} \quad (4)$$

This specification has the advantage of allowing me to put firm-destination-year fixed effects, thus controlling for any variant and invariant firm-destination unobserved factors. In this setting, I can identify whether within the same firm-destination-year

services react differently to distance with respect to goods. Results in Table 5 show that services have a greater advantage in more distant destinations with respect to goods even within the same firm. This is driven by the fact that the average exports per transaction are higher than for goods.

** I did not check whether this varies over time. Moreover, this says that it is not only firm characteristics that make services react differently from goods with respect to distance. There is something intrinsic to services that make them be less responsive to distance.**

Table 5: Bi-Exporters Gravity

	Exp_{ict}	# $Prod_{ict}$	# $Trans_{ict}$	Avg. Exp_{ict}
$Dist_c$	-	-	-	-
$Dist_c$*$Serv_s$	0.176[a]	0.002	-0.031	0.204[a]
	(0.026)	(0.006)	(0.020)	(0.021)
GDP_{ct}	-	-	-	-
GDP_{ct}*$Serv_s$	-0.174[a]	-0.017[a]	-0.049[a]	-0.109[a]
	(0.011)	(0.003)	(0.008)	(0.009)
Observations	39,696	39,696	39,696	39,696
R-squared	0.635	0.613	0.578	0.601

Note: Standard errors clustered at the firm level in parentheses. [a] p<0.01, [b] p<0.05, [c] p<0.1

3 Conclusion

References

Appendix

A Additional tables and figures