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Regulation of Geo-blocking: does it address the problem of low intraEU iTrade?

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Abstract: The goal of the article is to critically verify and to discuss main areas necessary for increasing intraEU iTrade. To achieve this aim, the legal analysis of the regulation is confronted with the econometric approach identifying the main determinants of cross-border e-commerce. The model is based on data from a survey conducted among 6901 Polish business owners in 2017. Our hypotheses include the following issues: (1) the main barrier of intraEU iTrade is the low level of integration of digital technologies by SMEs; therefore (2) the character of the impact of legal means adopted in the regulation 2018/302 on the development of transnational service provision and entrepreneurship based on e-commerce is doubtful. We argue that the introduction of more and more advanced requirements by EC will only reduce their interest in developing business abroad through cross-border e-commerce and result in losing the opportunities linked to the development of digital economy.

Keywords: intraEU iTrade, cross-border e-commerce; geo-blocking; digital economy; DSM; European Union

JEL codes: F14, F18, K33, L81

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1. Introduction

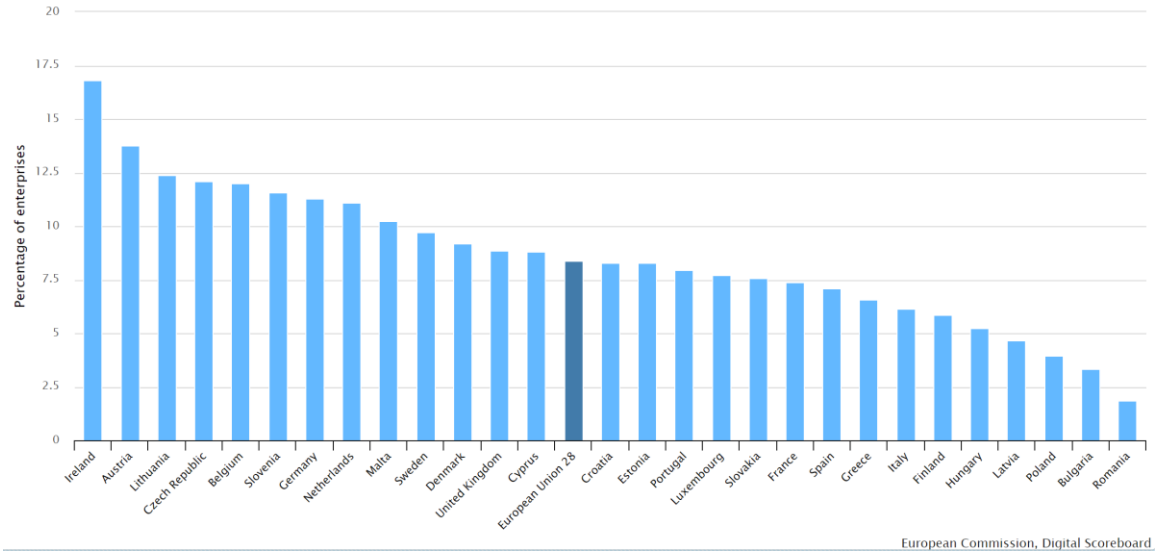
Digital technology is crucial for micro and small enterprises and gives them a high potential to facilitate running the business. It changes how the enterprises operate and provide them with the opportunity to scale their business and directly participate in the global trade, as it gives access to global markets thanks to the development of e-commerce solutions (McKinsey & Company 2016). Moreover, the integration of digital technology not only facilitates communication and management but also permits using data analysis to develop new or improved products and services. These processes have a dual impact on economic activities. On the one hand, thanks to digital technology customers have better access to global markets which is associated with a broader choice and lower prices. On the other hand, from the perspective of micro and small enterprises, this means more competition even in their local markets. The integration of digital technology by firms is becoming a leading factor in their business development and plays a significant role in cross-border cooperation.

Cross-border e-commerce between the member states of the European Union (hereinafter intraEU iTrade) is very low which shows that digital single market needs to be strengthened to use e-commerce potential within the EU. Additionally, in the context of the dynamic development of e-commerce in China and the USA, this fact becomes an essential challenge for shaping the economic policy in the EU. That is why the European Commission (hereinafter EC), building the Digital Single Market, has set one of the main goals the removal of barriers in e-commerce and boosting the intraEU iTrade as one of the primary goals. However, it seems that the EC's activities mainly focus on the limitations imposed on e-stores. Since the beginning of implementing *A Digital Single Market Strategy for Europe*, unjustified geo-blocking has been defined as one of the main barriers in cross-border e-commerce supposed to be removed from the internal market. To achieve this goal, the European Union has recently adopted the *Regulation 2018/302 on addressing unjustified geo-blocking and other forms of discrimination based on customers' nationality, place of residence or place of establishment within the internal market.* The aim of the regulation 2018/302 is to combat online discrimination concerning the commercial activities linked to e-commerce.

In the article, we examine the determinants of cross-border e-commerce between the member states of the European Union (hereinafter intraEU iTrade). While 15% of European consumers are already buying online from abroad, only 8% of European companies use cross-border e-commerce channel to build their business relationships internationally. Ireland, Austria, Lithuania, and the Czech Republic are among the EU leaders in transnational e-

commerce, while Slovenia exhibited the highest growth over the 2014 – 2018 period (Figure 1). Statistics for Polish companies are particularly worrying. Only 9.5% of Polish SMEs have been selling online in 2017, while only 4% to other EU countries. Moreover, the turnover from online sales accounted for only 6.6% of the total turnover of all Polish enterprises (10 or more employees) in 2017. The weighted combination of those statistics places Poland only at 25th place in the European Union, regarding e-commerce overall.

Figure 1: Share of small and medium enterprises (SMEs) selling online cross-border (2017)



Source: European Comission, Digital Scoreboard (2018).

The intraEU iTrade has the opportunity to boost the European economy, and EC is making a great effort to make it happen. Since 2015, the EC has been vigorously producing legislative proposals which aim is to build digital dimension of the common European market, namely the digital single market. Ambitious and complex plans to facilitate and boost European e-commerce, innovativeness, digital inclusion, and SMEs participation in the digital economy take the form of many regulations and directives. Broadly debated and – often – criticised, regulation 2018/302 is one of them. On the one hand, it has been widely promoted as a mean to end geographic discrimination, e.g., by the rapporteur on geo-blocking reform (Gräfin von Thun und Hohenstein 2018), on the other hand, it has been criticized as a 'baby step' concerning combating online geographical discrimination by the individual members of Parliament.[1]

[1] "Despite saying geoblocking on the tin, this law, the final version of which the Parliament passed today, only addresses three particular cases of location-based discrimination – and not the ones Europeans most commonly run into […]" – Reda (2018)

The primary objective of regulation 2018/302 is to boost cross-border e-commerce by reducing unjustified geo-blocking and other forms of discrimination based on customers' nationality, place of residence or place of establishment. However, the legal definition of geo-blocking is absent from the regulation. Therefore, the first part of the article aims to briefly present the meaning of the term 'geo-blocking' basing on the scholarly literature and the relevant reports. The second part of the article is the attempt to understand the meaning of the term which has been created through the content of the regulation 2018/302. Throughout detailed analysis of the regulation's provisions, we present the sources of doubts concerning the possible impact of the regulation on cross-border e-commerce in the EU. The third part of the article confronts the results of the legal analysis with some economic evidence based on the analysis of data from DESI database and the survey conducted among 6901 Polish business owners (6,230 owners of microenterprises and 671 owners of small enterprises).

Based on our research we argue that the regulation 2018/302 neither addresses the primary concerns of customers regarding cross-border trade nor facilitates intraEU iTrade for the sellers. The EC's legislative initiative is aimed at consumers and removing barriers to accessing online shopping from the buyers' perspective. Meanwhile, as we present in the article, the main barriers are the result of the low level of integration of digital technologies by enterprises. The study contributes to the literature with the analysis of determinants of cross-border e-commerce, based on data about 6,901 Polish small and micro enterprises, collected during the annual survey conducted by PBS survey agency in cooperation with Polish Bank Pekao and DELab UW. This dataset is used for the analysis the main goal of which is to understand whether the regulation 2018/302 is a step towards European Digital Single Market or rather an irrelevant to the development of the digital economy step into past?

2. What is geo-blocking: evidence from the literature review

The evidence based on literature review include the number of definitions and categorizations which aim to describe what geo-blocking precisely.[2] This once strictly technological term has recently achieved recognizability among the broader audience (Trimble 2016b). The EU's focus on geo-blocking resulted in two legislative proposals, first one concerning digital content portability, "enabling subscribers to audio-visual streaming services to keep their subscription when temporarily residing in another Member State" (van Cleynenbreugel 2017) and the

[2] In the article, we decided to use the spelling 'geo-blocking', even though version 'geoblocking' and 'geographical discrimination' is also used in the academic debate on this topic. In case of quotes, we stick to the original spelling of the author.

second – regulation 2018/302 which addresses geographical discrimination in a broader context and refers to some more precisely defined traders' practices. According to L. Kjølbye, A. Aresu, and S. Stephanou (2015) the definition of geo-blocking according to the Commission's approach should be perceived as build on two elements: (1) territorial and pricing restrictions on tangible goods (mostly regulation 2018/302), and (2) territorial restrictions on digital content (regulation 2017/1128 and to certain, limited extent regulation 2018/302).[3]

However, when compared to the definitions proposed in the scholarly literature, the scope of the legislative acts adopted in the EU in the area of geo-blocking seems to be somewhat limited. As M. L. F. Rojas (2018) briefly defines: "Geo-blocking occurs when traders are operating in one Member State block or limit the ability of customers from other Member State to order their goods or services". They notice that the geo-blocking practices may be divided into four main categories: (1) denial of access to a website; (2) automatic re-routing; (3) refusal to sell; (4) and changing the terms and conditions. The character of these tools may not be absolute, as marks M. Trimble (2016b): "the means might not prevent access absolutely; tools exist through which users may circumvent geoblocking, and such circumvention decreases the effectiveness of geoblocking.

As we elaborate on below, technically all of the abovementioned categories are somehow addressed by the regulation 2018/302. However, due to the exemptions implemented in the regulation their actual impact on facilitating the customers' access to goods and services online may be questioned. Moreover, the division between the regulations which refer to goods and the provisions which refer to the digital content (or services provided electronically) is visible in the regulation 2018/302. On the one hand, it is understandable, as the regime concerning removing obstacles regarding cross-border trade in case of traditional goods has a long tradition, and the regime concerning digital content as well as electronically supplied services seems to be in its early phase. On the other hand, even though the differentiation has been implemented to the regulation, it does not necessarily provide the solutions suitable for the specific character of goods and services in question. Last but not least, the perspective focused on customer's access to goods and services seem to miss the crucial determinants which influence intraEU iTrade. One shall not forget that adopting a regulation which technically should empower customers usually means that the entrepreneurs are obliged to adjust their

[3] The authors suggest that geoblocking may be analysed from the perspective of competition law as an abuse of dominance and analyse the possible scenarios in such cases

economic activities to the new conditions. Therefore, there is a definite need for detailed analysis of the regulation 2018/302 content.

3. Legal analysis of the regulation 2018/302

In this part of the article, we analyse the regulation 2018/302 from a strictly legal perspective of analysis. We examine the aim, scope, and exemptions which have been implemented to the regulation's provisions and present the terminological doubts which shall be raised to assess the possible impact of this legal act. The elements which will be put under consideration include the following detailed concepts implemented in the Regulation 2018/302 provisions: (1) exclusion of the services which are linked to the content protected by the copyrights. We argue that this exemption will lead to marginal effects of the regulation in terms of customers' perspective; (2) the concept of the place of delivery upon which both sides of the agreement agreed; (3) lack of terminological clarity which, as we argue, will result with very limited scope of the regulation's impact on cross-border e-commerce. The goal of the analysis is to present the actual meaning of the regulation 2018/302: it is necessary to translate the provisions into their possible, economic impact throughout the analysis of the data concerning the economic activities of micro and small enterprises (see the section 4 of the article).

The aim of the regulation 2018/302, as defined in Art. 1, is to prevent unjustified geo-blocking and other forms of discrimination based, directly or indirectly, on the customers' nationality, place of residence or place of establishment, including by further clarifying certain situations where different treatment cannot be justified under directive 2006/123/EC. Reference to Art. 20(2) of the directive 2006/123/EC indicates that the differentiation of the general conditions of access to a service justified by objective criteria is allowed. In the case of geo-blocking, this can be illustrated by the example of offering the same products or services to customers from different member states for various prices which reflect differences in purchasing powers. Moreover, it must be noted that the provisions of regulation 2018/302 refer to the insufficient number of aspects of cross-border e-commerce. Means adopted to achieve the ambitious goal of the regulation seem to be rather modest and include the following elements of transaction: (1) access to interfaces in Art. 3; (2) access to goods and services in Art. 4; and (3) non-discrimination for reasons related to payment in Art. 5.

Concerning the access to interfaces, the legislation forbids the trader to block or limit a customer's access to the trader's online interface for reasons related to the customer's nationality, place of residence or place of establishment. The article addresses the situation in

which the customer would be automatically forced to use the particular version of the website. According to Art. 3, the customer should give his explicit consent for redirecting him or her to the other version of the interface to one that he sought to be connected to. Moreover, the regulation 2018/302 explicitly states that the version of the trader's online interface to which the customer initially sought access shall remain easily accessible to that customer.

Technically, Art. 4 should prove to be more critical from the perspective of customers in case of ordering online goods or services from abroad. It focuses on ensuring equal general conditions of access to goods or services. As defined in Art. 2, the term ‘general conditions of access’ means:

> all terms, conditions and other information, including net sale prices, regulating the access of customers to goods or services offered for sale by a trader, which are set, applied and made available to the public at large by or on behalf of the trader and which apply in the absence of an individually negotiated agreement between the trader and the customer.

As explained in the Article 4(2) and the motive 27 the prohibition of the discriminatory treatment should not be understood as precluding the freedom of traders to offer different conditions, including different prices, in different points of sale or to make specific offers only to a specific territory within a Member State. As long as the differentiation of offer is not discriminatory – it is allowed.

Moreover, it should be noted that Art. 4 applies to the catalogue of enumerated situations. Firstly, the case of selling goods to customers in member states to which the trader offers delivery or to a location agreed upon between the trader and the customer. This solution is understandable, as the regulator wanted to avoid a situation in which the trader would be forced to sell products to all the member states. However, doubts may be raised concerning the potential impact of adopted provision: to what extent is it possible to develop the network of common places of delivery, which would boost EU's cross-border e-commerce? Secondly, the Art. 4 applies to situations in which the customer receives electronically supplied services from the trader, other than services the main feature of which is the provision of access to copyright protected works or other protected subject matter. This exemption is the source of scepticism concerning the possible effects of the regulation. Not only research on geo-blocking seem to be focused on its links to the works protected by copyrights (Trimble 2016a), but also the proposed revision of the regulation suggests that the decision makers perceive this issue as a key problem concerning guaranteeing web free from the digital reflection of the states' boundaries. However, the territoriality of copyrights creates a great obstacle to any initiatives

which are connected to this regime (Kjølbye et al. 2015). Thirdly, the Article 4 refers to services supplied in another way than electronically. This element of the regulation could raise doubts concerning its redundancy, as the general prohibition of discrimination based on nationality seems to cover these kinds of situations.

Finally, Article 5 of the Regulation, concerns the means of payment which should be accepted by the trader. The regulation refers to the means of payment accepted by the trader. Among them, there should occur no discriminatory treatment on the grounds of customer's nationality, place of residence or place of establishment, the location of the payment account, the place of establishment of the payment service provider or the place of issue of the payment instrument within the Union. Detailed catalogue of the conditions under which the article applies, include: (1) the fact that the payment is made through an electronic transaction by credit transfer, direct debit or a card-based payment instrument within the same payment brand and category; (2) authentication requirements are fulfilled pursuant to Directive (EU) 2015/2366; and (3) the payment transactions are in a currency that the trader accepts.

It seems that the regulation 2018/302 implements provisions, which may have an impact on cross-border e-commerce under particular conditions, e.g., if trader offers his goods or services to the particular country, if trader offers goods or services which are not protected by copyrights, or if trader accepts payment in particular currency. Moreover, the number of exemptions leads to even the more limited scope of the regulation. The provision which relates to Art. 2 of the directive 2006/123/EC leads to the exemption of the number of services from the scope of the regulation, including among others, financial services, electronic communication services, or audiovisual services. This provision could, under certain circumstances, bear severe consequences for the effectiveness of the regulation 2018/302. The proposal of European Electronic Communication Code (EECC), if adopted, may implement the new category of electronic communication services, namely interpersonal communication services. It would lead to qualification of the OTT communication services, e.g. Facebook Messenger, WhatsApp, or Skype, as electronic communication services. The result would be even further restrictions on the possible effects of the regulation 2018/302.

From a strictly legal perspective, what does the regulation 2018/302 seem to guarantee is not to diminish the differences between the general conditions of access to services itself, but rather – as presented above – general access to information on these differences. Compared to the above-mentioned four categories of phenomena which are considered as geo-blocking in the relevant literature, technically the regulation covers all four: 1) denial of access to a

website, as it prohibits blocking the interface to which the customer sought the access; (2) automatic re-routing, as it demands on the trader to receive the consent of the customer for redirecting him or her to the other version of the website; (3) refusal to sell, as it obliges the trader to provide the access if he or she sells to the member state from which the customer is trying to buy the good or service; (4) and changing the terms and conditions, which can vary solely on non-discriminatory grounds. However, limitations mentioned above, especially concerning the refusal to sell, may result with insufficient effects of the regulation concerning the customers' perspective.

On the other hand, one may wonder to what an extent will the regulation influence the willingness of the entrepreneurs to engage in intraEU iTrade because there seem to be more obligations than possibilities linked to such a move. The necessity to provide non-discriminatory grounds for differentiation of the conditions of access in case of offering one's goods or services to the customers abroad may become instead of a possibility, a challenge to, e.g., SMEs. Moreover, the fact of considering geo-blocking as a primary obstacle for boosting intraEU iTrade is questionable: the next section of the article examines in detail how does the regulation answer the issues which limit the possibilities of boosting cross-border e-commerce in the EU.

4. Determinants of cross-border e-commerce: economic evidence

Digital transformation gives new opportunities for markets and companies to become international and competitive. Technological progress and the new possibilities to get to customers (B2C) and other firms (B2B), enables every business to buy or sell on a global scale. Especially SMEs can benefit and develop their activities via e-commerce. Digital technologies constitute the basis for purchasing and selling services and goods online, and the possibility of expanding distribution channels through e-commerce is a vital development opportunity for micro and small enterprises. Meanwhile, only 3% of Polish SMEs use advanced cloud computing services, i.e. accounting software, CRM software or computing power, which is a percentage that deviates significantly both from the average value for the “old” EU member states – EU-15 (15%) and for the new EU member states – NMS (8%). Polish micro and small enterprises are also unwilling to open themselves onto the foreign markets: numerous barriers that the businesses need to face as they decide on whether to expand to new markets might cause the low share of Polish entities selling abroad.

In this section, we present the economic analysis of the determinants which influence intraEU iTrade. The structure of the section is as follows: (1) detailed description of the methodology (datasets and model used for the calculations as well as theoretical inspirations); (2) conclusions drawn from the analysis. We argue that the main factor which has an impact on the readiness of SMEs to participate in cross-border e-commerce is the integration of the digital technologies. Therefore, the obligations mentioned above linked to the online presence of traders may impede the willingness of the European SMEs to participate in intraEU iTrade, instead of boosting their readiness to be a part of the global e-commerce market.

4.1. Methodological remarks and theoretical inspirations

The study addresses the problem and focuses on the analysis of determinants of cross-border e-commerce sales of Polish micro and small enterprises. Data were obtained from PBS sp. z.o.o survey agency that has been conducting a survey on micro and small enterprises (1-49 employees) for the last seven years. The dataset includes basic information about those companies, e.g., their financial situation, employment, exports, innovation, investment, and sources of external finance. In 2017, the survey was extended with the questions, formulated by DELab UW, concerning digitalization of those enterprises. Among the issues which were examined were the usage of digital technologies, the exploitation of e-commerce, online advertising channels or online banking usage (Pekao and DELab UW 2018).

For the analysis, the binomial regression in a simplified version of the approach inspired by the Helpman-Melitz-Rubinstein model was used (Helpman, Melitz, and Rubinstein 2008). The need for simplification proposed in this study mainly results from the limited data availability which hinders the possibility for the direct implementation of international trade model to study cross-border e-commerce determinants. Nevertheless, the scope of the dataset enables to take into account the firms' heterogeneity (Melitz 2003) related to differentiation in industries. Moreover, it allows taking into consideration the firm's location, which is linked with (1) differentiation of the productivity in the various regions and (2) the distance to a border of Poland and neighboring countries.

To verify the main cross-border e-commerce determinants, we propose the binary model where dependent variable is the binary variable, which takes the value of "1" if the firm is engaged in cross-border e-commerce and "0" otherwise. To identify the determinants of such phenomenon, we use the data from the database on micro and small enterprises. The data have been disaggregated to NUTS3 level (sub-regions) and broken down by sectors ("Trade",

"Services", "Production", and "Construction"). Basic data on analyzed companies are considered, such as whether the company is an exporter (*export_*) and whether the company is innovative (*innovation_*). We expect that the fact of being an exporter has a positive effect on engagement in cross-border e-commerce, as well as – basing on results of Brodzicki and Śledziewska (2015) – that innovation has a positive impact.

The database is complemented with variables approximating the traditional determinants of international trade, used in well-known gravity model for international trade developed by Tinbergen (1962). Therefore, we use the data representing the distance between countries (*border_* – a binary variable informing whether the sub-region is in the near distance to the border) and Gross Value Added (*gva_*) of each sector in each sub-region (GUS 2017). According to Helpman-Melitz-Rubinstein model, it is expected that the fact of being in near-distance to the border has a positive effect (i.e., negative relationship between distance and export) on engagement in cross-border e-commerce, e.g., due to lower shipping costs. Basing on Helpman-Melitz-Rubinstein model, we assume that the relationship with GVA is positive as well. Moreover, the variable approximating the quality of access to the internet (*internet_access_*) in the sub-region of company's headquarters (UKE 2018) is included. In this case, it is expected that the better the internet infrastructure and more widespread access to the internet results, the higher the probability that the firm would engage in cross-border online selling.

Finally, the data on firms' digitalization, informing whether the company has used at least one of four considered digital technologies (*one_digital_*) are included. The analysis of data collected by the firm on its clients (*digital_data_*) enables the firm to adjust the provision of their products and services, focusing more on clients' needs and preferences. The use of systems for internal management, such as CRM (Customer Relationship Management) solutions (*digital_systems_*) or systems for cooperation with business partners, such as ERP (Enterprises Resource Planning) and SCM (Supply Chain Management) solutions (*digital_b2b_*) substantially improve the efficiency of company's operations. Last but not least, the usage of cloud computing solutions (*cloud_*) enables the firm to operate at the bigger scale and save on storing their data or maintaining their software, which leads to the increase in firm's efficiency and productivity. Since the usage of digital technologies increases the company's productivity, more productive companies should benefit more from engagement in online international trade (Melitz 2003). Therefore, in the case of all variables related to the digitalization, it is expected that the relation between the usage of digital technologies and

engagement in cross-border e-commerce is positive. The full list of variables is presented in Table 1.

Table 1: The list of independent variables used to identify the determinants of cross-border e-commerce in Poland, with the use of binomial regression

Variable name	Expected sign	Source and type of aggregation	Description
innovation_	+	DELab UW, Pekao survey: firm-level data	Binary variable informing whether the firm has introduced a product or a process innovation during last 12 months
export_	+	DELab UW, Pekao survey: firm-level data	Binary variable informing whether the firm has exported during last 12 months
border_	+	GUS (2018): NUTS3 level	Binary variable informing whether the firm is located in the sub-region in the near-distance to the Polish border
gva_[4]	+	GUS (2017): NUTS 3 level	Gross Value Added of the firm's sector in the sub-region of firm's location in 2015
internet_access_	+	UKE (2018): NUTS 3 level	Calculated as the population density in the sub-region of the firm's location concerning the number of internet services in this sub-region (on building level), i.e. (Population density)/(Internet services)
one_digital_	+	DELab UW, Pekao survey: firm-level data	Binary variable informing whether the firm has used at least one of the four digital technologies (digital_data_, digital_systems_, digital_b2b_, or cloud_) during last 12 months
digital_data_	+	DELab UW, Pekao survey: firm-level data	Binary variable informing whether the firm has collected and processed the data on clients using digital technologies, to increase sales level
digital_systems_	+	DELab UW, Pekao survey: firm-level data	Binary variable informing whether the firm has used digital systems for a firm's management (management of personnel, stock, transport processes, invoicing)
digital_b2b_	+	DELab UW, Pekao survey: firm-level data	Binary variable informing whether the firm has used digital technologies for cooperation with business partners (B2B regarding, e.g., planning, forecasting, supply, production, contract implementation, sales, service)
cloud_	+	DELab UW, Pekao survey: firm-level data	Binary variable informing whether the firm has used cloud computing services for storing data or software maintenance)

[4] Because of the diversity in the sector classification between the one in our database ("Trade", "Services", "Production", "Construction") and the one provided by Polish Statistical Office (access online: https://bit.ly/2mJRXco Table 15 – last visited 26.7.2018) we unify classification in the following manner: *Trade* = trade, repair of motor vehicles, transportation and storage, accommodation and catering, information and communication; *Services* = financial and insurance activities, real estate activities + other services; *Production* = agriculture, forestry and fishing + industry.

To determine which type of binary choice model is more accurate in our case, i.e., logit or probit regression, a series of statistical tests dedicated for that purpose has been conducted. Due to the existence of a so-called class bias[5] in the research sample, for diagnostic tests, the sample is divided into 'training set' (with a proportional number of events and non-events in the dependent variable) and 'testing set' containing the rest of research sample. The procedure for conducting diagnostic tests goes as following: (1) building the model(s) using the training set, (2) calculating predicted values based on built model and testing set (converting them into probability scores), (3) calculating optimal prediction probability cut-off, (4) calculating VIF in order to check for multicollinearity, (5) calculating misclassification error, (6) calculating Receiver Operating Characteristics (ROC) Curve, (7) and calculating Concordance.

Then, the results from the same diagnostic procedure between corresponding logit and probit models (using variables from Model I and II, Table 2) are compared. The results show that in the case of the probit model the optimal cut-off is around 85%, while in the case of the logit model it is around 95%. More importantly, there is no multicollinearity in either model, as VIF varies between 1 and 1.5 in the case of all variables. The misclassification error is the same in the case of the probit and logit model, i.e., 0.0153 in Model I and 0.0149 in Model II, which is very low. The choice between logit and probit model was made based on results from ROC and Concordance tests. The area under ROC Curve (AUROC) in the case of logit model is 0.8714 in Model I and 0.8885 in Model II, while in the case of the probit model AUROC in Model I equals 0.8740 and 0.8882, which implies that in the case of Model I (the base model for our research) probit model exhibits better predictive ability. Moreover, the results from Concordance test are also slightly in favor of probit regression, as in the case of probit Concordance equals 0.87319 for Model I and 0.88846 for Model II, while in the case of logit regression Concordance equals 0.87298 in Model I and 0.88825 in Model II. The results from diagnostic tests and the fact that the original HMR model also uses the probit regression leads to the final choice of probit regression for the analysis. Table 2 presents the final results of probit regression with the use of the entire research sample.

The next stage of the research includes the following steps:

1. We run the regression for the whole sample. We take as a determinant the variable indicating whether the firm is using digital technology (Model I). Then we check whether which type of technology increases cross-border e-commerce (Model II). That means that

[5] Understood as the fact that the proportion of non-events and events in the dependent variable is not the same.

we verify if analyzing data obtained from their customers, using systems for internal management and for cooperation with business partners and adopting cloud computing solutions is needed for boosting iTrade

2. We run regressions for different sectors. We verify our hypothesis for service (Model III), trade (Model IV) and production sectors (Model V)
3. We test what are the determinants of iTrade for the enterprises producing digital content (Model VI)
4. We test how variables determine iTrade, depending on the maturity of the company. We split the dataset into 3 periods depending on the age of enterprises: childhood - Model VII, youth – Model VIII, maturity – Model IX.

4.2. Results of the economic analysis: determinants of intraEU iTrade

The results from Model I (Table A.1, Annex) indicate that innovative and exporting firms are using cross-border e-commerce sale channels with higher probability than other firms. Moreover, if the firm is using at least one of the four considered digital technologies, it is more likely to be a cross-border e-commerce seller as well. To identify which of considered technologies' usage is increasing the probability of being a cross-border e-commerce seller, the Model II is estimated. The results show that each of the variables is statistically significant at least at the 5% significance level, while the usage of digital systems for firm's internal management has the weakest effect on being a cross-border e-commerce seller (both regarding the coefficient value and significance level).

Table A.2 (Annex) presents the results from the calculations based on the above-described models, where sub-samples depending on the sector in which the firm operates in (Model III – Services sector, Model IV – Trade sector, and Model V – Production sector[6]) and the sub-sample of firms who declared to be producing digital content or services (digital content) are extracted. The results indicate that in the case of Trade sector (Model IV), being innovative seems to play a lesser role on being engaged in cross-border iTrade selling activity than in the case of other sectors. On the other hand, in the case of Services industry (Model III), the fact that the firm is located in the sub-region at the border increases the probability of the firm's engagement in cross-border e-commerce selling. Moreover, among the firms who

[6] In our database we also have firms from construction sector but there are only 4 of those who engage in cross-border e-commerce selling. For that reason, we encountered the situation that fitted probabilities were very close to 0 or 1, which is known as perfect/complete separation problem (Gelman et al. 2008).

produce digital products or services, the usage of cloud computing increases the probability of conducting cross-border e-commerce sales. The last finding may indicate that firms who produce digital content and sell transnationally online tend to store their data or maintain their software using the cloud computing solutions.

Table A.3 (Annex) shows the results from the models estimated on sub-samples dependent on firms' age. The results from Model VII indicate that the more widespread access to the internet in the region (*internet_access_*) of youngest firms' (of age between 0 and 3 years) location increases the probability of their engagement in the cross-border e-commerce. Moreover, in the case of middle-aged firms (of age between 4 and 12 years) the usage of digital solutions dedicated for both internal management (*digital_systems_*) and the cooperation with business partners (*digital_b2b_*), as well as the usage of cloud computing solutions (*cloud_*) increases the probability of using cross-border e-commerce sale channels. In the case of the oldest firms (of age more than 12 years) the usage of systems dedicated for analysis of collected data (*digital_data_*) has a positive and highly significant effect on engagement in cross-border e-commerce.

5. Conclusions: regulation on unjustified geo-blocking as an answer to (non-)existing challenges of digital economy?

Boosting the cross-border e-commerce is one of the main goals of the European Commission. One of the essential steps in this field has been the implementation of regulation 2018/302, being celebrated by some a significant victory for non-discriminatory e-commerce. This regulation concentrates on the elimination of barriers faced by consumers: problems when trying to access specific versions of the seller's website, various general conditions of access depending on the customer's nationality or discriminatory treatment concerning payment means allowed by the seller. However, it leaves aside some services which are vital to the iTrade, e.g., audiovisual services and electronic communication services. Assuming the adoption of the broad definition of electronic communication services in the European Electronic Communication Code.[7] Therefore, from a legal perspective, the regulation may lead to severe doubts concerning their effectiveness. In the economic analysis presented in the article, we proposed the different approach to the one presented by the EC: we concentrate on the entrepreneurs' perspective. We took Poland, as a country with relatively low cross-border e-commerce, to assess the determinants having an impact on the entrepreneur's willingness to

[7] Assuming the adoption of the broad definition of electronic communication services in the European Electronic Communication Code.

participate in the intraEU iTrade. To find the barriers of iTrade we proposed the binary model on data from the survey on 6901 Polish business owners in 2017.

Our study shows that the intraEU iTrade is mainly depended on the product innovation, already establish trade relations and the integration of digital technology by enterprises. The more "digital" the enterprises are, the higher is the probability that they are going to succeed in boosting their exports through e-commerce channel. Those of the enterprises which develop their cross-border e-commerce are the ones which are (1) analyzing data obtained from their customers, (2) using systems for internal management and for cooperation with business partners and (3) adopting cloud computing solutions. These technologies are the main factors that decide whether or not the enterprises can expand their business and compete in global markets and that are observed for enterprises in main economic sectors: services, trade, and production.

Low level of digitalization of Polish enterprises is alarming because it is going to impact the Polish share in interEU iTrade. Furthermore, the introduction of more and more advanced requirements by the Commission will only reduce their interest in developing business abroad through cross-border e-commerce. Especially that both, regulations and technologies, are getting more and more advanced. Because many micro and small firms cannot cope with digital transformation, there is a need for public and private support. Instead, our analysis shows that the means adopted in the regulation 2018/302 lead to focusing on the limited number of e-commerce aspects which may contribute to a certain extent – but not necessarily significant – improve the customers' treatment by the online sellers. Simultaneously, the complex support for European micro and small entrepreneurs is still somewhat under-developed.

The main reason for just a small percentage of the Europeans – both the customers and the entrepreneurs – participating in intraEU iTrade may lay somewhere else: the customers abroad are not an interesting target for companies overwhelmed by highly specific obligations which they have to fulfill. According to the results of our research, the current challenge for the European digital economy is the low level of integration of the digital technologies by SMEs. The initiatives undertaken as a part of the Digital Single Market strategy seem to address the threats which could be real if only more entrepreneurs decided to broaden the scope of their business to the intraEU iTrade. The panic which was caused by the General Data Protection Regulation entering into force illustrates how the most vulnerable to the reform were the entrepreneurs who are not tech-giants. Implementing yet another regulation which influences the entrepreneurs who consider the possibility of entering European e-commerce market may

impede they readiness to participate in intraEU iTrade and as a result weaken the EU's position in the global e-commerce market.

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Annex

Table A.1: Probit regression with a dependent variable indicating whether the firm conducts cross-border e-commerce sales or not – the entire research sample

Variable name	Model I	Model II
innovation_	0.297406 **(0.000003 ***)** [0.063537]	0.248467 **(0.000126 ***)** [0.064817]
export_	1.381919 **(0.000000 ***)** [0.062809]	1.366036 **(0.000000 ***)** [0.063526]
border_	0.050606 (0.444) [0.066151]	0.038924 (0.559562) [0.066708]
gva_	0.000001 (0.668) [0.000003]	0.000001 (0.791239) [0.000003]
internet_access_	0.037133 (0.553) [0.062624]	0.024373 (0.702322) [0.063772]
one_digital_	0.420536 **(0.000000 ***)** [0.070755]	----------
digital_data_	----------	0.253001 **(0.001105 **)** [0.077552]
digital_systems_	----------	0.159210 **(0.026641 *)** [0.071821]
digital_b2b_	----------	0.216830 **(0.002623 **)** [0.072066]
cloud_	----------	0.230236 **(0.001486 **)** [0.072460]
(Intercept)	-2.615544 (0.000000 ***) [0.083587]	-2.575817 (0.000000 ***) [0.076932]

Table contains estimated coefficients, p-values in parentheses (), and std. errors in brackets []
Significance codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1, estimated using R software

Table A.2: Probit regression with a dependent variable indicating whether the firm conducts cross-border e-commerce sales or not – sub-samples divided by sectors (Model III – Model V) and sub-sample of firms producing digital products or services (Model VI)

Variable name	Model III (Sample -Services)	Model IV (Sample - Trade)	Model V (Sample - Production)	Model VI (Sample - Digital Content)
innovation_	0.270815 **(0.000981 ***)** [0.082164]	0.271034 (0.0527 .) [0.139916]	0.519437 **(0.00960 **)** [0.200563]	0.471467 **(0.00558 **)** [0.170111]
export_	1.416608 **(0.000000 ***)** [0.081021607]	1.557523 **(0.000000 ***)** [0.137400]	1.177113 **(0.000000 ***)** [0.218446]	1.445591 **(0.000000 ***)** [0.165585]
border_	0.179182 **(0.039949 *)** [0.087224]	-0.082163 (0.5607) [0.141233]	-0.291470 (0.12842) [0.191709]	0.016525 (0.92651) [0.179162]
gva_	-0.000003 (0.464882) [0.000005]	0.000007 (0.3756) [0.000008]	-0.000014 (0.61953) [0.000029]	-0.000006 (0.43551) [0.000007]
internet_access_	0.118374 (0.133143) [0.078820]	-0.158489 (0.3053) [0.154600]	0.053800 (0.76529) [0.180210]	0.214079 (0.14819) [0.148054]
one_digital_	0.351587 **(0.000093 ***)** [0.089976]	0.400238 **(0.0114 *)** [0.158148]	0.600041 **(0.00285 **)** [0.201150]	----------
digital_data_	----------	----------	----------	0.125626 (0.47102) [0.174280]
digital_systems_	----------	----------	----------	0.245261 (0.22463) [0.201978]
digital_b2b_	----------	----------	----------	0.206265 (0.26442) [0.184825]
cloud_	----------	----------	----------	0.508885 **(0.00406 **)** [0.177093]
(Intercept)	-2.617609 (0.000000 ***) [0.108754]	-2.335415 (0.000000 ***) [0.171272]	-2.564331 (0.000000 ***) [0.341961]	-2.782451 (0.000000 ***) [0.273197]

Table contains estimated coefficients, p-values in parentheses (), and std. errors in brackets []
Significance codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1, estimated using R software

Table A.3: Probit regression with a dependent variable indicating whether the firm conducts cross-border e-commerce sales or not – sub-samples divided by firm's age

Variable name	Model VII (Sample - Age 0-3)	Model VIII (Sample - Age 4-12)	Model IX (Sample - Age 12+)
innovation_	0.230283 (0.1932) [0.176982]	0.331039 (**0.000409 ***) [0.093664]	0.197643 (0.0661 .) [0.107555926]
export_	1.636143 (**0.000000 ***) [0.178522]	1.365026 (**0.000000 ***) [0.092217]	1.323603 (**0.000000 ***) [0.104614]
border_	0.140601 (0.4551) [0.188251]	0.079706 (0.416178) [0.098031]	-0.020751 (0.8469) [0.107499]
gva_	0.000001 (0.9475) [0.000007]	-0.000003 (0.611613) [0.000006]	0.000004 (0.5044) [0.000006]
internet_access_	0.359084 (**0.0238 ***) [0.158820]	-0.036209 (0.707563) [0.096523]	-0.014614 (0.8911) [0.106762]
one_digital_	----------	----------	----------
digital_data_	0.321895 (0.1307) [0.212997]	0.037318 (0.746269) [0.115335]	0.510022 (**0.00041 ***) [0.124338]
digital_systems_	0.278207 (0.1720) [0.203688]	0.278314 (**0.007672 ****) [0.104387]	0.012744 (0.9147) [0.118910]
digital_b2b_	0.283508 (0.1547) [0.199238]	0.314947 (**0.002003 ****) [0.101930]	0.047939 (0.6991) [0.124021]
cloud_	-0.007903 (0.9687) [0.201706]	0.265967 (**0.010332 ***) [0.103711]	0.224312 (0.0668 .) [0.122388]
(Intercept)	-2.740526 (0.000000 ***) [0.231560]	-2.643117 (0.000000 ***) [0.118348]	-2.519857 (0.000000 ***) [0.119582]

Table contains estimated coefficients, p-values in parentheses (), and std. errors in brackets []
Significance codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1, estimated using R software

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