Identification of factors affecting the popularity of cross-border online shopping in the European Union countries

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Abstract

The popularity of cross-border online purchases among consumers in EU countries is strongly diversified (between 3% and 81% of Internet users). The level of Internet penetration in a given country and the level of involvement in online shopping measured by the percentage of online shoppers do not adequately explain this diversification at EU countries level. Paper goal is to explain the level of the percentage of cross-border online shoppers at 34 European countries level, including 28 EU countries, 2 EEA members and 4 EU candidates, using the Classification And Regression Trees (CART) approach. Data used include the Eurostat quantitative data, supplemented with mystery shopping study data commissioned by the European Commission, indicators for local B2C e-commerce markets, and qualitative variables - e.g. sharing an official language, being insular country. The main identified factors affecting the level of cross-border online shopping are geo-blocking practices of online sellers, level of online-shopping from national sellers, having a common/similar language with another country, and EU membership. Unexpectedly, the existence of the local language version of AliExpress.com website coincides with the higher level of cross-border online shopping.

Keywords: *online cross-border shopping, B2C e-commerce, geo-discrimination, EU countries, CART analysis*
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1 Introduction

During last 20 years, B2C and B2B e-commerce transformed the retail landscape substantially all over the world. Merchants adopted the internet technologies successfully and created online channel not only substituting the physical one but also making both channels complementary (Mącik, 2015). Easy access to various goods, easy comparison of prices and products, extended time to return goods, are main advantages of online shopping for consumers. Globalisation and economic integration made e-commerce activities not limited to domestic markets (Schu et al. 2016), allowing the retailers operate globally, also via global marketplaces (Jiang et al. 2011), influencing international logistics growth.

The cross-border online shopping still faces many obstacles, mainly legal, financial and logistics related ones. Even in economically integrated zones like the EU Member States, the consumers are frequently unable to shop online abroad, being discriminated in their consumer

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rights. Those practices conflict with the fundamental European Union freedoms, particularly with free movement of goods. Some difficulties can arise when the shopper's country of residence and the seller location are in countries without free trade agreements or customs unions, but as Chinese and United States sellers prove, those issues are easy to overcome, in contrast to prolonged time for delivery (Cho and Lee, 2017).

The aim of this paper is gaining a better understanding of country-level differences in online cross-border shopping for European countries including 28 EU Member States and a few EU candidates as well as two members of European Economic Area (EEA). Determinants of online cross-border shopping based on cross-national data are explored and explained using the Classification And Regression Trees (CART) approach.

2 Cross-border online shopping – a brief literature review

The term cross-border online shopping is the analogue to offline (traditional) cross-border shopping, differing only in the channel used (online instead offline). Such activity involves cross-border transactions, based on selling online physical or digital products to consumers with (legal) residence in another country than seller's (legal) location (Ballard and Lee, 2007). Similar terms such: overseas direct purchases, overseas online shopping, foreign online shopping, and cross-border e-sales are also used (Cho and Lee, 2017). The author proposes to distinguish between using "cross-border" term (for purchases in the neighbouring country or within the continent – e.g. Europe) from the word "overseas" fitting better (when real overseas shipping is involved – e.g. Asia to Europe). This is more than a semantic difference because shopping online is typically perceived easier when countries have similar geographic and cultural characteristics (Gomez-Herrera et al., 2014).

In effect, the level of cross-border online shopping varies substantially from country to country, even within Europe and EU-members. Online consumer markets within EU are far from the common market idea (European Commission, 2015). The differences in popularity of online cross-border purchases are the result of demand-side and supply-side factors. For demand side, cost related factors and connected with the time of delivery as well as mentioned legal difficulties (taxes and duties), possible language difficulties and perception of being discriminated by the foreign seller on the base of nationality or location, are favouring shopping from national sellers. From the supply side, high consumers involvement in cross-border online shopping may come from the size/structure of the national market, e.g. in a case of small (Luxembourg) or insular countries (Malta, Cyprus), where operating a separate national e-commerce infrastructure is not feasible. Also countries sharing a common language

are expected to have a higher involvement in online shopping abroad (Gomez-Herrera et al., 2014).

On the microeconomic level, the still common trade agreements between producers and resellers lead to granting territorially limited rights for distribution of products and brands (leading to grey online markets and lateral import). Even for digital goods, where instant delivery is possible, the intellectual property rights and different taxation (e.g. for movies, music), make international sales impossible or unwanted. Legal and logistic barriers in cross-border e-commerce arise for physical goods involving higher shipping cost, increasing the risk of damaging parcels in transit (Kawa, 2017), and requiring international payments handling, with the duties and taxes deduction (Gomez-Herrera et al., 2014). Also, sellers' self-limitation practices (treating foreign purchases as unwanted from technical, logistics, cost or communication reasons) lead to geo-discrimination practices experienced by consumers. Geo-discrimination takes the form of geo-blocking - the practices of automatically limiting access (or changing the terms of sale) by geo-localisation of the user's device connecting to seller's website. Less automated practices based on address filled in delivery form also apply. Mącik (2017) provides a detailed discussion about geo-discrimination of consumers.

3 Method

Paper uses the exploratory approach with secondary data analysis. The research question is:

RQ: *What factors are explaining the differences in popularity of cross-border online shopping on a country level in Europe, with the focus of European Union member states?*

Data used include quantitative secondary data retrieved from the Eurostat (data series: isoc_ec_ibuy), including the percentages of internet users buying online from national sellers and from abroad. It was supplemented with geo-blocking prevalence data retrieved from mystery shopping study (European Commission, 2016), and other selected indicators including qualitative variables, dichotomously coded (Yes/No) – e.g. the insular country location, small population country (<1 million of inhabitants), EU membership, common or similar official language to another country, and also having Amazon.com branch with national website and/or having AliExpress.com website in local language.

The dependent variable to explain was the level of popularity of cross-border online shopping on country level measured as the percentage of Internet users declaring making at least one cross-border transaction to buy goods or services over the internet. Collected data refer to 28 EU Member States and six other countries: two EEA members (Iceland and Norway), and four EU Candidates (Turkey, Serbia, Montenegro, FYR of Macedonia).

The Classification And Regression Trees (CART) approach (Breiman et al., 1984) is a primary analytical method used (as the number of objects is low in relation to the independent variables, not linear dependencies are observed, and no natural clusters are identified). CART analysis is nonparametric and robust to outliers. Technically the algorithm grows a large tree and then prunes it to a size having lowest cross-validation error (Loh, 2014).

4 Results

Buying online activities level (regardless domestic or abroad) varies substantially from country to country within Europe and EU-members (Fig. 1).

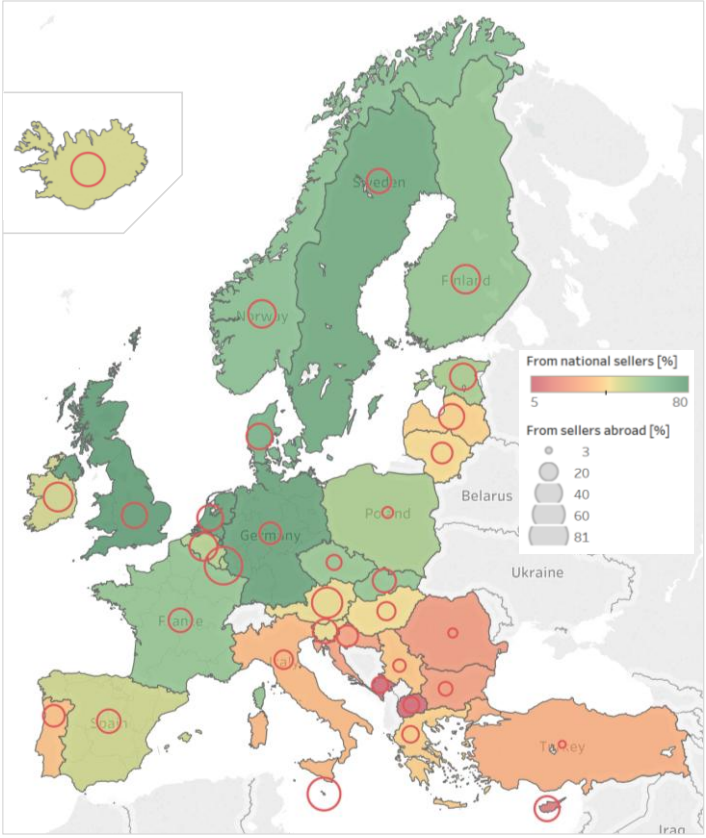

Fig. 1. Online purchases (from national sellers and from abroad) in 2017 – map.

The popularity of cross-border online shopping in 2017 in European countries according to Eurostat estimation ranged between 3% and 81% (for Turkey and Luxembourg respectively). Mean for this variable was 31.5% with standard deviation equal 17.9%, and median equal 32%. In four countries (Serbia, Poland, Romania, Turkey) cross-border online shopping is practised by less than 10% of Internet users. At the same time between 5% and 80% of internet users (for Montenegro and United Kingdom respectively) were shopping

online from national sellers. For UE members mean and median for such activities were 45.5% with standard deviation 20.3%, being the lowest for Cyprus (11%) and Malta (18%).

Both variables are assumed as positively correlated on a country level, but according to Eurostat, this correlation weakens with time, for 2017 being not significant (Pearson r=0,3, p=0,085). Also, the not linear relationship between online purchases from national sellers and abroad seems to be weak (Fig. 2), suggesting seeking other explanatory variables.

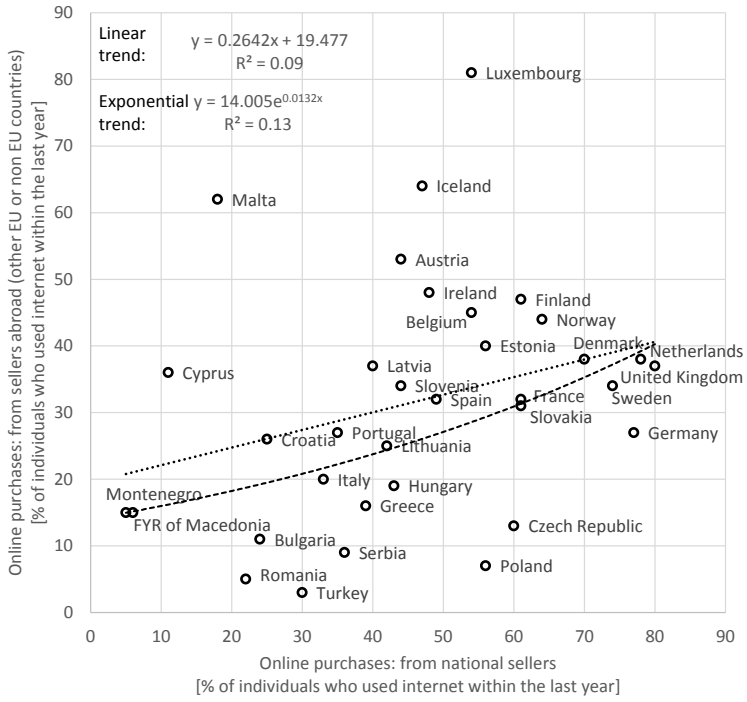

Fig. 2. Online purchases (from national sellers and from abroad) in 2017.

As Gomez-Herrera et al. (2014) and Mącik (2017) research suggest, among possible variables explaining the level of cross-border online shopping can be the prevalence of geo-blocking (data available for EU Members only), and qualitative variables described earlier. The prevalence of geo-blocking the purchases of consumers from abroad is very high – in average in 68.5% of cases making cross-border online purchase encountered difficulties (with standard deviation = 6.2%, median 69%, min. 57% (for the UK), and max. 78% (for Latvia)).

As the number of observations is low, and most of the independent variables are qualitative, the Classification And Regression Trees (CART) analysis with V-fold cross-validation has been performed including for EU members the geo-blocking prevalence, and shopping online from national sellers for all 34 countries as quantitative explanatory variables, and set of qualitative variables. As analysis goal was to explain mainly the lowest and the highest values for cross-border online shopping, the response variable has been coded

into three classes: “low” (<15%), “average” (16-41%) and “high” (>=42%). Optimal trees using Breiman et al. (1984) procedure involving costs of classification were found (Fig. 3, Fig. 6).

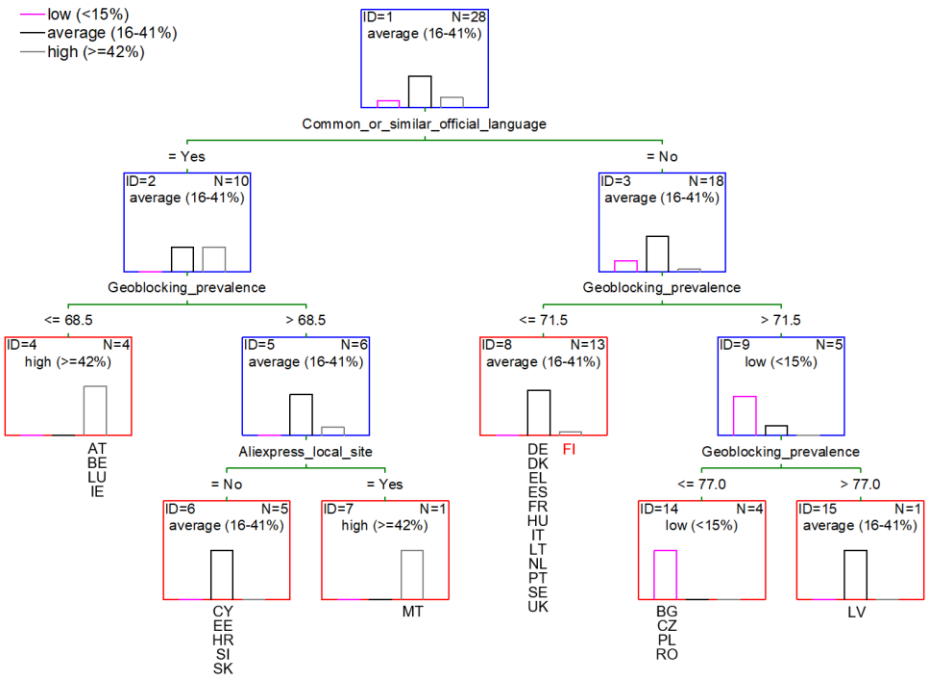

Fig. 3. Classification tree for EU Member countries – dependent variable: Online purchases from sellers abroad (other EU or non-EU countries) as % of individuals who used internet within the last year (country name shortcuts according to ISO 3166 alpha-2 format).

The classification for EU Member countries is efficient, only one case (Finland) is misclassified (to “average” class instead “high” one - Fig. 4). That gives classification accuracy of 96.4%. The “high” value of cross-border online shopping popularity is connected mainly with having common or very similar official language with another country and lower than 68.5% prevalence of geo-blocking (cases of Austria, Belgium, Luxemburg and Ireland). Alternatively sharing a common language, higher geo-blocking prevalence than 68.5% and the existence of Aliexpress.com site in local language also gives the same classification result (case of Malta). For “low” class of cross-border online shopping popularity most likely leads having own national official language and geo-blocking prevalence between 71.5% and 77% (Bulgaria, Czech Republic, Poland and Romania are classified to this group).

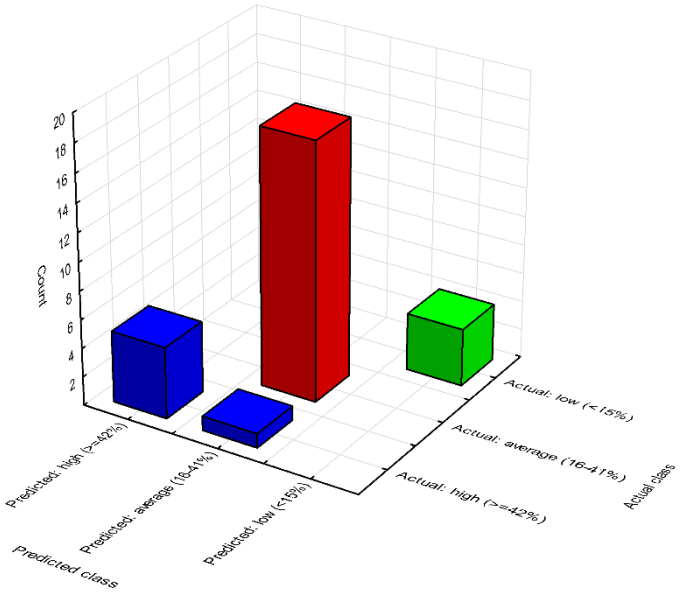

Fig. 4. Classification effectiveness for the tree from Fig. 3.

In classification, main role played numerical variable the prevalence of geo-blocking, and the existence of localised websites of global online marketplaces (particularly AliExpress.com) (Fig. 5). Smaller importance had being very small country (<1 million of inhabitants), insular location and common or similar official language with another country.

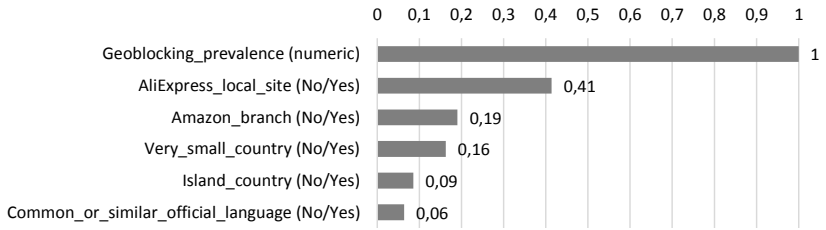

Fig. 5. The importance of predictors in classification from Fig. 3.

In the second case (34 countries) the percentage of internet users shopping online from national sellers substituted the prevalence of geo-blocking because of lack of data for six non-EU countries. This classification is less efficient (with an accuracy of 82.4%) – only the "average" group is classified well. More often countries were misclassified to "average" class instead "high" one, than to "average" class instead of "low" (Fig. 7).

For 34 countries case, the EU countries are firstly separated from non-EU ones. In a non-EU group, the level of cross-border online shopping depends on the online shopping from national sellers. Values >41,5% result in "high" activity in cross-border e-commerce (Iceland, Norway), values <41,5% create "low" group (Montenegro, FYRoM, Serbia and Turkey). For

EU countries lower values of the of cross-border online shopping from higher ones are separated by common/similar official language. Lack of common language connected with domestic online shopping <28.5% leads to "low" class for cross-border online purchases (Bulgaria, Romania). For common/similar language criterion met, the result is "average" or "high" (more likely if AliExpress.com site in the local language exists (Ireland, Malta)).

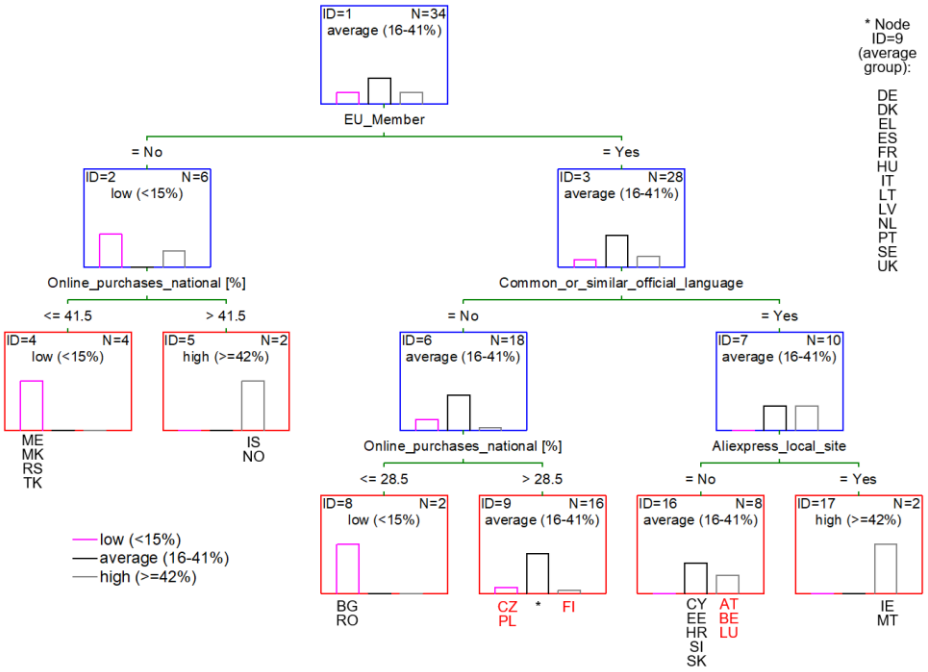

Fig. 6. Classification tree for 34 European countries – dependent variable: as in Fig. 3 (country name shortcuts according to ISO 3166 alpha-2 format).

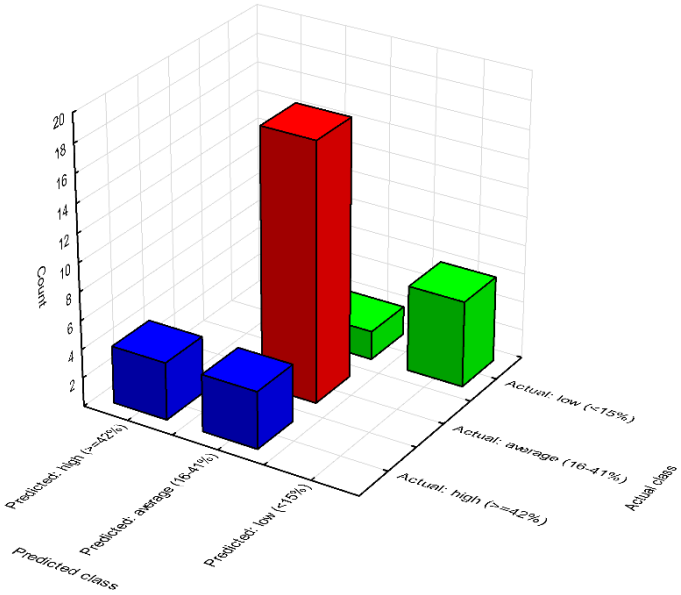

Fig. 7. Classification effectiveness for the tree from Fig. 6.

Unfortunately, three smaller countries with a common language (Austria, Belgium and Luxembourg) are classified in "average" group instead "high" one. Also, Poland and the Czech Republic are classified as "average" instead "low", because of having quite a high level of domestic online purchases activity. Finland is misclassified in both analyses.

The primary role in classification for 34 countries case played numerical variable: the percentage of Internet users shopping online from national sellers. Categorical variables: being insular country and the existence of localised websites of global e-commerce marketplaces (in that case more likely Amazon.com), as well as sharing common language, and being EU Member country were less important for classification (Fig. 8).

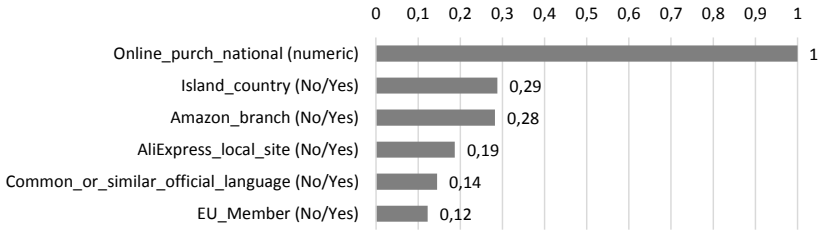

Fig. 8. The importance of predictors in classification from Fig. 6.

Conclusions

Obtained results for EU countries confirm the supposition that higher geo-blocking prevalence discourages consumers from engagement to cross-border online shopping (the case of larger Central European countries). Lower geo-blocking level with sharing common/similar official language with another country favour higher level of cross-border online shopping on a country level (particularly for smaller countries). In case of 34 European countries, the accuracy of classification is worse, although it is confirmed that the level of online shopping from national sellers leads to higher percentage of Internet users buying online abroad, particularly for six non-EU countries. Having common/similar official language, as well EU membership allows predicting the level of cross-border online shopping on the country level as "average" or "high". An unexpected finding is that the access to Aliexpress.com website in official country's language may lead to the substantially higher use of cross-border online shopping (for Malta and Ireland) – this requires further examination.

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