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The Macro-economic Impact of Cross-border eCommerce in the EU

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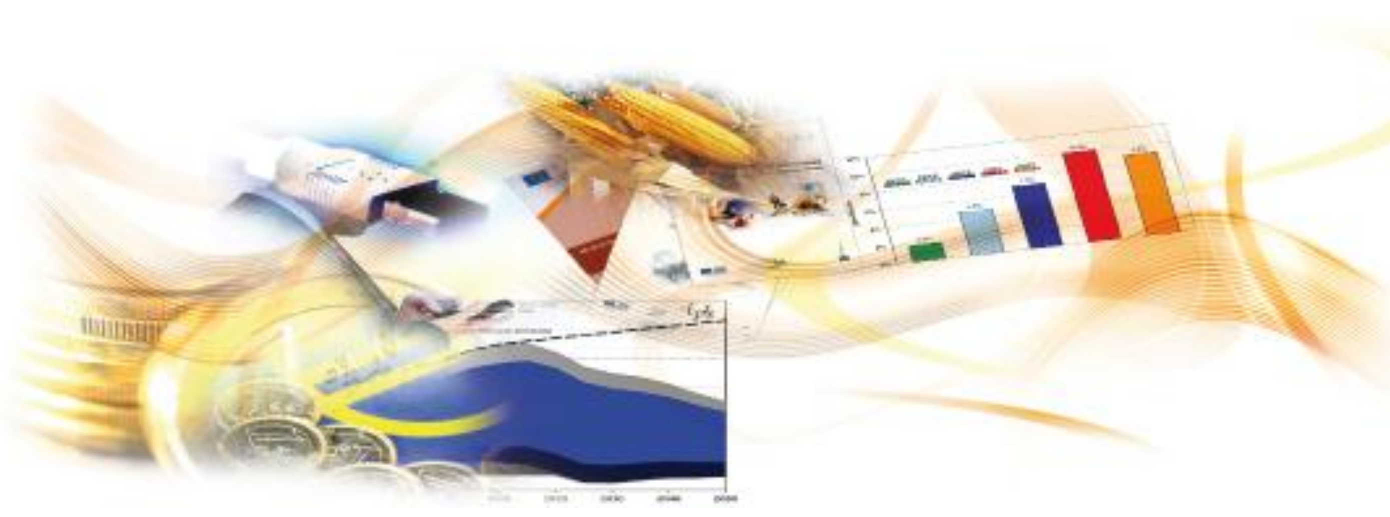

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Abstract

This paper examines the impact of one transmission channel for the economic effects of a shift from offline to online consumption: cross-border trade costs. We use data on cross-border e-commerce between EU Member States to estimate the implied cross-border trade cost reduction when consumers move from offline to online consumption. We plug this trade cost estimate into a macro-sector multi-country CGE model to estimate the impact of online retailing on consumers as well as producers. We find that cross-border e-commerce increases real household consumption. However, the domestic spill-over effect squeezes price margins in the retail sector and has a negative output effect for that sector. The resulting retail sector efficiency gains have a positive effect on production in other sectors. The combined macro-economic effect of these transmission channels is generally positive for EU Member States, ranging between 0.07 and 0.25 per cent of GDP. As such, this paper adds an innovative macro-perspective to existing micro-economic estimates of the impact of e-commerce on consumer welfare. The paper does not consider several other transmission channels such as price and variety effects.

1. Introduction

Consumer access to goods, both domestic and foreign, involves the wholesale, retail, transport and warehousing activities (margin or distribution services) that move those goods from the factory gate to the hands of consumers. The cost of these services can contribute substantially to total prices paid by consumers. This is a point emphasized by the macroeconomic literature on exchange rate pass-through, transmission of global price shocks (for example with food prices), and the extent to which trade liberalization actually reaches consumer prices. In this paper, we examine the impact that e-commerce has on consumer prices and patterns of demand. We focus on the European single market, combining econometric evidence of changes in trade costs with a computational model of trade, production and consumer demand in individual EU Member States.

The introduction of digital technology and the internet as a communication tools between digital machines has resulted in a dramatic drop in information & communication costs. Digital information can be moved around at the speed of light at close to zero marginal transport costs. This has led to the rise of e-commerce, a new retail technology. Retailers have moved the information part of their operations online. Warehousing and transport of physical goods can of course not be digitized. As a result consumers and producers can capture information from a much larger range of geographical locations at much lower information costs: any webpage is just a click away. This leads to more price competition, lower prices and more variety of supply (Dixit and Stiglitz, 1977).[1]

Empirical research on the micro-economic effects of e-commerce has focused on two effects: lower online prices and a wider variety of products. Both effects boost consumer welfare. Typically, the welfare effects of these price and variety effects induced by ICT have been estimated in partial equilibrium models that look at the consumer side only. They do not examine the impact on the supply side, meaning the producers and retailers on the other side of electronic commerce. Yet there is considerable concern about the impact of e-commerce on traditional retailers operating from bricks & mortar stores. The squeeze from e-commerce has been felt strongly in the book sector as the closure of the Borders bookstores in the US illustrates. However, many other traditional retailers feel the heat from competition from online stores. This has not been reflected in partial equilibrium model studies. In this study we do not take into account the traditional micro-economic effects of lower online prices and wider variety of products; we only focus on the reduction in cross-border trade costs. As such, the findings of this paper could be considered as a lower bound on the economic impact of e-commerce.

The objective of this study is to integrate the impact of the shift from offline to online stores on the supply and the demand side into a single model and estimate the net overall impact. We take into

[1] See for example Brynjolfsson, Hu & Smith (2003). This development also led to the rather inflated prediction of the "death of distance" (Cairncross, 1997).

account two transmission channels through which the shift from offline to online trade affects the economy: cross-border trade and domestic competition. We look at income, growth, redistribution and trade effects. In this sense, the present paper can be viewed as exploratory. In aiming to answer some questions, our results raise other questions and raise a clear case, in our view, for further research.

In this paper, we introduce two mechanisms driving exogenous price effects resulting from new online retail technologies. First, online trade reduces the cost for consumers to gather information on the available supply of products. Traditional offline consumers rarely venture beyond the border and usually shop on their domestic market, even in their immediate vicinity. Since any online shop is "just a click away", online retailing technology enables consumers to extend their geographical range of information gathering and buying, going far beyond the borders of their home market. We estimate the impact of a shift from offline to online trade on distance-related trade costs, using consumer survey data on domestic and cross-border e-commerce in the EU. We translate the drop in trade costs into a price reduction that makes imported products more attractive for consumers. The reduction in the relative price of online imports, in turn, puts price pressure on domestic markets and leads to a price reduction there as well. This first mechanism emphasizes cross-border competition. However, the new online technologies also impact domestic distribution networks, and so we also model a second, more comprehensive mechanism as a productivity shock to the distribution services used for both domestic and cross-border supply of goods to consumers. It is this second mechanism that also provides a link to restructuring in the distribution sector.While we are interested in the impact of e-commerce on consumer access to goods, the question is closely related to that emphasized in the exchange rate pass-through literature, which includes consumer prices (Frankel et al, 2005; Campa and Goldberg, 2006; Hellerstein, 2006; Ihrig et al, 2006; Mishkin, 2008). This literature points to a range of explanations. For consumer prices, the pass-through literature highlights costs added in the distribution sector. For example, Burstein et al (2003) show that the share of the distribution costs for the average consumer good is between 40 and 60 percent. Focusing on distribution sector itself, Francois and Wooton (2010) estimate that pricing behavior of European distributors may effectively add 4 percent to the cost of trade between EU Member States. Viewed in this context, we should not be surprised that a combination of increased efficiency and competition should squeeze cross-border margins.

We find that cross-border e-commerce reduces trade costs and thereby increases real household consumption. Once we map these cost savings onto the distribution sector, we find that domestic spill-over effects squeeze price margins in the retail sector and have a negative output effect for that sector. However, the resulting retail sector efficiency gains have a positive effect on production in other sectors. Basically, producers find it easier to reach consumers. The combined effect of these transmission channels is generally positive for EU Member States.

The paper is organized as follows. In Section 2 we present econometric evidence of reductions in trade costs linked to the shift from offline to online cross-border trade in goods. In Section 3, we introduce these reduced trade costs in a computational model, modifying it to include bundling of margin services with consumer goods. In Section 4 we use the model to estimate both the impact of e-commerce on intra-EU trade cost savings, and also the impact of broader retail sector margin cost savings. We discuss the main results and draw conclusions in Section 5.

2. Online trade in goods in the EU[2]

Contrary to offline trade, there are no official statistics on online trade in goods in the EU, whether for domestic trade or cross-border trade. Some industry associations (The European e-Commerce Association for example) compile estimates of national online sales in some EU markets but there is no split between domestic and cross-border online transactions and no bilateral trade flows. In the absence of official statistics, we use data from an online consumer survey in the 27 EU Member States (Civic Consulting, 2011). The survey contains information on consumer online expenditure on goods only, at home as well as abroad. Based on this survey, we estimate the total value of online business-to-consumer (B2C) trade in goods in the EU at 241 billion € in 2011. Out of that total, 197 billion € (80%) is traded domestically. Only about 44 billion € (18%) crosses borders between EU Member States, and another 6 billion € (2%) is imported from non-EU countries.

We use these data to construct a 27 x 27 bilateral online trade matrix. We also construct a mirror offline trade matrix with the same basket of goods, so that we can compare online and offline trade patterns. For more details on the construction of this trade matrix, see Gomez et.al. (2014). Comparing the value of estimated online cross border trade (44 billion €) and observed offline intra-EU trade in the corresponding products categories (491 billion € according to the Comext database), we conclude that online trade represents about 8.7% of all cross-border trade in the EU. This indicates that online orders for the relevant categories of goods constitute a significant part of physical cross-border trade in goods.

The question arises to what extent the offline and online trade figures are actually comparable. On the one hand, offline and online trade involve the sale of identical consumer products: books, electronics, clothing, etc. These are final products and the trade volume is determined by consumer demand for these goods. However, the organization of both supply chains is very different. Offline trade is mostly conducted business-to-business (B2B). Wholesalers export and import and use retailers as intermediaries before a good reaches the final consumer. By contrast, online trade is mostly B2C, with online wholesalers selling directly to final consumers. Differences in supply chains may, in turn, result in

[2] This section is based on Gomez et al (2014).

differences in the structure of the trade costs that underpin the two sets of trade flows. Wholesalers often have established relations with their foreign customers, with a fixed cost that can be amortized over many transactions. Transaction size is likely to be larger, again inducing economies of scale. Offline B2B cross-border trade figures would have to be augmented with retail gross price margins to produce a trade value figure that is comparable to direct B2C estimates. The above estimate of online B2C representing 8.7% of total cross-border trade should therefore be interpreted with caution.

We estimate a gravity model with the data from the bilateral online and offline trade matrices. The gravity model includes the following explanatory variables:

(1) $$\ln T_{ij} = \beta_0 + \beta_1 \ln D_{ij} + \eta_i + \eta_j + \varepsilon_{ij}$$

Where T_{ij} is the volume of cross-border trade from the seller in origin country *i* to the buyer in destination country *j*, D_{ij} is the geographical distance between *i* and *j*, and η_i and η_j are country fixed effects for the exporter and importer countries. The measurement of distance can be extended to include other proximity variables such as a shared language and a shared border. This could be considered as a proxy for "cultural distance" (Blum and Goldfarb, 2006). In a B2C trading environment a shared language is essential. It is likely to be more important for cross-border trade in books for instance, than for electronic goods that are more or less standardized across the world. We can also introduce a dummy variable that measures home bias or the role of administrative borders in explaining trade flows. Finally, we measure the role of critical infrastructure items for online trade, such as online payment systems – proxied by the use of PayPal - and the efficiency of parcel delivery services – proxied by the relative cost of domestic to cross-border deliveries.

The results of the gravity model estimations can be found in Table 1. What matters in these regressions for the purpose of our argument here is to compare the value of the coefficient for the distance variable between online and offline trade in the same products. As can be observed in columns 2 and 3 in Table 1, the distance coefficient for offline trade is about twice as high as for online trade (-0.740 and -1.349). A similar cut in the distance coefficient was observed by Hortaçsu et al. (2009) and Lendle et al (2012) in their analysis of cross-border trade on eBay. We conclude that online trade costs are substantially lower than offline trade costs. How much lower? In order to translate the trade cost reduction in a tariff equivalent, we multiply the percentage difference in the predicted volume of cross-border trade with the price elasticity of imports in order to arrive at the implicit price or tariff difference which is attributed to changes in trade costs.

Note that the coefficient for the common language dummy variable nearly halves in the gravity model when we move from online to offline trade (from 1.315 to 0.657). This means that online consumers have a strong preference for carrying out online transactions with supplier countries that share a language with the buyer and that this preference is nearly twice as strong in online trade compared to offline trade. Language-related trade costs clearly increase when moving to online trade. However, we do not take this into account in our trade cost reduction since our data concern ex-post realized transactions where the buyer has already overcome the language barrier. The gravity model estimates to what extent language barriers influence cross-border trade but the observed trade pattern is an ex-post realized set of cross-border transactions. In some cases, online stores may re-route consumers to a store in their language. For instance, Amazon.de attracts German-speaking consumers in Austria and Switzerland. E-Bay has set up a network of local language online stores in many EU countries that supply a mixture of local and international goods.

3. The macro-economic model

We next turn to modeling the impact of cost savings in the distribution sector linked to e-commerce. As noted in the introduction, we take two approaches. The first assumes trade cost reductions for intra-EU trade, as discussed in the previous section, for consumer goods. The second approach involves treating our econometric estimates as cost savings as applying to domestic trade as well, and as being indicative of productivity gains in the distribution sector. This means that in the second approach, cross-border cost reductions are subsumed in a more general reduction in distribution costs. This second approach requires working with a model where consumer demand passes through the distribution sector.

In this section we provide an overview of how we model consumer distribution, followed by the basic data structure of the model. Results are discussed in the next section.

We start with a standard modeling framework, a version of the GTAP model (Hertel 2013) based on Francois, van Meijl, and van Tongeren (2005) that includes monopolistic competition. This model integrates the GTAP database, version 9 (benchmarked to 2011). Sectors are linked through intermediate input coefficients (based on national social accounts data) as well as competition in primary factor markets. The model includes imperfect competition, as well as the standard static, perfect competition, Armington-type of model as a subset. Econometrically based substitution elasticities for goods originate from ECORYS (2009) while elasticities for the services sectors were obtained from Francois and Hoekman (2010). (See OECD, 2011, and Francois, van Meijl and van Tongeren, 2005 for more information on model structure.)

CGE models are generally built around social accounting data that are "margined" meaning that margin activities are separated from demand for goods (Reinert and Roland-Holst 1997) and modeled as a distinct set of activities. This includes the GTAP class of models. For our purposed here, we modify the basic GTAP framework by integrating purchased goods and associated service activities in the final stage of consumption. This provides an immediate channel, through changes in the pricing of margin services, for cost-savings from e-commerce technologies to translate into reduced goods prices for consumers. In our first specification, we include trade costs in the model as Samuelson-type deadweight costs, using these iceberg costs to model intra-EU trade cost reductions, based on our estimates as discussed in the previous section. In the second specification, we instead model efficiency gains in the trade and distribution sector, where these services are integrated with final goods supply.

The model is structured around the GTAP 9 database with base year 2011. The GTAP database provides internally consistent data on production, consumption and international trade by country and sector. Agricultural and food processing sectors are classified according to the Central Product Classification (CPC). The other sectors are defined by reference to the International Standard Industry Classification (ISIC revision 3 as defined by United Nations Statistic Division, which corresponds to NACEr1). Table 2 provides a summary of sectors and regions in the CGE model. In the annex, we provide a concordance from models sectors to NACE sectors.

As noted above, margin services account for a substantial share of final consumer costs for goods. In Table 3 we summarize the difference this makes, on average, for EU Member States. In the first column, we present "margined" household demand. Goods represent 39.2 percent of final household expenses, while services account for 60.8 percent. Critically, trade services linked to goods consumption are counted as part of services demand in the standard GTAP model. In the second column of Table 3, we report consumer expenditure shares, where goods demand includes estimated trade sector margins. On this basis, goods purchases inclusive of margin services are roughly 56.5 percent of household purchases, and services (excluding trade and distribution) are 43.5 percent.

4. Simulation scenarios and results.

The simulation scenario consists of two components. First, we introduce a trade cost shock in the baseline scenario. Section 2 presented an empirical estimate of the cross-border trade cost reduction triggered by a switch in consumer behaviour towards a new retail technology, online e-commerce. We build this trade cost reduction into the CGE model and apply it to goods imported through the e-commerce retail channel. The model has a single distribution sector for all goods and for offline and online sales. The reduction in trade costs, or in the cost of imported products, puts pressure on the margins of the distribution sector. Table 4 summarizes these calculations. The relevant categories of goods in online e-commerce and the share of total consumption imported through online channels is calculated on the basis an EU online consumer survey (first column in Table 4). The second column shows the share of online imports in total imports. Column three calculates the trade costs savings by category, starting from the change in the distance coefficient between the online and the offline gravity equation (a quantity shock) and multiplying this with the price elasticities of imports for each product category in order to obtain a price shock. Column four calculates costs savings for total consumption and column five for imported consumption only. These savings are then applied to the sector break-down of household consumption in the CGE model.

Second, we treat the trade cost estimates as indicative of a more general reduction in distribution costs, and so map this to the distribution sector supplying both imported and domestic goods. Here we assume that the domestic retail sector faces a technology shock that reduces the cost of moving goods from producer to consumer, and that this shock results in a corresponding reduction in domestic retail price margins (mark-ups reflecting distribution costs). As our data preclude modelling online and offline sales to consumers, we are essentially working with a reduced form, with reductions in average distribution costs. In other words, there is a full pass-through of the estimated average distribution/trade costs to domestic markets. This follows from a modelled efficiency gain in the retail sector.

In a sense, the cross-border trade cost shock is only part of the estimates total effect under the second specification. It does however provide a useful decomposition of the trade-related component of our total estimated effects. The trade cost shock increases consumer welfare and real consumption through price, income and substitution effects in the CGE model. That, in turn, boosts GDP unless domestic supply is insufficiently responsive and the relative price effect for domestic and imported goods is such that it results in additional demand being siphoned off to imports. The full retail technology shock reduces margins and output in the retail sector (less resources are needed to achieve the same delivery of goods to consumers) but causes an efficiency gain for the economy as a whole. The squeeze in retail pricing margins is beneficial for other sectors that sell their output through the retail sector. As a result, value-added and output increases in many other sectors. The combined net effect of the output reduction in the retail sector and output increase in other sectors is an empirical issue that merits more research, and datasets beyond those we have available here.

Note that the simulation results are based on a comparative static analysis, and hence do not consider the dynamic costs of transition between the offline and online "states of the world". Resources (labour and capital) have to migrate from the retail sector to alternative uses. This migration could take some time and in the meantime imply some efficiency loss. One could argue however that such cost of transition could be relatively small for the retail sector.

Tables 5-9 (in Annex) present the simulation results, separately for the trade cost effect only and for the overall retail efficiency effect (including the trade cost effect).

Table 5 presents the impact of both shocks on household consumption. The trade cost effect is generally positive, in the range of 0.1-1.0%, except for Slovakia where there is a marginally negative effect. The retail efficiency effect is considerably stronger however in many countries since it does not only benefit consumers but spreads throughout the economy to all sectors. For the EU27 e-commerce boosts household consumption by 1.07 percent, of which 0.27 percent comes from the trade cost effect and the remainder from efficiency gains in distribution.

Table 6 shows the impact of both shocks on the retail sector. The trade cost reduction triggered by a shift to e-commerce generally has a positive effect in most countries. This is mainly driven by the increase in real incomes and household consumption that increases demand for retail services. However, the retail margin squeeze and efficiency shock is, as expected, strongly negative across the board and dominates the picture. For the EU27, retail sector output shrinks by 2.57 percent, of which 0.21 percent is due to the trade cost shock only. The impact of the trade cost shock is uneven across countries, with some experiencing a small positive and other a negative effect.

Tables 7 summarises the overall impact of e-commerce on GDP and compares impacts across countries. Countries are ranked from highest to lowest impact on GDP. For the EU27, e-commerce boosts GDP by 0.14 percent. However, on average larger economies benefit more from this trade opening. Conversely, the negative impact on distribution services output falls relatively more heavily on smaller economies.

Table 8 presents the overall impact of e-commerce on the most important sectors. The table focuses on the most frequently traded products in cross-border e-commerce: clothing & shoes, books and digital media, pharmaceuticals and electronics. Note that these are production sectors; the trade margin on the sale of these goods is allocated to the retail & distribution sector. The impact is almost universally positive, except of course for the retail & distribution sector itself. It shows that other sectors benefit from the margin squeeze in retail services because that makes selling their products cheaper and thus more competitive.

Table 9 brings the aggregate effect of all this transmission channels together in overall GDP and GNI effects. The net effect, both of the trade cost and the retail efficiency shock is mostly positive, except for a few countries. The structure of GDP, the relative importance of external trade and the degree of competition in the domestic retail sector will be important factors in determining that outcome.

5. Conclusions

Technical innovations like on-line sales have the potential for yield substantial benefits for EU consumers. Existing micro-economic research on the shift from offline to online consumption focuses on the welfare effects of lower prices and higher product variety in online shops, compared to bricks & mortar shops. It does not take into account the impact on the supply side, in particular on the retail sector, or the income and substitution effects in overall consumer expenditure. That research may match the consumer experience in online shopping but it does not explain the observed pressure of e-commerce on offline retail trade in mortar & bricks stores.

In this paper we try to fill that gap. We use a multi-country multi-sector CGE model to compute the overall economic impact of a change in retail technology and a shift from offline to online consumption. We trace two transmissions channels, first through the relative trade cost in cross-border trade and second through a broader technology shock to retail, where cross-border cost savings are one manifestation of this effect. Because trade and distribution represent a substantial share of consumption costs we should expect substantial consumer gains with innovation affecting the sector. On the other hand, we do not take into account the lower online price and wider variety effects that dominate the micro-economic research literature on e-commerce. As such, our findings can be considered as a lower bound on the economic impact of cross-border e-commerce.

We find that the impact of the first channel is generally positive because it increases real household consumption, a major driver of GDP growth. The second channel has an effect on the size of the overall retail sector, because of a squeeze in price margins and the drop in input requirements to facilitate transactions between producers and consumers. However, retail sector efficiency gains as a result of this margin squeeze have a positive effect on production in other sectors. The net balance of these transmission channels and effects is generally positive, except for slightly negative effects in a few EU Member States. . In the case of the EU, this implies both increased scope for intra-EU consumer level trade, and lower margin costs within Member States. From the estimates reported here, impact varies by Member State, and also varies over trade cost savings vs. within country efficiency savings. These gains do not represent a "growth" benefit per se, but basically redistribution and efficiency gains in consumption. For households, the magnitude of the savings from innovation in distribution rivals those of complex international trade and investment agreements.

From a social welfare perspective, it is reassuring to find that e-commerce has an overall positive effect on the economy, despite the negative effects that it may have on bricks & mortar stores. In that sense, the impact of this new trade technology and the reduction in cross-border trade costs that it triggers is very similar to other trade-cost reducing technologies and innovations, and trade opening policy measures in general. They increase the efficiency of trade and thereby benefit the economy, despite negative effects in some sectors. Bricks & mortar retailer seem to be the main losers of this change in retail technology, although this findings needs qualification. Many retailers are rapidly complementing their high street bricks & mortar stores with online stores and thereby share in the benefits of this new retail channel. Consumers often use a combination of online and offline search before deciding on a purchase. Having a foot in both retail channels may reduce the risks for retailers. On the other hand, retail margin squeeze is also driven by another phenomenon that is associated with online trade, the emergence of a few major online stores that dominate the online market. Economies of scale as well as search rankings have put these online retail platforms in a dominant position both on the demand and on the supply side. Small producers and online retailers have a hard time getting visibility on 14" computer screens or 4" mobile phone screens because the dominant platforms also dominate online search. They often have no alternative but to join the platform and accepting the margins and other conditions offered by the platform.

This paper documents a first and to the best of our knowledge innovative experiment in macro-economic modelling of the impact of a shift from offline to online retail services. There is further work to be done to improve on this:

- We used the 2011 consumer survey data on cross-border e-commerce volumes to estimate the trade cost effects but have not yet implemented the bilateral e-commerce trade flows derived from this survey in the trade data in the model. Moreover, e-commerce trade volumes will have greatly increased since 2011. The variety of goods affected and the resulting trade patterns may also have changed. This may need to be updated.

- the magnitude and pass-through of the spill-over effect from imported on domestic retail prices is assumed to be 100 per cent in this crude exercise while the price impact on output prices in production sectors is assumed to be zero; retail sector price margins absorb the entire shock. A more realistic modelling would require the estimation of cross-price elasticities between online imports and offline sales, and an estimation of pass-through of price effects to wholesale prices and producer margins.

- Finally, these e-commerce data relate to goods only and not trade in online services (without physical transport of goods). The trade cost effect is likely to be much stronger here because services used to be difficult to trade and all of a sudden became very tradable in an online setting. Work on estimation of cross-border trade flows in online services is in progress.

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Table 1: OLS estimates

	Online	Online, external trade only	Offline	Online, Home bias
Dep.variable	**logCBT**	**logCBT**	**logCBT**	**logCBT**
lnDistance	-0.899***	-0.740***	-1.349***	-0.639***
	[0.0812]	[0.0925]	[0.0997]	[0.0955]
Common Language	2.564***	1.315***	0.657**	1.505***
	[0.268]	[0.219]	[0.287]	[0.215]
Home bias				2.804***
				[0.375]
Constant	11.22***	10.42***	15.22***	9.723***
	[0.598]	[0.643]	[0.702]	[0.660]
Observations	610	583	701	610
R-squared	0.838	0.837	0.878	0.857

Notes: Robust standard errors in brackets. *** p<0.01, ** p<0.05, * p<0.1.
Source: Gomez et.al. (2014)

Table 2: CGE Model Regions and Sectors

regions		sectors
Austria	Lithuania	Primary
Belgium	Luxembourg	Textiles
Cyprus	Malta	Clothing
Czech Republic	Netherlands	Leather products
Denmark	Poland	Paper products, publishing
Estonia	Portugal	Chemical, rubber, plastic prods
Finland	Slovakia	Electronic equipment
France	Slovenia	Other consumer goods
Germany	Spain	Food
Greece	Sweden	Transport equipment
Hungary	United Kingdom	Machinery and equipment nec
Ireland	Bulgaria	Other industrial goods
Italy	Romania	Distribution
Latvia	Rest of the World	Services

Table 3: Adjusted consumption shares – EU 27

	unadjusted	adjusted
wearing apparel	0.040	0.058
leather products	0.011	0.016
paper & publishing	0.018	0.026
chemicals	0.033	0.048
electronic equipment	0.011	0.016
other consumer goods	0.029	0.042
other manufactures	0.249	0.359
total goods	0.392	0.565
total services	0.608	0.435

Source: GTAP9 and author calculations.

Table 4: Online share of totals and cost savings

	online % total hh cons	online % total EU imports	online trade cost savings	cost savings, total basis	cost savings, import basis 3/
wearing apparel	0.152	0.161	-0.537	-0.081	-0.087
leather products	0.123	0.078	-0.505	-0.062	-0.039
paper & publishing	0.379	0.133	-0.619	-0.234	-0.082
chemicals	0.074	0.008	-0.578	-0.043	-0.004
electronic equipment	0.670	0.078	-0.477	-0.319	-0.037
other consumer goods	0.123	0.138	-0.532	-0.066	-0.073

Source: Civic Consulting consumer survey (2011) and JRC/IPTS own calculations

Table 5: Changes in household consumption

	trade costs	retail efficiency
Austria	0.57	1.32
Belgium	0.88	0.72
Bulgaria	0.15	0.52
Cyprus	0.47	0.76
Czech Republic	0.68	0.43
Denmark	1.07	0.75
Estonia	0.90	0.61
Finland	0.14	0.73
France	0.20	0.76
Germany	0.24	0.90
Greece	0.16	1.30
Hungary	0.63	0.55
Ireland	0.46	1.07
Italy	0.19	1.31
Latvia	0.38	0.47
Lithuania	0.34	0.18
Luxembourg	0.67	0.61
Malta	0.38	0.55
Netherlands	0.37	1.03
Poland	0.34	0.53
Portugal	0.12	1.08
Romania	0.27	0.26
Slovakia	-0.02	0.49
Slovenia	0.52	0.96
Spain	0.16	2.00
Sweden	0.35	0.46
United Kingdom	0.13	1.54
EU27	0.27	1.07
Rest of the World	-0.02	0.00

Table 6: Changes in retail/distribution output, %

	trade costs	retail efficiency
Austria	0.60	-2.73
Belgium	0.63	-2.26
Bulgaria	-0.14	-2.76
Cyprus	0.52	-3.02
Czech Republic	0.52	-1.75
Denmark	0.76	-2.61
Estonia	0.59	-2.59
Finland	0.36	-2.65
France	0.21	-2.69
Germany	0.19	-2.61
Greece	0.24	-2.84
Hungary	-0.14	-2.21
Ireland	-0.28	-0.98
Italy	0.16	-2.57
Latvia	0.31	-1.65
Lithuania	-0.22	-1.18
Luxembourg	0.50	-1.71
Malta	-0.61	-2.67
Netherlands	0.26	-3.31
Poland	0.30	-2.77
Portugal	0.07	-2.58
Romania	0.19	-2.03
Slovakia	0.18	-2.19
Slovenia	-0.30	-1.56
Spain	0.13	-2.19
Sweden	0.07	-2.11
United Kingdom	0.15	-2.77
EU27	0.21	-2.57
Rest of the World	-0.01	-0.01

Table 7: The macro-economic impact of e-commerce (%)

	GDP impact from trade costs only	Total GDP impact	Change in retail output	Share in EU GDP
United Kingdom	0.11	0.25	-2.77	14.6%
Slovenia	0.43	0.23	-1.56	0.3%
Spain	0.12	0.22	-2.19	7.9%
Greece	0.19	0.19	-2.84	1.4%
Malta	0.08	0.18	-2.67	0.1%
Austria	0.27	0.18	-2.73	2.4%
Germany	0.11	0.15	-2.61	21.0%
Portugal	-0.05	0.14	-2.58	1.3%
Italy	0.13	0.13	-2.57	12.0%
France	0.14	0.10	-2.69	15.8%
Denmark	0.85	0.09	-2.61	1.9%
Ireland	0.22	0.09	-0.98	1.3%
Netherlands	0.16	0.09	-3.31	4.6%
Finland	0.02	0.08	-2.65	1.5%
Belgium	0.60	0.07	-2.26	2.9%
Estonia	0.65	0.07	-2.59	0.1%
Hungary	0.74	0.07	-2.21	0.8%
Luxembourg	0.43	0.07	-1.71	0.3%
Poland	0.24	0.06	-2.77	3.0%
Cyprus	0.44	0.06	-3.02	0.1%
Sweden	0.19	0.06	-2.11	3.2%
Latvia	0.43	0.06	-1.65	0.2%
Bulgaria	-0.28	0.06	-2.76	0.3%
Slovakia	-0.25	0.05	-2.19	0.6%
Czech Republic	0.69	0.04	-1.75	1.1%
Lithuania	0.30	0.03	-1.18	0.3%
Romania	0.12	0.01	-2.03	1.1%
EU27	**0.17**	**0.14**	**-2.57**	**100.0%**

Table 8: Changes in Output as a result of the productivity shock to Distribution Services

	textiles, clothing, leather	paper and publishing	pharma, chemicals, cosmetics	electrical goods	other goods	distribution	other services
Austria	2.65	1.56	0.91	0.74	0.28	-2.73	0.05
Belgium	0.33	0.51	1.03	1.15	-0.27	-2.26	-0.04
Bulgaria	1.25	0.88	-0.22	0.78	-0.05	-2.76	0.00
Cyprus	1.30	1.50	0.93	1.40	0.08	-3.02	0.05
Czech Republic	0.18	-0.41	-0.56	1.18	0.13	-1.75	0.00
Denmark	3.57	0.77	0.10	0.89	-0.06	-2.61	-0.03
Estonia	1.12	0.01	0.33	0.73	0.04	-2.59	-0.04
Finland	-0.34	0.54	-0.12	0.77	0.03	-2.65	-0.05
France	2.10	1.12	0.69	1.43	0.06	-2.69	-0.01
Germany	2.56	3.04	0.59	1.00	0.23	-2.61	0.16
Greece	3.01	2.81	1.63	1.47	0.15	-2.84	0.12
Hungary	0.85	0.03	-0.45	0.89	0.03	-2.21	-0.03
Ireland	2.75	1.62	-0.02	1.03	0.14	-0.98	0.07
Italy	2.45	1.49	0.72	1.84	0.00	-2.57	-0.03
Latvia	0.83	0.27	0.04	0.45	0.10	-1.65	0.02
Lithuania	1.07	-0.17	-0.06	0.59	0.10	-1.18	0.04
Luxembourg	1.08	2.78	1.42	1.37	-0.21	-1.71	0.01
Malta	2.21	3.65	1.69	0.16	0.12	-2.67	0.14
Netherlands	1.86	1.19	0.64	1.52	0.00	-3.31	-0.04
Poland	0.62	0.14	-0.10	1.17	-0.01	-2.77	0.01
Portugal	3.27	0.85	0.14	1.20	-0.12	-2.58	0.01
Romania	0.26	-0.24	-0.40	0.92	0.00	-2.03	0.03
Slovakia	0.95	0.18	-0.55	1.23	0.02	-2.19	-0.06
Slovenia	0.39	0.38	-0.91	0.69	0.56	-1.56	0.12
Spain	7.19	3.22	1.60	1.80	0.24	-2.19	0.27
Sweden	0.71	0.48	0.30	0.94	0.08	-2.11	0.00
United Kingdom	2.93	4.43	2.34	1.34	0.60	-2.77	0.20
EU27	2.57	2.13	0.89	1.31	0.17	-2.57	0.08
Rest of the World	-0.06	-0.07	-0.08	0.21	0.01	-0.01	0.00

note: the shock is applied to the use of distribution services.

Table 9: GDP vs National Income

	trade costs		retail efficiency	
	GDP	GNI	GDP	GNI
Austria	0.27	0.41	0.18	0.86
Belgium	0.60	0.72	0.07	0.47
Bulgaria	-0.28	0.10	0.06	0.44
Cyprus	0.44	0.40	0.06	0.62
Czech Republic	0.69	0.58	0.04	0.26
Denmark	0.85	0.93	0.09	0.44
Estonia	0.65	0.76	0.07	0.43
Finland	0.02	0.05	0.08	0.47
France	0.14	0.14	0.10	0.51
Germany	0.11	0.19	0.15	0.59
Greece	0.19	0.14	0.19	1.13
Hungary	0.74	0.55	0.07	0.36
Ireland	0.22	0.34	0.09	0.52
Italy	0.13	0.15	0.13	0.92
Latvia	0.43	0.35	0.06	0.38
Lithuania	0.30	0.29	0.03	0.14
Luxembourg	0.43	0.53	0.07	0.37
Malta	0.08	0.04	0.18	0.58
Netherlands	0.16	0.25	0.09	0.55
Poland	0.24	0.28	0.06	0.38
Portugal	-0.05	0.04	0.14	0.82
Romania	0.12	0.24	0.01	0.21
Slovakia	-0.25	-0.09	0.05	0.33
Slovenia	0.43	0.44	0.23	0.70
Spain	0.12	0.13	0.22	1.39
Sweden	0.19	0.27	0.06	0.26
United Kingdom	0.11	0.10	0.25	1.17
EU27	0.17	0.21	0.14	0.74
Rest of the World	0.00	-0.01	0.00	0.00

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Abstract
This paper examines the impact of one transmission channel for the economic effects of a shift from offline to online consumption: cross-border trade costs. We use data on cross-border e-commerce between EU Member States to estimate the implied cross-border trade cost reduction when consumers move from offline to online consumption. We plug this trade cost estimate into a macro-sector multi-country CGE model to estimate the impact of online retailing on consumers as well as producers. We find that cross-border e-commerce increases real household consumption. However, the domestic spill-over effect squeezes price margins in the retail sector and has a negative output effect for that sector. The resulting retail sector efficiency gains cent of GDP. As such, this paper adds an innovative macro-perspective to existing micro-economic estimates of the impact of e-commerce on consumer welfare. The paper does not consider several other transmission channels such as price and variety effects.

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