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The Macro-economic Impact of e-Commerce in the EU Digital Single Market

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Abstract

This paper examines the economic impact of a change in retail technology - the shift from offline to online shopping – and a change in policy – measures to reduce the barriers to online trade perceived by consumers and retailers. Contrary to the prevalent micro-economic partial equilibrium consumer modelling approach to e-commerce, we use a macro-economic general equilibrium model that brings together the impact on consumers as well as on producers. We use survey 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 as well as the implied costs of perceived regulatory barriers to e-commerce. We distinguish between cross-border and domestic trade costs effects. We find that cross-bordere-commerce reduces trade costs compared to offline trade. Increased price competition squeezes domestic retail price margins and has a negative output effect in that sector (-2.6%). However, the resulting retail efficiency gains have a positive effect on production in other sectors (between 0.9 and 2.6%) and on household consumption (+1.07%). The combined macro-economic effect of these transmission channels adds 0.14% to EU GDP. Additional policy measures to facilitate cross-border e-commerce between EU Member States could add another 0.3% to household consumption and 0.04% to GDP, or 0.03% in the more conservative estimate. The relatively weak GDP effect in comparison with the production and consumption effects indicates that the shift from offline to online retail induces considerable welfare redistribution from retailing to other sectors and to households, more so than a production effect.

1. Introduction

Consumer access to goods, both domestic and foreign, involves wholesale, retail, transport and warehousing activities to move the goods from the factory gate to consumers. The cost of these distribution services can contribute substantially to total prices paid by consumers. 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 the distribution sector itself, Francois and Wooton (2001) estimate that pricing behavior of European distributors may effectively add 4 percent to the cost of cross-border trade between EU Member States. Some of these distribution costs are information costs incurred to find out the characteristics of goods, where they are produced and stored, where consumers are located and how they can be moved to the consumer. The introduction of digital information technology has dramatically reduced these information costs. It can process much more information and move it around much faster at close to zero marginal transport costs. This has led to the rise of e-commerce, a new distribution technology. Though warehousing and transport of physical goods cannot be digitized, wholesalers and retailers have moved the information part of their operations online. As a result consumers and producers can capture information from a much larger range of geographical locations at much lower information costs. The perception that any webpage is just a click away has led to the rather inflated prediction of the "death of distance" (Cairncross, 1997). Transport costs for physical goods and new cultural barriers to online trade have reduced but not eliminated distance-related trade costs (Blum & Goldfarb, 2006; Alaveras & Martens, 2015). Empirical economic research on e-commerce has emphasized how increased price competition, lower prices and more variety of supply (Dixit and Stiglitz, 1977, Brynjolfsson and Hu, 2003) boost consumer welfare. Typically, these welfare effects 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. Yet there is considerable concern about the impact of e-commerce on traditional retailers operating from bricks & mortar stores in almost all retail sectors. This has not been reflected in partial equilibrium model studies. The innovative aspect of this study is that we apply a general equilibrium approach that examines the impact of e-commerce as a new retail technology and the trade cost reductions that it entails on consumers as well as on producers of goods and distribution services.

However, e-commerce as a new retail technology does not only reduce retail trade costs. It also generates new sources of trade costs for consumers and producers. Consumers may be less familiar with distant online suppliers and feel less trust in shops where they cannot physically walk in and meet the vendor. Although e-commerce makes it easy to shop abroad, consumers may face language barriers or feel uncertain about their consumer rights in other countries and how to handle potential disputes. Conversely, online retailers may lack sufficient knowledge about the rules that apply to selling abroad or the logistics involved in cross-border delivery. In the offline economy, cross-border trade was usually handled through wholesalers with established supply networks. In online retail, direct business-to-consumer (B2C) transactions open up a new set of trade issues. As such, e-commerce creates new challenges both for retailers and for policy makers in charge of the regulatory environment in which e-commerce operates.

In this paper we examine the economic impact of the introduction of e-commerce as a new B2C retail technology that reduces trade costs as well as the new sources of trade costs that it generates. As such, we estimate the general equilibrium impact of a technology shock (the introduction of e-commerce) and a policy shock (regulatory measures to reduce new sources of online trade costs).

The empirical setting for our study is the EU Digital Single Market. In May 2015 the European Commission announced a policy agenda that seeks to boost the digital

economy in the EU and eliminate obstacles to digital trade among the 28 Member States of the EU[1]. Better access for consumers and businesses to digital goods and services across Europe will be achieved through new rules to make cross-border e-commerce easier, including harmonized EU rules on online contracts and consumer protection to boost confidence to shop and sell across borders, faster and more consistent enforcement of consumer rules including a review of the Regulation on Consumer Protection Cooperation and measures to ensure more efficient and affordable parcel delivery. Data from a 2011 EU online consumer survey already produced an estimate of the volume and patterns of domestic and cross-border online e-commerce between EU Member States and the extent of trade cost reduction implied by the shift from offline to online trade (See Gomez et al, 2014). We use another 2015 EU online consumer survey to estimate the economic impact of (the removal of) the sources of online trade costs mentioned in the DSM policy document. We plug both the trade cost reductions and the remaining trade cost barriers in a macro-economic general equilibrium model to estimate the economic impact already achieved by the e-commerce technology shock as well as the potential impact of the policy shock if it would succeed in removing new sources of online trade costs. The combination of the two provides an insight into the potential overall economic impact of e-commerce in the EU.

Our macro-economic model features two transmission mechanisms through which the shift from traditional offline retail technology to online e-commerce affects the economy: cross-border trade and domestic competition in the retail sector. The first mechanism emphasizes cross-border competition. Online trade reduces the cost for consumers to gather information on the available supply of products. Because of information and transport costs, traditional offline consumers rarely venture beyond their domestic market and often remain in their immediate vicinity. Online retail technology enables consumers to extend their geographical range of information gathering and buying far beyond their traditional home market. We estimate the impact of a shift from offline to online trade on distance-related trade costs, using 2011 online 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. However, the new online technologies also impact domestic distribution networks, and so we model a second, more comprehensive mechanism whereby the reduction in the relative price of online imports puts price pressure on domestic markets, reduces price margins in domestic retailing and leads to an overall domestic price reduction as well. Since distribution costs constitute a substantial part of the total cost of consumer goods (Burstain et al, 2003; Francois and Wooton, 2010) we should not be surprised that a combination of increased efficiency and competition should reduce cross-border margins. This second mechanism provides a link to the often observed restructuring in the distribution sector. This decline in retail price margins constitutes a productivity shock to the distribution services used for both domestic and cross-border supply of goods to consumers. It reduces trade costs for domestic producers of goods and thereby boosts their production and sales, including exports. The net domestic impact of e-commerce is an empirical question. It combines the negative effect of the price pressure on retail services output with the positive effect that the reduction in retail trade costs has on domestic producers. We apply the same two mechanisms to evaluate the impact of a policy or regulatory shock. We use data from a 2015 EU online consumer survey to estimate the impact of the perceived obstacles for consumers and online retailers on the volume of cross-border online purchases and sales in the EU. We translate this volume effect into a trade cost equivalent and plug it into the macro-economic model to estimate the potential impact of policy measures to remove the perceived barriers on consumer expenditure and output.

We find that the introduction of e-commerce as a new retail technology has an overall positive impact on the economy in almost all EU Member States, both in the scenario

[1] See http://ec.europa.eu/priorities/digital-single-market/

that limits the impact to cross-border trade costs only and in the wider scenarios that allows a spill-over of price competition into domestic retail. The latter scenario causes an output reduction in retail services by about 2.6%. However, the resulting retail sector efficiency gains have a substantial positive effect on production in other sectors, between 0.9 and 2.6%. Household consumption increases by about 1%, driven by reduced prices and an increase in overall GDP by 0.14%. We also find that additional consumer policy measures to eliminate or reduce new trade barriers in online trade experienced by consumers and retailers could further reduce trade costs and boost the economic impact of e-commerce, adding an additional 0.04% to GDP and 0.3% to household consumption in the optimistic scenario, and 0.03% to GDP and 0.023% to household consumption in the more conservative scenario (the different scenarios are explained in Section 5.1)

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, based on 2011 consumer survey data. 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. In Section 5 we estimate the impact of remaining perceived barriers to online trade, both by consumers and retailers, based on 2015 consumer survey data. In Section 6 we examine the impact of removing these perceived barriers. Section 7 concludes.

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 then 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

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

intermediaries before a good reaches the final consumer. By contrast, online cross-border trade data are available only for B2C, with online wholesalers/retailers selling directly to final consumers. Differences in supply chains may, in turn, result in 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 is specified as follows:

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

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.

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 (explained in chapter 5) 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. Imperfect competition is introduced by assuming monopolistic competition[3] by applying the Armington assumption[4]. Econometrically based substitution elasticities[5] for goods originate from ECORYS (2009) while elasticities for the services sectors were obtained from Francois and Hoekman (2010).[6]

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 purposes 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 prices for goods for consumers. In our first specification, we include trade costs in the model as Samuelson-type deadweight costs[7], using these 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

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[3] Monopolistic competition assumes a large number of firms (as in the perfect competition model), producing differentiated products (a source of market power), as in the monopoly model.

[4] The Armington assumption implies that two identical products produced or sold in different countries are considered as if they were differentiated, ie, two different products.

[5] Elasticities of substitution measure the substitutability between goods, i.e. how easy it is to substitute one good for one another.

[6] See OECD (2011) and Francois, van Meijl and van Tongeren (2005) for more information on the model structure.

[7] Also known as iceberg-type trade costs. Under this assumption, the shipment of a quantity X from A to B implies that only a fraction τX arrives to the destination (as if $(1-\tau)$ units melt away in the process. The higher the fraction of goods that effectively arrives to destination, the lower the transport costs.

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. The economic impact of e-commerce retail technology

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 within the EU. 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 of 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 estimated 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 reduction 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 losses. One could argue however that such cost of transition could be relatively small for the retail sector. Tables 5-9 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 fall 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 compared to the baseline hypothetical scenario without e-commerce 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 reduction 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. Perceived barriers to cross-border e-commerce in the EU

The introduction of e-commerce as a new online retail technology reduces trade costs for consumers and sellers. However, it also creates new obstacles to trade because consumers and sellers face new problems that did not exist or were less important in offline retailing. In order to gauge the importance of these specific obstacles to online trade the European Commission launched two surveys in early 2015, the first addressing the barriers faced by consumers and the second the barriers for online retailers. Descriptive statistics drawn from these surveys have been published (Eurobarometer nr 413, 2015; GfK report, 2015) and some of the results were reported in the Digital Single Market strategy paper (European Commission, 2015). A more detailed econometric analysis of the survey findings is presented in Cardona et al. (2015) and Duch-Brown & Martens (2015). The description in this section builds on the latter two reports.

The surveys ask consumers and retailers whether their cross-border purchases and sales are affected by a list of potential obstacles. They also report the extent of cross-border transactions by consumers and retailers. By combining these two sets of variables Cardona et al (2015) and Duch-Brown & Martens (2015) estimate the actual quantitative impact of perceived barriers on cross-border purchases and sales, both at the extensive margin (the number of consumers and retailers who engage in cross-border transactions) and the intensive margin (the volume of cross-border purchases and sales). Alternatively, these estimates can be interpreted as an expected increase in cross-border trade if the barriers mentioned in the surveys would be eliminated, for instance by means of uniform consumer contract law rules in the EU, as the European Commission proposes under the Digital Single Market strategy.

For the purpose of the present study, the survey replies to specific perceived barriers have been grouped into categories that correspond to the proposed legal changes (see Table 10) for online consumers and retailers. The estimated quantitative impact of the groups of barriers that produced statistically significant coefficients is plugged into the macro-economic model as an exogenous policy shock and the model simulates the resulting overall economic impact of such a policy shock.

5.1 Barriers to cross-border online purchases by consumers

Cardona et al. (2015) estimate the extensive margin (a consumer's decision to buy online abroad or not) by means of a logit regression where the dependent variable is a dummy that takes the value 1 when the consumer survey data show that a respondent has purchased cross-border online within the last 12 months, and 0 otherwise. The independent variables include dummies for each of the 17 potential barriers listed in the survey.[8] The logit regression than calculates the impact of each of these potential barriers on the number of consumers that buy online abroad. For the intensive margin (the amount spend online abroad) the authors use an OLS (ordinary least squares) regression where the dependent variable is the Euro amount spent on online purchases cross-border from other EU countries. In both regressions the dependent variable is originally regressed on each of the 17 potential barriers to online cross-border

[8] The coefficients to the regressions were based on Cardona et al. (2015), which use Q21 (domestic e-commerce) from the GFK survey for comparability reasons for the different regressions in the study. The answers in Q21 generally reflect the same concerns regarding e-commerce and the reply rates to Q21 and Q22 are broadly similar, as shown in Figure 94 and 97 from the GFK report. Additionally by rerunning the regressions with Q22, the overall effect that we draw from these regressions and numbers to plug into the macro model remain largely similar.

consumption. As an alternative approach a principal component analysis (PCA) [9] was applied prior to the regression on the 17 barriers. The regression was then carried out on the 5 components emerging from the PCA. For that purpose the 17 barriers were pre-categorised into 5 groups. Table 10 summarizes and identifies the statistically significant results for the regressions by individual barrier items and by PCA items. Statistically significant coefficients are obtained for barriers related to "Conformity with the contract" in the original "by-item" regression. In the PCA regression we find significant results for barriers related to "Consumer Rights". Neither of the two approaches shows significant results for the group "Contract Terms", which was also preselected as relevant for the proposal.

In order to introduce these estimations into the macroeconomic model, we combined the impact on the intensive and extensive margins in a single figure. Unlike the results of the intensive margin, the extensive margin results are reported as marginal effects and have to be transformed into percentage changes in order to calculate the trade costs needed for the macroeconomic model. Lifting the barrier "wrong products" will increase the number of consumers who buy cross-border by 5.3 percentage points, on top of the 50.9%[10] who already do cross-border purchases according to the survey, so an increase by 10.5% in relative terms. [11] Lifting the barrier "products not delivered" will increase the volume of cross-border purchases by 13.6% for all those who buy cross-border. Combining the extensive and intensive margins produces a total increase of 25.6%[12], a very large jump in cross-border trade for a single policy measure. This is based on the implicit assumption that an additional consumer who starts doing cross-border purchases when a barrier is eliminated will spend as much cross-border as consumers who have been doing this for a longer time. A more conservative assumption would be that new cross-border consumers spend less on cross-border purchases. We have somewhat arbitrarily fixed this conservative assumption at 50% of the average of existing cross-border consumers, which reduces the increase in cross-border trade from 25.6 to 18.1%. This creates two scenarios, an optimistic scenario (new buyers spend just as much as the existing ones) with a strong trade shock and a more conservative scenario (using the 50% assumption) with a lower trade shock.

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[9] PCA is a common multivariate technique to reduce the dimensionality of a database, more specifically, the number of variables. In a first step, independent principal components are constructed from linear combinations of the originally surveyed 17 barrier variables. We chose five components and interpreted them according to the variables that contributed the highest loadings (or correlation) and in accordance to the groupings relevant to the new contract and consumer law. Interestingly, the variables that go into the component remedy show significant results as an item. An explanation is that by constructing components out of linear combinations of the single variables it is possible to overcome problems of multicollinearity. That is, if different single items measure a similar concept they might not show significant results by themselves, but only combined to a (hopefully) more meaningful component. This comes at a cost: the principal components do not account for the entire variance given by the single items, so some information is lost.

[10] 50.9% from the population that already has purchased tangible good or services online.

[11] Accordingly this is calculated for "Consumer Rights". The marginal effects are calculated for the average population of online purchasers. Currently 50.9 of online purchasers buy cross-border, according to the marginal effect for the principal component "Consumer Rights", the percentage would increase by 1.6 to 51.7, when the barrier is removed. This corresponds to a 3.2% change in cross-border purchasers ($\Delta x/\bar{x}$).

[12] This combines the percentage change of the extensive margin x_e (10.5%) and of the intensive margin x_i (13.6%), $x_i\,(x_e + 100/100) + x_e$, under the assumption that the new consumers will consume as much as the existing consumers.

5.2 Barriers to cross-border online sales by firms

The data from the firm survey were used to analyse the effects of the barriers on cross-border e-commerce between the different Member States. For that purpose, as is typically done in traditional international trade models, a two-step strategy was followed. As with the consumer survey we estimate the extensive and intensive margin. First, we estimate the impact of the barriers on a firm's decision to sell across the border, which is equivalent to the number of firms that sell cross-border (the extensive margin). The decision is a binary variable, taking the value 1 if the firm is selling online cross border and 0 otherwise. Due to the binary nature of the dependent variable, the appropriate estimation methodology is a logit or probit regression model. The second step seeks to explain the impact of these perceived barriers on the volume of cross border e-commerce – the intensive margin of cross-border trade. Volume in this case is measured as the share of total cross-border e-commerce within the firms engaging in e-commerce; hence it is a variable that can take any value in the interval [0-100]. We use a generalised linear regression model to allow non-normally distributed errors, as is the case for shares. While both the extensive and intensive margin models use the same explanatory variables, there should be differences in the coefficients between the two, because we anticipate that the determinants of the decision to sell online across the border and the volume of cross-border e-commerce should not necessarily be the same. In theory, e-commerce should bring trade costs down, in particular those related to transport (in terms of time), search costs, information costs, and distribution costs.

The firm survey included 17 different potential barriers to cross-border e-commerce that were reduced to 7 categories for the purpose of the regression analysis: cultural and linguistic barriers; suppliers' restrictions; barriers related to delivery/payments; contract law related barriers; other regulatory barriers; redress; and infrastructure/interoperability barriers. The category "contract law" is relevant for the purpose of the policy reforms that we consider here. It is formed by two barriers reported in the survey: "guarantees and returns are too expensive" and "you don't know the rules which have to be followed". The category variable takes the value 1 if a firm declares that any of two barriers is relevant and 0 otherwise.

Duch-Brown & Martens (2015, Table 4) carry out the intensive and extensive margin regressions on these 7 categories. However, only the contract law category is relevant for our purposes here. It is statistically significant both for the decision to sell online across the border and the volume of online trade. The effective removal of contract-law related barriers would increase the number of firms engaged in cross-border e-commerce by 5.3% compared to the number of firms already selling cross-border; the volume of online exports (measured in % of turnover) would increase by 3.1%. The combined intensive and extensive margin effects sum up to 8.4% increase in cross-border trade. We use the latter value as the policy shock to firm barriers in the model simulation.

6. The economic impact of removing remaining barriers

The above estimates can be interpreted as an expected increase in cross-border trade if the perceived barriers would be eliminated by means of legal and regulatory changes. However, this expected quantitative impact is only a first-round direct effect and does not give us a comprehensive picture of the impact on various aspects of the economy; for that, we need to run this impact through a macro-economic general equilibrium model. Changes in consumer and firm behaviour affect many other variables, as explained in Section 3 above in the description of the CGE model. For example, when consumers shift from domestic to cross-border purchases, domestic expenditure will decrease and increased online imports will put pressure on the domestic retail sector to reduce its price margins to become more competitive. This generates a general decline in domestic trade costs for all domestic producers who distribute their output through

the retail sectors. This has an overall positive effect on producer and consumer welfare but is likely to reduce value-added in the domestic retail sector. It generates efficiency gains for the economy as a whole. Similarly, when firms increase online exports their sales volume will increase and generate economies of scale that affects their productivity in foreign and domestic markets. In order to trade all these effects, a macro-economic general equilibrium model is required. These effects, in turn, will positively affect GDP.

In practical terms, we plug the trade volume shocks (from Table 10) into the macro-economic general equilibrium model as an external shock. The model converts the volume shock into a trade cost equivalent, using the sector price elasticities in the model. A decline in trade costs increases trade volume. It then calculates all the effects of trade cost decrease on cross-border trade, prices and household consumption, retail service output and production in other sectors, and GDP in all 28 EU Member States. The simulation results that we present here do not distinguish between cross-border and domestic trade costs; we only present results for a full spill-over of the decrease in cross-border trade costs onto domestic trade cost reductions. We do however distinguish between three different types of policy measures that cause this decline in trade costs: enhanced conformity in contract law and improved consumer protection on the consumer side, and the elimination of contract law related barriers on the supply side.

The overall macro-economic results can be found in Table 11. The table distinguishes between the two scenarios with full and partial implementation of the conformity shock, as explained in the previous section. Sticking to the full policy shock scenario columns, we find that EU GDP increases by a modest 0.04%. However, household consumption and real national income increase much stronger, by 0.29 and 0.21% respectively. These are driven by the substantial decline in consumer prices (-0.25%) and some additional leverage from the increase in overall output or GDP, despite a fall in output in the retail services sectors. This indicates that the proposed policy measures induce similar effects as the shift from offline to online retailing: it induces mainly welfare redistribution from the retail sector to other sectors and to consumers, and a much weaker productivity or growth effect. When we compare these results with the magnitude of the effects of the retail technology shock or the shift from offline to online retailing (see Section 4), we conclude that policy measures to reduce or eliminate new trade barriers in online trade can give an additional boost to the economic impact of e-commerce. As Table 11 shows, these effects are very similar across EU Member States, though the order of magnitude may vary because of difference in the sector 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.

Tables 12-15 present further details by Member State and for each of the policy variables under consideration. Clearly, the policy proposals to boost conformity in online sales have the strongest impact[13], whether in the full or the partial effect scenarios. Consumer rights and contract law for the supply side have a somewhat lower impact – as could be expected from the magnitude of the trade volume effects in Table 10.

7. Conclusions

Technical innovations like on-line sales have the potential for yielding 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

[13] The cluster conformity consists of the items "wrong product" and "products not delivered" as described in Section 5.1 and shown in Table 10.

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 reduction 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 fall in margins 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, the reduction in retail margins 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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List of Tables

Table 1: Estimation of the gravity equation

	Online	Online, external trade only	Offline	Online, Home bias
	(1)	(2)	(3)	(4)
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: Results based on Ordinary Least Squares (OLS). Robust standard errors in brackets. *** p<0.01, ** p<0.05, * p<0.1. The Dependent variable logCBT is the volume of cross-border trade (in logs), lnDistance is the geographical distance between importer and exporter country.

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
Croatia		

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
	(1)	(2)	(3)	(4)	(5)
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

Table 10: Macro-economic simulation scenarios

Change in:	Category (cluster)	Barrier label	Effect*		
			Extensive margin	Intensive margin	Combined effect
Consumer demand	Conformity with the contract	Wrong or damaged products will be delivered Products will not be delivered at all	5.3	13.6	25.6 18.1**
	Consumer rights	Returning a product I didn't like and getting reimbursed Replacement or repair of a faulty product is not easy I do not know what my consumer rights are when buying online There is a lower level of consumer protection when buying online	1.6		3.2
Firm supply	Contract-law related barriers	Guarantees and returns are too expensive You don’t know the rules which have to be followed	5.3	3.1	8.4

* Expected % increase in cross-border online trade when barriers are removed, except for underlined figures, in which case it refers to percentage points. The calucations of the combined effect are explained in sections 5.1. for consumer demand.

** Combined effect under a scenario where the effect of conformity with the contract is 50% intensive. Note: trade costs reductions are estimated based on volume estimates above, with the CGE model.

Source: JRC/IPTS estimates based on DSM Consumer survey and Eurobarometer 315. For details see Cardona et al. (2015) and Duch-Brown and Martens (2015).

Table 11: Summary of macroeconomic effects (% change)

	Real national income		GDP		Household consumption		Consumer prices	
	Full	**Partial**	**Full**	**Partial**	**Full**	**Partial**	**Full**	**Partial**
	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**	**(8)**
AT	0,23	0,19	0,05	0,04	0,34	0,27	-0,29	-0,23
BE	0,15	0,12	0,03	0,02	0,21	0,17	-0,17	-0,14
CY	0,18	0,14	0,02	0,01	0,19	0,16	-0,16	-0,13
CZ	0,08	0,06	0,01	0,01	0,12	0,10	-0,10	-0,08
DK	0,13	0,11	0,02	0,02	0,21	0,17	-0,18	-0,15
EE	0,10	0,08	0,02	0,01	0,15	0,12	-0,13	-0,10
FI	0,15	0,12	0,02	0,02	0,21	0,17	-0,19	-0,15
FR	0,16	0,12	0,03	0,02	0,22	0,17	-0,19	-0,15
DE	0,17	0,14	0,04	0,03	0,25	0,20	-0,21	-0,17
EL	0,22	0,18	0,05	0,04	0,23	0,18	-0,19	-0,15
HU	0,14	0,11	0,03	0,02	0,17	0,14	-0,14	-0,11
IE	0,16	0,12	0,02	0,02	0,32	0,26	-0,29	-0,23
IT	0,27	0,22	0,03	0,03	0,34	0,28	-0,31	-0,25
LV	0,12	0,09	0,02	0,01	0,14	0,11	-0,12	-0,10
LT	0,05	0,04	0,01	0,01	0,07	0,05	-0,06	-0,05
LU	0,13	0,11	0,02	0,02	0,20	0,16	-0,18	-0,14
MT	0,18	0,14	0,06	0,05	0,16	0,13	-0,11	-0,09
NL	0,16	0,13	0,02	0,02	0,30	0,24	-0,27	-0,22
PL	0,11	0,09	0,02	0,01	0,15	0,12	-0,13	-0,10
PT	0,23	0,18	0,04	0,03	0,28	0,22	-0,24	-0,19
SK	0,10	0,08	0,02	0,01	0,14	0,11	-0,12	-0,10
SL	0,21	0,17	0,08	0,06	0,26	0,21	-0,19	-0,15
ES	0,36	0,29	0,06	0,05	0,48	0,38	-0,43	-0,35
SE	0,08	0,06	0,02	0,01	0,13	0,11	-0,12	-0,09
GB	0,31	0,25	0,06	0,05	0,40	0,32	-0,35	-0,28
BU	0,11	0,09	0,01	0,01	0,14	0,11	-0,13	-0,10
RO	0,06	0,05	0,00	0,00	0,07	0,06	-0,07	-0,05
HR	0,07	0,06	0,02	0,01	0,09	0,08	-0,08	-0,06
EU28	0,21	0,17	0,04	0,03	0,29	0,23	-0,25	-0,25

Note: results under the assumption of retail sector technology shock.
Source: results from the simulation using the CGE model.

Table 12: Household Consumption (% change)

	Demand-side			Supply-side		
	Conformity (full effect)	**Conformity (partial effect)**	**Consumer rights**	**Contract Law**	**Total (full effect)**	**Total (partial effect)**
Austria	0,23	0,16	0,03	0,08	0,34	0,27
Belgium	0,15	0,10	0,02	0,05	0,21	0,17
Cyprus	0,13	0,09	0,02	0,04	0,19	0,16
Czech Republic	0,08	0,06	0,01	0,03	0,12	0,10
Denmark	0,14	0,10	0,02	0,05	0,21	0,17
Estonia	0,10	0,07	0,01	0,03	0,15	0,12
Finland	0,14	0,10	0,02	0,05	0,21	0,17
France	0,15	0,10	0,02	0,05	0,22	0,17
Germany	0,17	0,12	0,02	0,06	0,25	0,20
Greece	0,16	0,11	0,02	0,05	0,23	0,18
Hungary	0,12	0,08	0,02	0,04	0,17	0,14
Ireland	0,22	0,16	0,03	0,07	0,32	0,26
Italy	0,24	0,17	0,03	0,08	0,34	0,28
Latvia	0,09	0,07	0,01	0,03	0,14	0,11
Lithuania	0,04	0,03	0,01	0,01	0,07	0,05
Luxembourg	0,14	0,10	0,02	0,04	0,20	0,16
Malta	0,11	0,08	0,01	0,04	0,16	0,13
Netherlands	0,20	0,14	0,03	0,07	0,30	0,24
Poland	0,10	0,07	0,01	0,03	0,15	0,12
Portugal	0,19	0,14	0,02	0,06	0,28	0,22
Slovakia	0,10	0,07	0,01	0,03	0,14	0,11
Slovenia	0,18	0,13	0,02	0,06	0,26	0,21
Spain	0,33	0,23	0,04	0,11	0,48	0,38
Sweden	0,09	0,06	0,01	0,03	0,13	0,11
United Kingdom	0,27	0,19	0,03	0,09	0,40	0,32
Bulgaria	0,10	0,07	0,01	0,03	0,14	0,11
Romania	0,05	0,03	0,01	0,02	0,07	0,06
Croatia	0,06	0,05	0,01	0,02	0,09	0,08
EU28	0,20	0,14	0,03	0,07	0,29	0,23

Note: results under the assumption of retail sector technology shock.
Source: results from the simulation using the CGE model.

Table 13: Real national income, welfare based (% change)

	Demand-side			Supply-side		
	Conformity (full effect)	Conformity (partial effect)	Consumer rights	Contract Law	Total (full effect)	Total (partial effect)
Austria	0,16	0,11	0,02	0,05	0,23	0,19
Belgium	0,11	0,08	0,01	0,04	0,15	0,12
Cyprus	0,12	0,09	0,02	0,04	0,18	0,14
Czech Republic	0,05	0,04	0,01	0,02	0,08	0,06
Denmark	0,09	0,06	0,01	0,03	0,13	0,11
Estonia	0,07	0,05	0,01	0,02	0,10	0,08
Finland	0,10	0,07	0,01	0,03	0,15	0,12
France	0,11	0,08	0,01	0,04	0,16	0,12
Germany	0,12	0,08	0,02	0,04	0,17	0,14
Greece	0,15	0,11	0,02	0,05	0,22	0,18
Hungary	0,10	0,07	0,01	0,03	0,14	0,11
Ireland	0,11	0,08	0,01	0,04	0,16	0,12
Italy	0,19	0,13	0,02	0,06	0,27	0,22
Latvia	0,08	0,06	0,01	0,03	0,12	0,09
Lithuania	0,04	0,03	0,00	0,01	0,05	0,04
Luxembourg	0,09	0,06	0,01	0,03	0,13	0,11
Malta	0,12	0,09	0,02	0,04	0,18	0,14
Netherlands	0,11	0,08	0,01	0,04	0,16	0,13
Poland	0,08	0,05	0,01	0,03	0,11	0,09
Portugal	0,16	0,11	0,02	0,05	0,23	0,18
Slovakia	0,07	0,05	0,01	0,02	0,10	0,08
Slovenia	0,14	0,10	0,02	0,05	0,21	0,17
Spain	0,25	0,17	0,03	0,08	0,36	0,29
Sweden	0,05	0,04	0,01	0,02	0,08	0,06
United Kingdom	0,21	0,15	0,03	0,07	0,31	0,25
Bulgaria	0,08	0,05	0,01	0,03	0,11	0,09
Romania	0,04	0,03	0,01	0,01	0,06	0,05
Croatia	0,05	0,03	0,01	0,02	0,07	0,06
EU-28	0,14	0,10	0,02	0,05	0,21	0,17

Note: results under the assumption of retail sector technology shock.
Source: results from the simulation using the CGE model.

Table 14: GDP, quantity index (% change)

	Demand-side			Supply-side		
	Conformity (full effect)	Conformity (partial effect)	Consumer rights	Contract Law	Total (full effect)	Total (partial effect)
Austria	0,03	0,02	0,00	0,01	0,05	0,04
Belgium	0,02	0,01	0,00	0,01	0,03	0,02
Cyprus	0,01	0,01	0,00	0,00	0,02	0,01
Czech Republic	0,01	0,00	0,00	0,00	0,01	0,01
Denmark	0,02	0,01	0,00	0,01	0,02	0,02
Estonia	0,01	0,01	0,00	0,00	0,02	0,01
Finland	0,01	0,01	0,00	0,00	0,02	0,02
France	0,02	0,01	0,00	0,01	0,03	0,02
Germany	0,03	0,02	0,00	0,01	0,04	0,03
Greece	0,03	0,02	0,00	0,01	0,05	0,04
Hungary	0,02	0,01	0,00	0,01	0,03	0,02
Ireland	0,02	0,01	0,00	0,01	0,02	0,02
Italy	0,02	0,02	0,00	0,01	0,03	0,03
Latvia	0,01	0,01	0,00	0,00	0,02	0,01
Lithuania	0,01	0,01	0,00	0,00	0,01	0,01
Luxembourg	0,01	0,01	0,00	0,00	0,02	0,02
Malta	0,04	0,03	0,01	0,01	0,06	0,05
Netherlands	0,02	0,01	0,00	0,01	0,02	0,02
Poland	0,01	0,01	0,00	0,00	0,02	0,01
Portugal	0,02	0,02	0,00	0,01	0,04	0,03
Slovakia	0,01	0,01	0,00	0,00	0,02	0,01
Slovenia	0,05	0,04	0,01	0,02	0,08	0,06
Spain	0,04	0,03	0,01	0,01	0,06	0,05
Sweden	0,01	0,01	0,00	0,00	0,02	0,01
United Kingdom	0,04	0,03	0,01	0,01	0,06	0,05
Bulgaria	0,01	0,01	0,00	0,00	0,01	0,01
Romania	0,00	0,00	0,00	0,00	0,00	0,00
Croatia	0,01	0,01	0,00	0,00	0,02	0,01
EU28	0,03	0,02	0,00	0,01	0,04	0,03

Note: results under the assumption of retail sector technology shock.
Source: results from the simulation using the CGE model.

Table 15: Value of exports (% change)

	Demand-side			Supply-side		
	Conformity (full effect)	Conformity (partial effect)	Consumer rights	Contract Law	Total (full effect)	Total (partial effect)
Austria	0,03	0,02	0,00	0,01	0,05	0,04
Belgium	0,01	0,01	0,00	0,00	0,01	0,01
Cyprus	0,05	0,03	0,01	0,02	0,07	0,06
Czech Republic	0,01	0,01	0,00	0,00	0,02	0,02
Denmark	0,02	0,01	0,00	0,01	0,03	0,02
Estonia	0,01	0,00	0,00	0,00	0,01	0,01
Finland	0,04	0,03	0,01	0,01	0,06	0,05
France	0,05	0,04	0,01	0,02	0,08	0,06
Germany	0,03	0,02	0,00	0,01	0,05	0,04
Greece	0,03	0,02	0,00	0,01	0,05	0,04
Hungary	0,01	0,01	0,00	0,00	0,02	0,01
Ireland	0,04	0,03	0,01	0,01	0,06	0,05
Italy	0,02	0,01	0,00	0,01	0,03	0,02
Latvia	0,03	0,02	0,00	0,01	0,04	0,03
Lithuania	0,00	0,00	0,00	0,00	0,01	0,00
Luxembourg	0,04	0,03	0,01	0,01	0,06	0,05
Malta	0,02	0,02	0,00	0,01	0,03	0,03
Netherlands	0,03	0,02	0,00	0,01	0,04	0,03
Poland	0,06	0,04	0,01	0,02	0,08	0,07
Portugal	0,05	0,03	0,01	0,02	0,07	0,05
Slovakia	0,12	0,08	0,01	0,04	0,17	0,14
Slovenia	0,08	0,06	0,01	0,03	0,12	0,10
Spain	0,02	0,02	0,00	0,01	0,04	0,03
Sweden	0,10	0,07	0,01	0,03	0,14	0,11
United Kingdom	0,01	0,00	0,00	0,00	0,01	0,01
Bulgaria	0,02	0,02	0,00	0,01	0,03	0,03
Romania	0,03	0,02	0,00	0,01	0,04	0,03
Croatia	0,00	0,00	0,00	0,00	0,01	0,00
EU28	0,03	0,02	0,00	0,01	0,05	0,04

Note: results under the assumption of retail sector technology shock.
Source: results from the simulation using the CGE model.

Table 16: Consumer prices (% change)

	Demand-side			Supply-side		
	Conformity (full effect)	Conformity (partial effect)	Consumer rights	Contract Law	Total (full effect)	Total (partial effect)
Austria	-0,20	-0,14	-0,03	-0,07	-0,29	-0,23
Belgium	-0,12	-0,08	-0,01	-0,04	-0,17	-0,14
Cyprus	-0,11	-0,08	-0,01	-0,04	-0,16	-0,13
Czech Republic	-0,07	-0,05	-0,01	-0,02	-0,10	-0,08
Denmark	-0,12	-0,09	-0,02	-0,04	-0,18	-0,15
Estonia	-0,09	-0,06	-0,01	-0,03	-0,13	-0,10
Finland	-0,13	-0,09	-0,02	-0,04	-0,19	-0,15
France	-0,13	-0,09	-0,02	-0,04	-0,19	-0,15
Germany	-0,15	-0,10	-0,02	-0,05	-0,21	-0,17
Greece	-0,13	-0,09	-0,02	-0,04	-0,19	-0,15
Hungary	-0,09	-0,07	-0,01	-0,03	-0,14	-0,11
Ireland	-0,20	-0,14	-0,03	-0,07	-0,29	-0,23
Italy	-0,21	-0,15	-0,03	-0,07	-0,31	-0,25
Latvia	-0,08	-0,06	-0,01	-0,03	-0,12	-0,10
Lithuania	-0,04	-0,03	-0,01	-0,01	-0,06	-0,05
Luxembourg	-0,12	-0,09	-0,02	-0,04	-0,18	-0,14
Malta	-0,07	-0,05	-0,01	-0,02	-0,11	-0,09
Netherlands	-0,18	-0,13	-0,02	-0,06	-0,27	-0,22
Poland	-0,09	-0,06	-0,01	-0,03	-0,13	-0,10
Portugal	-0,17	-0,12	-0,02	-0,06	-0,24	-0,19
Slovakia	-0,08	-0,06	-0,01	-0,03	-0,12	-0,10
Slovenia	-0,13	-0,09	-0,02	-0,04	-0,19	-0,15
Spain	-0,30	-0,21	-0,04	-0,10	-0,43	-0,35
Sweden	-0,08	-0,06	-0,01	-0,03	-0,12	-0,09
United Kingdom	-0,24	-0,17	-0,03	-0,08	-0,35	-0,28
Bulgaria	-0,09	-0,06	-0,01	-0,03	-0,13	-0,10
Romania	-0,05	-0,03	-0,01	-0,02	-0,07	-0,05
Croatia	-0,06	-0,04	-0,01	-0,02	-0,08	-0,06
EU28	-0,17	-0,17	-0,02	-0,06	-0,25	-0,25

Note: results under the assumption of retail sector technology shock.
Source: results from the simulation using the CGE model.

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