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Supply-side Barriers to Cross-border eCommerce in the EU Digital Single Market

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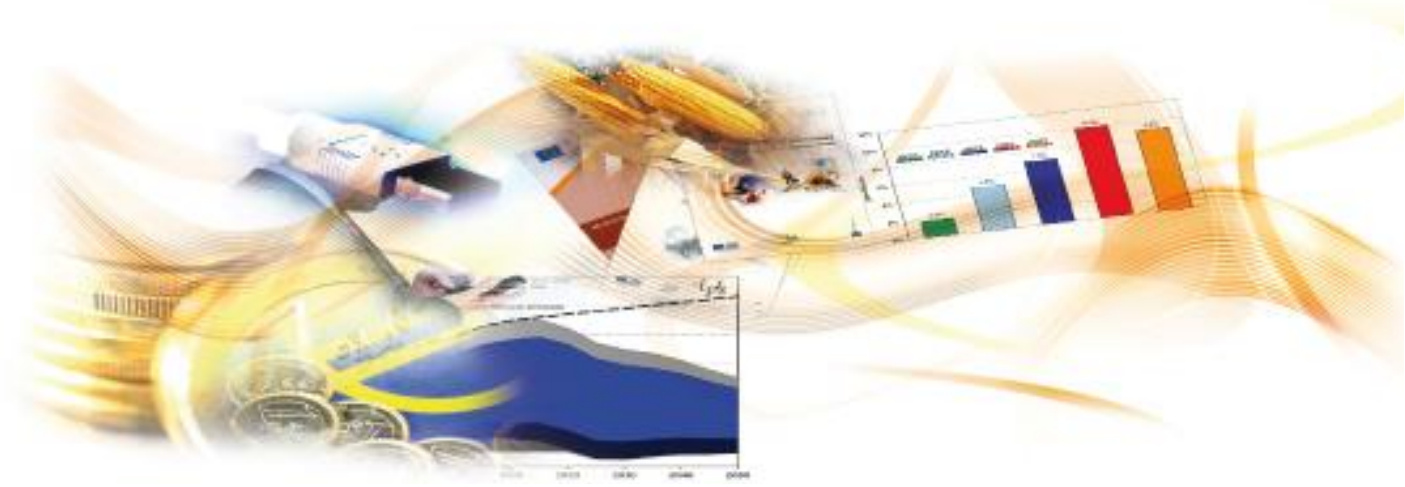

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Abstract

Between 2009 and 2012 the percentage of online consumers in the EU who made online purchases in another EU Member State increased from 8 to 11 per cent, below the target of 20 per cent put forward in the EU Digital Agenda. Both, subjective perceptions on the consumer side or objective barriers on the supply side can play a role. This study uses a mystery shopping survey to measure the relative importance of supply side barriers. While 97 per cent of domestic orders lead to a successful shipment, we find that suppliers accepted to ship only 48 per cent of all cross-border online orders. This high failure rate may overstate the ordinary consumer experience because of the artificiality of the mystery shopping trade patterns. We therefore focus on the factors that drive success and failure. A shared language between buyer and supplier countries increased and size of the goods decreased the chances of success. Goods that are subject to geographical sales restrictions (vertical agreements) between producers, wholesalers and retailers are the least likely to be available for online cross-border orders. This may indicate that restrictions in competition in offline markets are spilling over to online markets and prevent the realization of some of the benefits of e-commerce. We conclude that regional integration in digital markets is constrained by the lack of integration in traditional bricks & mortar markets.

1. Introduction

One of the fundamental ideas underlying the EU is the creation of a Single Market where goods and services, capital and labour, can flow freely between Member States. This idea has been extended to online trade in the Digital Agenda for Europe (DAE) that envisages the creation of a Digital Single Market (European Commission, 2010) and "tackling the regulatory barriers holding back European businesses from trading cross-border". The performance targets set in the DAE include specific e–commerce targets: At least 50 per cent of all European consumers should engage in online purchases by 2015, and 20 per cent should do online cross-border purchases by 2015. Boosting e-commerce and cross-border trade should not be seen as economic policy objectives in their own right. They are means to generate the welfare benefits that can be expected from (cross-border) e-commerce: more competition and lower prices, a wider range of consumer choice, economies of scale for suppliers, etc. The annual Digital Agenda Scoreboard (European Commission, 2014) reveals that e-commerce uptake by EU households stood at 47% in 2013 and within reach of the 50% target for 2015. The cross-border e-commerce target remains out of reach however. It stood at 12% only in 2013, up from 9 % in 2009 but still far from the 20% target. This may be due to a variety of reasons related to consumer preferences, suppliers' commercial strategies and regulatory issues.

Subjective obstacles to e-commerce on the consumer side are lack of trust or familiarity with e-commerce. Some studies point to an inherent preference for home market suppliers and suppliers within the consumer's own cultural and linguistic realm (Gomez et al., 2014). A consumer survey carried out for the European Commission found that concerns regarding delivery and return possibilities, as well as doubts about misuse of payment cards and personal data may deter consumers from shopping online in another country (Civic Consulting, 2011). Another consumer survey shows that while the majority of the EU population (59.2 %) feels confident making domestic purchases via the Internet, a much lower percentage (35.4 %) expresses confidence about cross-border purchases (European Commission, 2013a). Another study looks at the EU parcel market and finds that online shoppers regard delivery times as too long and delivery costs too high (Copenhagen Economics, 2013). The Commission formulated actions to build trust in online markets, improve consumer protection and operator information, dispute resolution, reliable payment and delivery systems (European Commission, 2012).

In this study we focus on the objective obstacles on the supply side that consumers may encounter after they have decided in favor of shopping online and possibly cross-border, and set aside any subjective concerns about trust or security, language and cultural barriers, etc. We use a mystery shopping survey to examine two types of obstacles that may occur: refusal of shipment (usually carried out by parcel delivery services) and rejection of a means of online payment. Mystery shopping data address objective barriers; consumer concerns are filtered out. To our knowledge there is no literature

that specifically looks at these supply-side barriers of the e-commerce market. There are studies on the postal market and on payment systems, but they do not examine how this reduces supply on the e-commerce market. This study aims to contribute to fill this gap.

Research has investigated the question whether internet facilitates cross-border trade and interaction. Earlier studies found that more servers are associated with higher trade (Freund et al., 2002). More recent studies tend to show that a home bias exists in the online world and that the distance effect remains especially for taste dependent goods (Blum et al., 2006). An adoption study shows that e-commerce is not more attractive for firms that sell in distant markets (Hollenstein et al., 2008). To the best of our knowledge there is no study about the objective supply side barriers that restrict consumer attempts to buy cross-border online.

This study addresses several research questions. First, we try to quantify the importance of supply side barriers in EU online trade and their negative impact on e-commerce. What is the probability that online transactions fail because of some objective reasons on the supply side that are not related to the consumer's subjective perceptions? Second, we estimate to what extent these objective obstacles have a differential impact on domestic and cross-border online trade patterns in the EU. Third, we explore if obstacles are related to the characteristics of the online traded goods and what the cause of the obstacles could be. We find that 52 per cent of all attempts at cross-border purchase fail because the online shop refused to ship the product to the buyer's country – compared to a marginal but nevertheless non-zero refusal rate for domestic orders (only 3 per cent, see Figure 1). Furthermore these obstacles are most prevalent for goods that are subject to geographical restraints agreed between producers, wholesalers and retailers. As such, obstacles to online cross-border trade mirror the territorial restrictions in competition in offline markets.

This report is structured as follows. Section 2 discusses the data source and presents some descriptive statistics. Section 3 presents and tests some simple analytical models, and discusses the results. Section 4 concludes.

2. The Data and some descriptive statistics

The main data source for this study is a 2009 "mystery shopping" survey carried out on behalf of the European Commission (Meier-Pesti et al., 2009). Mystery shopping is employed to measure shopping service quality by having a trained anonymous observer mimic a shopping experience and go through the entire online ordering process up to the final order confirmation but without actually placing the

order at the end of the process[1]. The strength of this method lies in evaluating objective criteria that impede a transaction once the decision to shop online has been taken and subjective criteria such as trust and familiarity no longer play a role. Subjective perceptions of customer experience are collected in consumer surveys (Finn et al., 1999).

The mystery shopping survey was conducted from each of the 27 EU Members States[2]. The pre-defined shopping list included 100 products that are representative of the average online shopping basket. Products were defined in detail. For example, "DVD film: The Dark Knight". Products were classified in eleven different groups (See Table 1). The three most important online shopping products, "clothes, sports goods", "Household goods" and "books/magazines" (European Commission, 2013b) are represented. The survey covers only physical goods that need to be shipped, not digital download versions of books, CDs and DVDs. Services were also excluded. Five shopping attempts were made for each product from each country, adding up to a total of 500 shopping tours from each Country of Buyer (CoB). Overall 100 different products tested 5 times from 27 countries sums up to a total of 13,573 observations (completed questionnaires).[3]

Shopping destination countries (Country of Seller, CoS) and online shops were identified in the first stage of the survey. Potential online suppliers were identified by means of a search process launched from each CoB. Out of the search results, five links were selected that included domestic online shops as well as shops in other EU countries. Links outside the EU were excluded. The list of 5 was designed in such a way that it included at least one small Member State per product.

Table 2 shows which country relationships were tested by the mystery shoppers. The diagonal shows domestic shopping attempts; off-diagonal elements represent cross-border shopping attempts. Obviously the sample design is primarily focused on representing as many country combinations as possible and is not representative of actual domestic and cross-border online trade volumes. About 36 per cent of all possible country pairs were not covered at all, e.g. no Belgian mystery shopper tested a web-shop in Bulgaria. The frequency distribution of CoS varies considerably. The most popular e-shopping destinations for the mystery shoppers were UK and Germany, while web-shops in Cyprus and Malta received hardly any visits from the mystery shoppers. These proportions roughly reflect the true weights of countries in EU online commerce (Civic Consulting, 2011, p35). Still the weakness of the

1 Not pushing the "order" button may induce bias in the data since, in some cases, rejections and obstacles may not emerge before the order button is pushed.

2 As the study was carried out 2009 Croatia was not included in the survey.

3 A more detailed description of the survey, the complete questionnaire and summary of answers can be found in the original study: http://ec.europa.eu/consumers/consumer_research/market_studies/docs/mystery_shopping_eval_en.pdf

mystery shopping method is that it reflects to some extent an artificial pattern of cross-border shopping attempts. There is a degree of randomness in the selection of online shops where the mystery shoppers attempted to buy goods. Apart from some well-known large online retailers, many of the selected shops were rather unknown outside their home country and ordinary consumers would rarely attempt to buy there unless they would happen to know the shop. Conversely, these online shops would probably not expect many foreign buyers. The high failure rates that this type of survey generates should be interpreted with caution. It is likely to overestimate the actual failure rate that discerning consumers face when looking for online shops. However, the survey data do generate interesting results with respect to the type of products and other factors that may contribute to a failed shopping attempt. That will be the focus of our analysis.

In the second stage, the mystery shoppers activated the links to the online shops and went through the shopping process, stopping short of pushing the final "order" button. In that process they filled in a questionnaire with 75 questions on topics ranging from product details, registration procedure to complaint management. For the focus of this study we concentrate on two main criteria that can pose an objective obstacle to a successful online shopping transaction: Shipment and Payment. These two variables are derived from the following questions: "Is shipment to your country possible?" ("shipment"). The variable "payment" is classified as successful when either the question "Does the shop accept my direct debit/bank details?" or "Does the shop accept my debit/credit card?" has been answered with yes. Additionally for some descriptives we take into account the answer to "Were you able to register on the website successfully?" (in the remaining text referred to as the variable "registration") and the summary question "Is it possible to conduct the complete ordering process up to the final order confirmation?" ("order"). We also measure the overall success of the ordering process with the variable "order (sum)" which receives an affirmative answer conditional on all criteria having been managed successfully by the mystery shopper. The summary statistics of these barrier variables can be seen in Table 3. More than 80% of the shopping attempts results in successful registration. The entire ordering process could be completed in only 42% of the cases. As Table 4 demonstrates, all barrier variables are positively and significantly correlated, though they are by no means completely overlapping. Registration is a more independent problem, while the success of shipping and payment are more closely related.

There is a substantial difference in success rates between domestic and cross-border shopping in the EU. The relative simple process of registration is only successful for 88% of all domestic orders and 80% of cross-border orders. These high failure rates seem to hint at problems in the construction of the websites, considering that mystery shoppers had to demonstrate a high level of online literacy and above average education in order to participate in the survey (Meier-Pesti et al., 2009). While 97% of domestic orders could successfully be shipped, not even half of the attempted cross-border orders could

potentially be shipped to the mystery shopper's country (**Figure 1**). The success rates for shipment for each country combination are shown in **Table 5**. Payment similarly shows a high failure rate (47%) for cross-border offers but also poses a problem to nearly a quarter of domestic orders. The substantial difference in success rates between domestic and cross-border payments alludes to geographical market segmentation in online payment systems. However, the high failure rate in payments for domestic transactions suggests a general inadequacy in online payment systems.

The mystery survey does not take into account the cost of possible additional charges for shipment or payment choices and solely reflects the possibility of shipment or payment. It is therefore likely to underestimate the scale of these obstacles.

There is also substantial variability of success rates across product categories (Table 1). Only 39% of electrical appliances (which includes products such as fridges, vacuum cleaners and drilling machines) could be shipped to the mystery shopper's country, while books could be shipped in nearly 82% of the cases. Potential explanatory variables may come into play with regard to shipment, such as bulkiness and transport costs. 90% of books, CD or DVD orders can be shipped while ordering electrical appliances fails in 25% of all cases. However, the same degree of variation across product categories can be observed for registration and payment. There is no immediately apparent reason why registration and payment should be correlated with the type of product, so other factors may be at work here. Payment success might still be explained for partly by price, as "Computer hardware" and “Electrical” goods showthe lowest acceptance rates of 43.2% and 40.5% respectively, while paying for "Books" is successful in 79% of the orders.

3. A more formal methodology

In this section, we propose a formal methodology for the analysis of the mystery shopping survey data. Our aim is to explain the differences in success rates at various stages in the order process (shipment, payment), across categories of goods and differences between domestic and cross-border transactions. The latter is especially important from an EU Digital Single Market policy perspective. What are the objective barriers that drive geographical market segmentation in online shopping? We use a standard trade model for this purpose, the gravity model. In its traditional interpretation, the gravity model is used to explain the volume of trade between two countries in function of the size of their economies and the distance between them (Feenstra, 2002, Gomez et al., 2014). Here, we do not examine the volume of trade between country pairs but the probability of a successful transaction. The mystery shopping survey data includes a number of potential explanatory variables for (un)successful transactions: the location (countries) of the buyer and the seller and the type of product. Moreover, we bring in additional

information on the products as meta-tags that were not included in the original survey data. We complement the data with country variables described in Table 6 and Table 7.

We formulate the probability function for a successful (step in the) online shopping procedure as dependent on product and country characteristics:

$$Prob(Sucess_{ti}) = \alpha CoB_i + \beta CoS_i + \gamma Product_i + \delta_1 domestic_i + \delta_2 lang_i + \delta_3 contiguity_i + \delta_4 log(distance)_i + u_i$$

where the subscript t represents different steps in the shopping procedure and the subscript i is an index that tracks each individual attempted transaction. Product variables represent classification according to different characteristics, such as size and category. All variables in the equation are dummies, except for the geographical distance between countries. "Success" takes the value 1 if a particular step in the shopping procedure for successful. We run this equation separately for shipment and payment. We use a Logit regression to estimate this equation.

In a second step of the analysis, we take the estimated coefficients of the country fixed effects, both for CoS and CoB, and regress them on a variety of country characteristics to extract more information out of these coefficients: are there any country-level characteristics that matter for the success of an online shopping operation?

$$\widehat{\alpha_j} = c + Xj + \varepsilon_j$$

to be estimated at the country level j. The dependent variable observations $\widehat{\alpha_j}$ are obtained from the first estimation above. The set of explanatory variables Xj is a set of country characteristics.

4. Results

Table 6**: Summary Statistics of Country Variables, 2009**

Variable	Observations	Mean	Std. Dev.	Min	Max
Country Variables					
Fixed Broadband Penetration	27	22.51	7.62	11.51	37.01
SMS per capita	26	1067.47	808.19	87.76	2764.21
International mobile minutes per capita	25	75.12	84.11	13.41	382.81
Population (in millions)	27	18.47	23.29	0.41	82.41
GDP per capita	27	20940.74	13737.02	3500	63700

Notes: Source are ITU World Telecommunication ICT Indicators 2012 (Broadband Penetration, SMS, Population and International mobile minutes) and Eurostat (GDP). Broadband access is defined as "above downstream speeds equal to, or greater than, 256 kbit/s". Penetration calculated per 100 inhabitants, per capita as per inhabitant. Missing observations for Latvia (SMS, international mobile minutes) and Finland (international mobile minutes).

Table 7: Summary Statistics for Country Pair Variables, 2007

Variable	Observations	Mean	Std. Dev.	Min	Max
Gravity Variables					
Contiguity	729	0.09	0.29	0	1
Common Language	729	0.04	0.19	0	1
Distance	729	1395.61	757.80	8.45	3779.73

Notes: Source is the CEPII database (http://www.cepii.fr/CEPII/en/bdd_modele/bdd.asp). Domestic distance is based on greatest circle method. Distance is measured by calculating bilateral distances between the biggest cities of the two countries and those inter-city distances being weighted by the share of the city in the overall country's population.

Table 8 presents the results of the Logit regressions for the gravity model for the main dependant variable, the probability of successful shipment of the goods. We have also run these regressions with successful payment as the dependent variable in Table 9. Overall, the coefficients in the shipment and payment regressions have the same sign and significance and a similar relative magnitude. The first three columns in Table 6**: Summary Statistics of Country Variables, 2009**

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Table 8 and Table 9 contain the regression for all attempted online transactions (with two variations on the contiguity and distance variables) while the last column runs this regression for cross-border transactions only. The country fixed effects from the full regression (the coefficients on the CoB and CoS dummies) have been put in a separate Table 10.

Nearly 20 per cent of all online transactions in our sample are domestic. We find that there is a strong border effect in the probability of successful shipment and, to a lesser extent, payment. Domestic shipment is almost 56 times more likely to succeed (exp(4.042)= 56) than cross-border shipment. Recall that the cost of shipment does not play a role here. This variable reflects the supplier's willingness to ship the good to the country of the buyer, not the buyer's rejection of the cost of shipment. There are less cross-border constraints on online payments, though domestic payments are still five times as likely to be successful than cross-border (exp(1.622)=5).

Contiguity (a common border) and geographical distance are statistically insignificant. Common language has the expected positive effect, though it is relatively small compared to what Gomez et al. (2014) find in gravity model estimates for e-commerce and other online trade. This may be due to the fact that this is not a sample of spontaneous consumer transactions and that the buyers have above-average language skills.

The probability of success is not affected by copyright-protected goods. The coefficient is not significant. While the territoriality of copyright might play a role in the online sale of digital media (for digital download and streaming), it is not expected to be important in physically delivered media products. For the latter category, copyright is exhausted at the point of sale and they can be sold

anywhere, without territorial restrictions. For digital goods, copyright is not exhausted at the point of sale and territorial restrictions apply. The size and/or weight of the goods clearly have a negative impact on the probability of shipment.

Among product categories, print books are the most likely to ship across borders. They are taken as the reference point in this regression. All other types of goods have lower probabilities of acceptance for shipment. Table 6**: Summary Statistics of Country Variables, 2009**

Variable	Observations	Mean	Std. Dev.	Min	Max
Country Variables					
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Table 8 shows for instance that computer games will change the likelihood to be accepted for shipment by -1.901 compared to books, and TV screens are least likely to be shipped. Since physical characteristics such as size and weight are already controlled for in this equation, other impediments must be at work here. Vertical agreements between wholesalers and online retailers with territoriality clauses that prohibit exports to other EU Member States look like a valid candidate to explain bottlenecks in cross-border trade. Indeed, the products least likely to ship may all be subject to territoriality clauses in contractual agreements between producers, wholesalers and (online) retailers.

For example, in the case of portable computers, versioning by country (language of the software, lay-out of the keyboard) is a well-known commercial strategy to segment markets and avoid price arbitrage between different country markets. While versioning is more difficult for other types of hardware and for software, sales restrictions may still apply. Warranty clauses and repair services offered by the supplier may be too costly across borders. Technical norms and standards, consumer protection and environmental rules that may vary across Member States may also play a role in the supplier's decision to withhold shipment. We conclude from this that vertical restraints that put limits on competition and cross-border sales in offline markets seem to spill over to online markets and create an impediments to cross-border e-commerce.

Table 10 shows the country fixed effects from the buyer and seller perspective. Being a buyer from France or Italy will increase your chances to get the product shipped compared to buyers from e.g. Malta or Cyprus. Buying from shops in Luxembourg and Bulgaria will increase the chances to get the order shipped compared to buying from Cyprus or Malta, which have the smallest probability here too.[4] We try to extract more information on country-specific factors that may affect the success of shipment from the country fixed effects coefficients that were obtained in the previous regressions. We put these coefficients as a dependent variable in a regression and try out several candidate explanatory variables. The results of the eight different specifications can be found in Table 11. The first four specifications run the regression on the country of seller fixed effects, the remaining four regress the same covariates on the buyer fixed effects. It reveals significant correlation with GDP. Higher income per capita also increases the probability of successful e-commerce. We observe that large markets (measured by population) attract web-shops form other countries and therefore increase the probability of shipment. However, somewhat surprisingly and not significantly, the larger the home country the less probable a web-shop will ship to other countries. A significant effect can also be observed for "International mobile minutes". This measures to some degree the openness of a country; this can be due to trade or immigration. How this results in a lower probability of shipment for shops and buyers remains to be investigated. Broadband penetration does not seem to have an effect on the barrier variable, in contrast to findings about the role of infrastructure for e-commerce adoption.

Generally, we observe low explanatory powers for these regressions. The estimations for payment show no significant variables and a very low R-squared, which suggests low explanatory power at the country level for the payment process. We believe the problem in this case starts already with the few observations in the first stage estimations of Equation 1 and, henceforth, measurement problems of the dependent variable of the second stage regression. Obviously, the low number of observations available

[4] The signs are all negative because shops from the base country, Latvia, have the highest probability to ship the online orders.

and the absence of firm level characteristics make it very difficult to come to meaningful conclusions. This might be an area for further data collection and research.

5. Conclusions and limitations

The study constitutes a first analysis of objective supply side barriers to online trade and in particular cross-border trade. We find that 97 per cent of domestic orders lead to a successful shipment but only 48 per cent of all attempts at cross-border shipment succeed. A shared language between buyer and supplier countries increased and size of the goods decreased the chances of success. However, goods that are subject to geographical sales restrictions (vertical agreements) between producers, wholesalers and retailers are the least likely to be available for online cross-border orders. This indicates that restrictions in competition in offline markets are spilling over to online markets and prevent the realization of some of the benefits of online sales technology. Regional integration in digital markets is constrained by (the lack of) integration in traditional bricks & mortar markets.

This leaves EU policy makers with a choice of instruments to address these obstacles. They might invoke Article 20 of the EU Services Directive that prohibits restrictions on cross-border online services unless there are objective reasons to do so. That debate would turn around the validity of these "objective reasons". Competition policy makers might argue that legitimate vertical restraints that limit cross-border sales constitute an objective reason. That shifts the debate to the question whether these vertical restraints retain their full economic justification in an online world where a substantial share of sales and economies of scale may be generated through cross-border transactions. This is an area where more empirical research would be needed.

For more robust and in-depth analysis, further information on the web-shops visited and the regulatory environment by country and sector would be helpful to study firm behaviour on the supply side in more detail. This might contribute to understanding whether these supply-side barriers are caused by regulation or strategic behaviour of companies. The current analysis is based on a 2009 cross-section data set. Repeating the survey would add a time dimension and allow us to observe possible changes. In order to better reflect today's digital markets both goods and services should be included in the study and website sampling could be undertaken to better reflect today's consumer behaviour. Last but not least, the mystery shopping dataset dates back to 2009. In the meantime, e-commerce markets have grown very fast, online sales technology has improved and both consumers and producers have become much more familiar with this technology. Results may well be different if survey data were obtained today, and more conclusions could be drawn from the changes we observe. We therefore conclude with the suggestion that this mystery shopping survey should be repeated.

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APPENDIX 1 – TABLES

Table 1: Successful Online Shopping by Product Category

	Observations		Register	Shipment	Payment	Order (sum)	Order
Product category	No.	%	% Yes	% Yes	% Yes	% Yes	% Yes
Books	740	0.05	93.0	81.6	79.0	73.8	62.3
Clothes, shoes, accessoires	2,829	0.21	79.4	62.7	62.6	48.8	45.2
Computer	1,235	0.09	82.7	44.7	43.2	26.3	32.6
Electrical	2,154	0.16	72.2	39.4	40.5	26.4	28.4
Electronics	2,213	0.16	81.5	51.3	44.4	34.3	36.1
Films/ music	773	0.06	90.0	72.6	72.6	64.5	56.1
Games	1,074	0.08	88.7	68.9	65.9	51.6	51.9
Non electrical household	418	0.03	83.7	55.3	55.3	48.8	42.3
Software	527	0.04	86.9	60.0	56.6	43.4	45.9
Toys	1,092	0.08	83.0	71.6	71.5	58.5	57.0
TV screens	518	0.04	80.7	42.5	47.1	28.7	29.0
Total	13,573	1.00	81.8	57.2	57.5	44.9	42.2

Notes: First two columns give the total number of observations from the survey per product category. Remaining 5 columns report the percentage of yes answers for the barrier variables per product category (100% are all orders in the product category)

Table 2: Country Matrix with number of completed questionnaires for all buyer-shop combinations

	Country of Shop																										
Country of Buyer	AT	BE	BG	CY	CZ	DK	EE	FI	FR	DE	GR	HU	IE	IT	LV	LT	LU	MT	NE	PL	PT	RO	SK	SI	ES	SE	UK	**Total**
Austria	123	0	0	0	0	2	0	0	11	228	0	0	3	3	2	0	1	0	2	2	0	0	0	0	2	1	130	**510**
Belgium	36	65	0	0	1	3	0	1	37	175	4	3	4	7	1	1	1	0	23	1	0	3	2	0	1	0	131	**500**
Bulgaria	52	0	99	0	0	3	0	0	5	165	0	0	0	3	0	0	0	0	2	1	2	0	0	0	0	1	170	**503**
Cyprus	24	9	1	2	0	5	1	1	3	185	65	1	3	3	3	0	4	0	13	2	0	2	1	0	1	1	170	**500**
Czech Republic	22	0	0	0	106	2	1	0	3	139	0	0	2	8	1	1	1	0	4	2	0	2	43	0	1	0	162	**500**
Denmark	18	0	0	0	5	158	0	0	1	155	0	0	2	10	0	0	0	0	4	1	0	1	1	0	0	65	79	**500**
Estonia	13	4	1	0	1	6	76	1	2	174	0	1	5	8	5	0	2	0	5	0	0	1	1	0	1	4	189	**500**
Finland	19	2	0	0	0	3	1	66	4	138	1	2	7	12	3	0	2	0	5	1	0	0	7	0	0	4	223	**500**
France	18	18	0	0	0	4	1	0	121	137	1	0	3	9	2	0	9	0	4	0	2	0	7	0	5	2	157	**500**
Germany	50	5	0	1	1	5	1	0	11	231	0	2	4	11	0	0	1	0	31	1	0	0	0	0	1	0	150	**506**
Greece	23	3	1	0	0	2	1	0	2	170	78	0	4	10	2	0	1	0	7	2	0	0	1	0	2	0	191	**500**
Hungary	16	5	0	0	1	4	1	0	11	146	0	110	3	10	0	0	1	0	7	0	2	1	3	0	4	0	182	**507**
Ireland	38	2	1	0	1	2	0	0	2	204	0	0	50	3	0	1	3	0	7	0	0	0	2	0	3	1	180	**500**
Italy	13	5	0	3	0	5	0	2	11	133	2	2	15	108	1	0	1	0	5	3	4	1	2	0	3	0	181	**500**
Latvia	40	8	0	0	0	2	0	0	23	163	1	0	2	7	72	1	1	0	3	1	0	0	1	1	1	1	178	**506**
Lithuania	30	6	1	0	0	4	3	0	2	191	1	1	5	11	2	42	1	0	6	1	1	0	4	0	7	8	180	**507**
Luxembourg	27	8	0	0	0	2	1	0	34	239	0	1	4	5	3	0	32	0	11	0	1	0	3	0	5	3	130	**509**
Malta	7	3	0	0	1	6	5	1	3	133	1	2	6	9	4	0	1	4	10	1	1	0	1	1	3	1	296	**500**
Netherlands	19	14	0	0	0	4	0	0	21	130	0	0	0	7	0	0	0	0	132	2	0	1	3	0	2	0	165	**500**
Poland	29	0	0	1	0	5	0	1	6	136	1	1	6	5	2	0	2	0	4	115	0	0	1	0	2	1	182	**500**
Portugal	18	4	0	2	0	3	1	1	9	152	0	3	4	10	0	0	0	0	6	1	72	1	0	0	3	3	207	**500**
Romania	19	4	0	0	1	2	0	0	21	173	0	0	9	13	1	0	1	0	6	1	0	89	1	0	2	0	159	**502**
Slovakia	24	1	0	2	63	3	0	0	0	154	0	0	3	11	0	0	2	0	3	2	0	1	89	0	0	2	158	**518**
Slovenia	34	3	2	0	0	2	1	0	1	158	1	2	2	12	0	0	2	0	6	0	0	0	4	73	2	1	194	**500**
Spain	15	3	0	0	1	4	0	0	15	157	1	1	5	2	0	0	1	0	6	1	0	0	7	1	148	3	129	**500**
Sweden	11	1	0	0	3	36	0	1	0	184	2	0	1	9	1	0	1	0	3	1	0	0	1	0	1	129	120	**505**
United Kingdom	14	5	2	1	0	2	1	0	25	177	3	1	1	38	2	0	0	0	4	1	0	0	0	0	1	1	221	**500**
Total	**752**	**178**	**108**	**12**	**185**	**279**	**95**	**75**	**384**	**4527**	**162**	**133**	**153**	**344**	**107**	**46**	**71**	**4**	**319**	**143**	**85**	**103**	**185**	**76**	**201**	**232**	**4614**	**13573**

Table 3: Summary Statistics of Barrier Variables

Variable	Observations	Mean	Std. Dev.	Min	Max
Barrier Variables					
Register	13573	.8176527	.386144	0	1
Shipment	13573	.5718706	.4948259	0	1
Payment	8010	.5747815	.494407	0	1
Order (sum)	8010	.448814	.4974041	0	1
Order	13573	.4223827	.493957	0	1

Notes: Barrier Variables defined from survey as: Register (Were you able to register on the website successfully?=Yes), Shipment (Is shipment to your country possible?=Yes), Payment (Does the shop accept my direct debit/bank details? OR Does the shop accept my debit/credit card?=Yes), Order (Is it possible to conduct the complete ordering process up to the final order confirmation?=Yes), Order(sum) (Register AND Shipment AND Payment=Yes).

Table 4: Correlation Table of Barrier Variables

	Register	Shipment	Payment	Order (sum)	Order
Register	1				
Shipment	0.21	1			
Payment	0.17	0.59	1		
Order (sum)	0.21	0.66	0.63	1	
Order	0.4	0.73	0.78	0.67	1

Notes: Pearson's correlation cofficient. All values significant at the 0.001 level.

Table 5: Country Matrix with percent of successful shipment for all buyer-shop combinations

	Country of Shop																										
Country of Buyer	AT	BE	BG	CY	CZ	DK	EE	FI	FR	DE	GR	HU	IE	IT	LV	LT	LU	MT	NE	PL	PT	RO	SK	SI	ES	SE	UK	**Total**
Austria	1					1			0.5	0.7			0.3	1	1		1		0.5	0.5					1	1	0.4	**0.7**
Belgium	0.5	1			1	1		0	0.8	0.6	0.5	0.7	0.5	0.9	0	0	1		0.7	1		0	1		1		0.4	**0.6**
Bulgaria	0.1		1			0.3			0.6	0.3				1					1	0	0.5					1	0.3	**0.4**
Cyprus	0.3	0.3	0	1		0.8	0	0	0.7	0.4	0.4	0	0.3	0.7	0.7		0.5		0.1	0		0.5	0		0	1	0.4	**0.4**
Czech Republic	0.3				1	0	1		1	0.5			0	0.9	1	0	1		0.5	0		1	0.5		1		0.4	**0.6**
Denmark	0.3				0.4	1			1	0.7			1	0.8					0.8	1		0	0			0.5	0.4	**0.7**
Estonia	0.2	1	1		0	0.7	1	0	0.5	0.5		1	0.4	1	1		0		0.8			0	1		1	0.5	0.4	**0.6**
Finland	0.5	0.5				1	1	1	0.5	0.6	1	1	0.4	0.8	0.7		1		0.4	0			0.9			0.8	0.5	**0.6**
France	0.2	0.5				1	1		1	0.7	0		0.7	0.8	1		1		1		0.5		0.9		0.8	1	0.4	**0.7**
Germany	0.5	0.6		0	1	1	1		0.7	1		1	0	0.9			1		0.3	0					1		0.4	**0.7**
Greece	0.3	0.7	1			1	1		1	0.5	1		0	0.7	1		1		0.7	0.5			1		1		0.4	**0.6**
Hungary	0.4	0.4			1	0.8	1		0.5	0.5		1	0.3	1			1		0.3		0.5	1	0.3		1		0.4	**0.6**
Ireland	0.4	1	0		0	1			0.5	0.6			0.9	1		0	1		0.9				0		1	1	0.5	**0.6**
Italy	0.5	0.8		0		0.8		1	0.6	0.6	0.5	0.5	0.5	1	1		1		0.6	0.3	1	0	0.5		1		0.4	**0.6**
Latvia	0.3	0.1				1			0.4	0.4	0		1	1	1	1	0		0.3	1			0	0	1	1	0.3	**0.5**
Lithuania	0.1	0.3	0			0.5	1		1	0.5	1	1	0.4	0.8	1	1	0		1	1	1		0.5		0.6	0.4	0.3	**0.5**
Luxembourg	0.3	0.3				1	0		0.7	0.6		1	0.8	0.8	0.7		1		0.3		1		0		1	1	0.4	**0.6**
Malta	0.3	0			1	0.2	0.8	0	0.3	0.3	1	0	0.5	0.9	0		0	0.8	0.5	0	0		0	1	1	1	0.4	**0.4**
Netherlands	0.5	0.4				1			0.7	0.6				0.7					1	0		0	0.7		1		0.4	**0.6**
Poland	0.2			0		0.6		1	0.8	0.5	0	1	0.2	1	1		1		0.5	1			1		1	1	0.4	**0.6**
Portugal	0.2	0.5		0		0.7	0	0	0.6	0.6		0	0.3	0.8					0.7	1	1	1			1	0.7	0.4	**0.6**
Romania	0.3	0.8			0	0			0.5	0.4			0	0.8	1		0		0.2	0		1	0		0		0.3	**0.5**
Slovakia	0.3	0		0	0.6	0.7				0.5			0.3	0.8			1		0.3	0		1	1			0	0.4	**0.5**
Slovenia	0.3	0.7	0.5			0.5	1		1	0.5	0	0.5	0.5	0.8			1		0.2				0.8	1	0.5	1	0.4	**0.5**
Spain	0.4	0.3			1	1			0.7	0.7	0	1	0.6	1			1		0.7	1			0.6	1	0.8	1	0.5	**0.6**
Sweden	0.5	1			0.3	0.5		0		0.5	0.5		0	0.8	1		1		1	0			0		1	1	0.5	**0.6**
United Kingdom	0.1	0.2	1	0		0.5	1		0.6	0.6	0.3	0	0	0.4	1				1	1					1	1	1	**0.7**
Total	**0.4**	**0.6**	**1.0**	**0.2**	**0.8**	**0.8**	**0.9**	**0.9**	**0.8**	**0.6**	**0.7**	**0.9**	**0.6**	**0.8**	**0.9**	**0.9**	**0.9**	**0.8**	**0.7**	**0.9**	**0.9**	**0.9**	**0.7**	**1.0**	**0.8**	**0.8**	**0.4**	**0.6**

Table 6: Summary Statistics of Country Variables, 2009

Variable	Observations	Mean	Std. Dev.	Min	Max
Country Variables					
Fixed Broadband Penetration	27	22.51	7.62	11.51	37.01
SMS per capita	26	1067.47	808.19	87.76	2764.21
International mobile minutes per capita	25	75.12	84.11	13.41	382.81
Population (in millions)	27	18.47	23.29	0.41	82.41
GDP per capita	27	20940.74	13737.02	3500	63700

Notes: Source are ITU World Telecommunication ICT Indicators 2012 (Broadband Penetration, SMS, Population and International mobile minutes) and Eurostat (GDP). Broadband access is defined as "above downstream speeds equal to, or greater than, 256 kbit/s". Penetration calculated per 100 inhabitants, per capita as per inhabitant. Missing observations for Latvia (SMS, international mobile minutes) and Finland (international mobile minutes).

Table 7: Summary Statistics for Country Pair Variables, 2007

Variable	Observations	Mean	Std. Dev.	Min	Max
Gravity Variables					
Contiguity	729	0.09	0.29	0	1
Common Language	729	0.04	0.19	0	1
Distance	729	1395.61	757.80	8.45	3779.73

Notes: Source is the CEPII database (http://www.cepii.fr/CEPII/en/bdd_modele/bdd.asp). Domestic distance is based on greatest circle method. Distance is measured by calculating bilateral distances between the biggest cities of the two countries and those inter-city distances being weighted by the share of the city in the overall country's population.

Table 8: Logit regression results for probability of successful shipment

		DEPPENDENT VARIABLE *Probability(Shipment)=1*							
COVARIATES		Full		Without contiguity		Without distance		Only crossborder	
Domestic		4.042***	(0.204)	4.007***	(0.190)	3.852***	(0.146)		
Contiguity		0.0445	(0.0965)			-0.0148	(0.0855)	0.0531	(0.0989)
Common Language		0.548***	(0.105)	0.571***	(0.0925)	0.543***	(0.105)	0.600***	(0.108)
Distance		0.111	(0.0830)	0.0929	(0.0737)			0.122	(0.0875)
Copyright Protection		-0.0840	(0.208)	-0.0836	(0.208)	-0.0817	(0.208)	-0.0213	(0.209)
Size	Medium (Parcel Delivery)	-0.419***	(0.0653)	-0.419***	(0.0653)	-0.418***	(0.0653)	-0.396***	(0.0662)
(Base Small)	Large (Bulky Package)	-0.365***	(0.0887)	-0.365***	(0.0887)	-0.364***	(0.0887)	-0.342***	(0.0906)
Product Category	Music/Film	-0.612***	(0.152)	-0.613***	(0.152)	-0.612***	(0.152)	-0.647***	(0.153)
(Base Books)	Games	-0.912***	(0.146)	-0.912***	(0.146)	-0.909***	(0.146)	-0.840***	(0.148)
	Software	-1.533***	(0.165)	-1.534***	(0.165)	-1.532***	(0.165)	-1.497***	(0.168)
	Electronics	-1.816***	(0.176)	-1.816***	(0.176)	-1.815***	(0.176)	-1.777***	(0.178)
	Electrical	-1.889***	(0.188)	-1.889***	(0.188)	-1.887***	(0.188)	-1.892***	(0.190)
	Computer	-1.901***	(0.194)	-1.901***	(0.194)	-1.898***	(0.194)	-1.869***	(0.196)
	TV screens	-1.911***	(0.217)	-1.911***	(0.217)	-1.908***	(0.217)	-1.870***	(0.220)
	Toys	-0.293	(0.191)	-0.293	(0.191)	-0.291	(0.191)	-0.257	(0.192)
	Clothing & shoes & accesoires	-0.864***	(0.174)	-0.863***	(0.174)	-0.861***	(0.174)	-0.850***	(0.176)
	Non-electrical household items	-1.021***	(0.208)	-1.021***	(0.208)	-1.018***	(0.208)	-1.024***	(0.210)
CoB Fixed Effects		Incl		Incl		Incl		Incl	
CoS Fixed Effects		Incl		Incl		Incl		Incl	
Constant		2.248***	(0.731)	2.377***	(0.675)	3.018***	(0.449)	2.044***	(0.765)
Observations		13,573		13,573		13,573		10,954	

Notes: Standard errors in parentheses, Significance Level at *** p<0.01, ** p<0.05, * p<0.1. Estimated with a maximum-likelihood logit model. Logit Regression coefficients shown.

Table 9: Logit Regression Results for the probability of successful payment

		DEPPENDENT VARIABLE *Probability(Payment)=1*							
COVARIATES		Full		Without contiguity		Without distance		Only crossborder	
Domestic		1.622***	(0.184)	1.710***	(0.167)	1.338***	(0.103)		
Contiguity		-0.136	(0.121)			-0.229**	(0.110)	-0.152	(0.129)
Common Language		0.551***	(0.132)	0.473***	(0.112)	0.555***	(0.132)	0.517***	(0.143)
Distance		0.184*	(0.0988)	0.229**	(0.0900)			0.181	(0.118)
Copyright Protection		0.0446	(0.225)	0.0419	(0.225)	0.0462	(0.225)	0.0892	(0.233)
Size	Medium (Parcel Delivery)	-0.189**	(0.0794)	-0.189**	(0.0794)	-0.188**	(0.0794)	-0.245***	(0.0850)
(Base Small)	Large (Bulky Package)	-0.231**	(0.110)	-0.232**	(0.110)	-0.229**	(0.110)	-0.260**	(0.120)
Product Category	Music/Film	-0.418**	(0.169)	-0.415**	(0.169)	-0.419**	(0.169)	-0.335*	(0.178)
(Base Books)	Games	-0.823***	(0.164)	-0.820***	(0.164)	-0.821***	(0.164)	-0.702***	(0.173)
	Software	-1.307***	(0.189)	-1.303***	(0.189)	-1.305***	(0.189)	-1.377***	(0.203)
	Electronics	-1.709***	(0.192)	-1.709***	(0.192)	-1.709***	(0.192)	-1.671***	(0.201)
	Electrical	-1.597***	(0.209)	-1.597***	(0.209)	-1.598***	(0.209)	-1.547***	(0.219)
	Computer	-1.559***	(0.213)	-1.559***	(0.213)	-1.555***	(0.213)	-1.530***	(0.224)
	TV screens	-1.364***	(0.244)	-1.365***	(0.244)	-1.363***	(0.244)	-1.360***	(0.260)
	Toys	-0.249	(0.213)	-0.251	(0.213)	-0.247	(0.213)	-0.0712	(0.221)
	Clothing & shoes & accesoires	-0.752***	(0.188)	-0.755***	(0.188)	-0.748***	(0.188)	-0.585***	(0.195)
	Non-electrical household items	-0.746***	(0.239)	-0.747***	(0.239)	-0.744***	(0.239)	-0.640***	(0.248)
CoB Fixed Effects		Incl		Incl		Incl		Incl	
CoS Fixed Effects		Incl		Incl		Incl		Incl	
Constant		-0.513	(0.752)	-0.816	(0.701)	0.638	(0.428)	1.461	(1.318)
Observations		8,009		8,009		8,009		6,622	

Notes: Standard errors in parentheses, Significance Level at *** p<0.01, ** p<0.05, * p<0.1. Estimated with a maximum-likelihood logit model. Logit Regression Coefficients shown.

Table 10: Buyer and Seller Country Fixed Effects in the Logit Regressions

		DEPPENDENT VARIABLE *Probability=1*			
COVARIATES		Shipment		Payment	
Buyer Country (CoB)	France	1.018***	(0.161)	-1.084***	(0.194)
(Base Latvia)	Italy	0.951***	(0.153)	-0.109	(0.189)
	Denmark	0.940***	(0.172)	-0.438**	(0.214)
	Austria	0.934***	(0.163)	-0.799***	(0.208)
	Finland	0.886***	(0.150)	-1.113***	(0.188)
	Netherlands	0.801***	(0.175)	-0.782***	(0.217)
	Germany	0.756***	(0.174)	-1.176***	(0.200)
	Ireland	0.731***	(0.154)	-0.811***	(0.202)
	Sweden	0.689***	(0.156)	-1.132***	(0.210)
	Portugal	0.656***	(0.150)	-0.474**	(0.203)
	Belgium	0.620***	(0.170)	-2.047***	(0.219)
	Spain	0.619***	(0.155)	0.120	(0.215)
	United Kingdom	0.609***	(0.167)	-0.369*	(0.206)
	Greece	0.566***	(0.152)	-0.912***	(0.192)
	Estonia	0.513***	(0.150)	-0.969***	(0.189)
	Slovenia	0.498***	(0.154)	-1.574***	(0.198)
	Czech Republic	0.466***	(0.163)	-1.402***	(0.215)
	Luxembourg	0.453***	(0.168)	-0.670***	(0.222)
	Hungary	0.449***	(0.153)	-0.850***	(0.196)
	Poland	0.398**	(0.158)	-0.922***	(0.206)
	Slovakia	0.355**	(0.157)	-0.716***	(0.201)
	Lithuania	0.350**	(0.148)	-0.911***	(0.188)
	Bulgaria	-0.279*	(0.158)	-1.767***	(0.221)
	Romania	-0.0113	(0.153)	-1.591***	(0.188)
	Malta	-0.0799	(0.162)	-0.737***	(0.204)
	Cyprus	-0.143	(0.160)	-0.472**	(0.215)
Seller Country (CoS)	Luxembourg	-0.696	(0.573)	2.515***	(0.561)
(Base Latvia)	Bulgaria	-0.705	(0.695)	-1.273	(0.874)
	Slovenia	-0.736	(0.947)	3.381***	(0.632)
	Italy	-1.233***	(0.437)	1.897***	(0.454)
	Portugal	-1.356**	(0.655)	0.875	(0.551)
	Estonia	-1.392**	(0.619)	-0.0426	(0.652)
	Czech Republic	-1.539***	(0.476)	1.276**	(0.559)
	Slovakia	-1.678***	(0.454)	0.940*	(0.516)
	France	-1.684***	(0.428)	1.316***	(0.444)
	Romania	-1.718***	(0.584)	0.249	(0.543)
	Denmark	-1.764***	(0.449)	1.204***	(0.446)
	Hungary	-1.829***	(0.544)	1.975***	(0.660)
	Greece	-1.942***	(0.473)	1.796***	(0.482)
	Lithuania	-1.980**	(0.795)	2.827***	(0.908)
	Germany	-1.992***	(0.406)	1.362***	(0.423)
	Poland	-2.055***	(0.525)	2.131***	(0.529)
	Sweden	-2.079***	(0.458)	1.142**	(0.464)
	Netherlands	-2.143***	(0.431)	1.474***	(0.453)
	Belgium	-2.165***	(0.451)	0.531	(0.457)
	Ireland	-2.452***	(0.455)	1.068**	(0.468)
	Finland	-2.477***	(0.691)	0.181	(0.505)
	United Kingdom	-2.535***	(0.407)	1.253***	(0.426)
	Austria	-2.779***	(0.415)	0.822*	(0.440)
	Spain	-3.296***	(0.469)	1.207**	(0.504)
	Malta	-3.592***	(1.280)		
	Cyprus	-4.580***	(0.948)	1.100	(0.904)

Notes: Standard errors in parentheses, Significance Level at *** p<0.01, ** p<0.05, * p<0.1. Estimated with a maximum-likelihood logit model. Logit Coefficients of full regression shown.

Table 11: Linear Regression Results for Second Step Country Analysis, Shipment

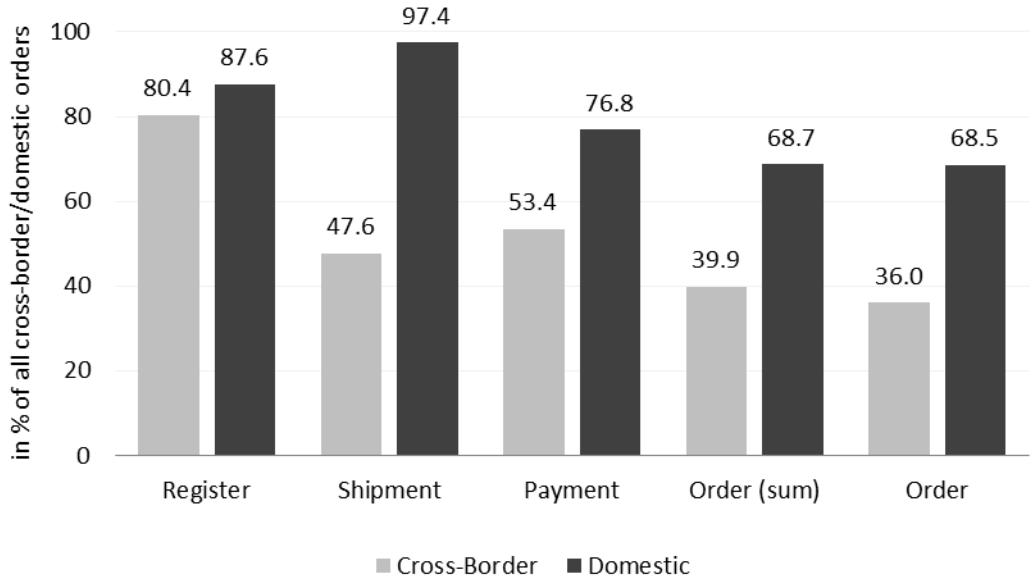
DEP VARIABLE	Fixed effect of Country of Seller (shop) probability(shipment)				Fixed effect of Country of Buyer (consumer) probability(shipment)			
COVARIATES	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Fixed Broadband penetration	-0.0332		-0.00650		0.00159		0.00778	
	(0.0204)		(0.0205)		(0.00694)		(0.00639)	
SMS per capita	-2.52e-05	-8.72e-05			5.32e-05	2.92e-05		
	(0.000125)	(0.000137)			(4.24e-05)	(4.39e-05)		
International mobile minutes p.c.	-0.00452***			-0.00348**	-0.000871			-0.000817*
	(0.00152)			(0.00136)	(0.000518)			(0.000450)
GDP p.c.	2.70e-05**	1.80e-06	2.98e-06	1.03e-05	8.04e-06*	7.18e-06**	4.48e-06	9.51e-06***
	(1.27e-05)	(8.06e-06)	(1.15e-05)	(7.91e-06)	(4.33e-06)	(2.58e-06)	(3.57e-06)	(2.62e-06)
Population (in Millions)	-0.00425	-0.000489	0.000222	-0.00444	0.00232	0.00304**	0.00256*	0.00216
	(0.00431)	(0.00453)	(0.00460)	(0.00437)	(0.00147)	(0.00145)	(0.00143)	(0.00145)
Constant	-0.560	-1.127***	-1.112***	-1.051***	0.0638	0.0726	-0.00510	0.125*
	(0.354)	(0.235)	(0.339)	(0.195)	(0.120)	(0.0753)	(0.105)	(0.0647)
Observations	25	26	26	25	25	26	26	25
R-squared	0.335	0.018	0.005	0.238	0.530	0.408	0.434	0.488

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

APPENDIX 2 – FIGURE

Figure 1: Successful Online Shopping by domestic or cross-border order



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Abstract
Between 2009 and 2012 the percentage of online consumers who made purchases in another EU Member States increased from 8 to 11 per cent, still far below the target of 20 per cent put forward in the EU Digital Agenda. Both, subjective issues on the consumer side and objective barriers on the supply side can play a role. This study uses a mystery shopping survey to measure the relative importance of supply side barriers. While 97 per cent of domestic orders lead to a successful shipment, we find that suppliers accepted to ship only 48 per cent of all cross-border online orders. However, these high failure rates may overstate the ordinary consumer experience because of the artificiality of the mystery shopping trade patterns. We therefore focus on the factors that drive success and failure. A shared language between buyer and supplier countries increased and size of the goods decreased the chances of success. Goods that are subject to geographical sales restrictions (vertical agreements) between producers, wholesalers and retailers are the least likely to be available for online cross-border orders. This indicates that restrictions in competition in offline markets are spilling over to online markets and prevent the realization of some of the benefits of online sales technology. We conclude that regional integration in digital markets is constrained by the lack of integration in traditional bricks & mortar markets.

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