

**E-COMMERCE ADOPTION BY EUROPEAN FIRMS:
A CROSS-COUNTRY MULTILEVEL ANALYSIS**

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Resumo

A adoção do comércio eletrônico tem vindo a ser reconhecida como uma nova forma de retalho, bem como uma forma inovadora de identificar, adquirir e reter clientes. As empresas têm tendência a enfrentar a incerteza no momento de decidir se irão ou não investir num canal na Internet, dado que são necessários recursos internos e a oferta de um serviço que faça os clientes quererem efetuar novas compras pela Internet. Os estudos nesta área focam-se principalmente em três dimensões: organizacional, tecnológica e contextual (Rodríguez-Ardura & Meseguer-Artola, 2010; Zhu, Kraemer, & Xu, 2003). São poucas as firmas que usam apenas canais virtuais para vender produtos/serviços/informações, sendo o retalho tradicional e o multicanal os canais mais utilizados pelos retalhistas (Zhu, Kraemer, & Xu, 2006; Li, Troutt, Brandyberry, & Wang, 2011). Em consequência, a adoção de comércio eletrônico enfrenta vários obstáculos, nomeadamente técnicos, cognitivos, sociopolíticos, económicos, legais, financeiros, culturais e organizacionais (Zhu, Kraemer, & Xu, 2003; Molla & Licker, 2005; Kshetri, 2007).

Tendo em consideração a heterogeneidade contextual, torna-se evidente que os fatores que dificultam a adoção do comércio eletrônico não são os mesmos em diferentes empresas ou países, o que origina um fosso digital a nível global. Assim sendo, o nosso foco ao longo desta dissertação será em empresas que ainda não adotaram o comércio eletrônico, considerando os diferentes inibidores no momento da tomada de decisão pelos gestores, bem como as diferenças que existem em cada países e entre países da União Europeia. A questão principal a ser respondida será: Quais os fatores que inibem a adoção do comércio eletrônico em cada país europeu? Considerando esta questão basilar, irão ser analisadas as atitudes das empresas europeias perante a adoção de comércio eletrônico, cruzando impedimentos específicos à adoção de e-comércio (como por exemplo, os elevados custos associados à entrega ou a natureza do negócio) com características específicas dos retalhistas (covariáveis): dimensão da empresa, tipo de produto transacionado, os canais de venda, a posição dos entrevistados na empresa, bem como se estão já ou não a exportar produtos ou serviços. Para explorar estas atitudes das empresas europeias perante a adoção de comércio eletrônico, foi proposto um modelo conceptual que combina uma estrutura em dois níveis: a nível individual, o modelo analisa as atitudes em cada país relacionada com as barreiras associadas à adoção do comércio eletrônico; e ao nível do país, onde são identificadas as diferenças e as semelhanças entre os países

européus. O modelo estatístico combina uma componente fatorial e uma componente de regressão. Para além disso, foi estimado usando o método de máxima verosimilhança, recorrendo ao software MPlus 6.12. Como o CFI é 0,989, o TLI é 0,984 e o RMSEA é 0,034, podemos concluir que o ajuste do modelo é excelente (Hu & Bentler, 1999). Os resultados revelam que aspetos como a dimensão da empresa e a posição dos entrevistados não influenciam as atitudes em relação à adoção do comércio eletrónico. Contudo, são três as covariáveis identificadas como tendo aversão à adoção do e-comércio: as empresas que usam as televendas, as empresas que usam o call center como canal de vendas e os retalhistas que optam pelas vendas diretas (comércio tradicional), bem como as que vendem produtos não alimentares.

Abstract

E-commerce has been recognized as a new form of commerce and a fresh way to identify, target, and retain customers. However, firms are often uncertain about investing in the online channel as there is no guarantee this will result in consumers engaging in online transactions. The studies on e-commerce adoption usually distinguish the following three dimensions: environmental, technological, and organizational (Rodríguez-Ardura & Meseguer-Artola, 2010; Zhu, Kraemer, & Xu, 2003). There are few purely virtual firms, and the traditional channel and multichannels continue to be the predominant types of retail channels used by firms (Zhu, Kraemer, & Xu, 2006; Li, Troutt, Brandyberry, & Wang, 2011). This is due to the many obstacles faced by firms adopting e-commerce; more specifically, they must overcome important technical, cognitive, socio-political, economic, legal, managerial, financial, and cultural challenges (Zhu, Kraemer, & Xu, 2003; Molla & Licker, 2005; Kshetri, 2007).

Given the heterogeneity of contexts, the factors constraining the adoption of e-commerce are not the same across firms and countries (digital divide). In light of this, our focus will be on firms that have not yet taken the decision to adopt e-commerce due to a set of restraints, and on analyzing the differences within- and between-countries. The research question to be answered is: What are the inhibitors of e-commerce adoption in each EU country? An analysis is made of the overall attitudes towards e-commerce adoption in European firms, linking specific deterrents of e-commerce adoption (e.g., higher delivery costs or the nature of business) and the following retailer characteristics: size, type of product, retail channels, and respondent's position in the firm and engagement in distance selling. To explore the overall attitude towards e-commerce adoption, we propose a conceptual model that combines a two-level structure: the individual level, which models the attitudes towards barriers that prevent adoption of the online channel within each country; and the country level that highlights the similarities (and differences) between EU countries. The statistical model combines factorial and regression components. This model was estimated by the maximum likelihood method using the MPlus 6.12. CFI is 0.989, TLI is 0.984, and RMSEA is 0.034; therefore, model fit is excellent (Hu & Bentler, 1999).

Results show that aspects such as firm size and the job position of respondents do not influence the attitudes toward e-commerce adoption. Three covariates point to the

aversion to e-commerce: telesales/call center retailing, direct retail channels, and selling non-food products.

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List of Acronyms

B2C – Business-to-consumer

CEO - Chief executive officer

CFI – Comparative Fit Index

EC – Electronic commerce

eGDP – Electronic gross domestic product

EU – European Union

GDP – Gross domestic product

ICC - Intraclass correlation coefficient

ICT - Information access and communication technology

IT – Information technology

MNC – Multinational corporations

OECD - Organization for Economic Co-operation and Development

R&D – Research and development

RMSEA – Root Mean Square Error of Approximation

SD – Standard deviation

SME – Small and medium sized enterprises

TLI – Tucker-Lewis Index

TOE – Technological, organizational and environmental

UK – United Kingdom

US – United States

VAT – Value added tax

1 Introduction

The added efficiency and rationalization of procedures brought by e-commerce has allowed firms to address the challenges of globalization, extending the geographic reach of their operations and competing with large firms (Kraemer, Gibbs, & Dedrick, 2005). On the other hand, e-commerce drives globalization by linking businesses and individuals at world level (Gibbs, Kraemer, & Dedrick, 2003). E-commerce has been recognized as a competitive advantage for firms, because it offers world visibility, cheap access to international markets, the possibility of real time optimization and coordination of the supply chain across borders, the chance to update and personalize products, services and marketing techniques (Lefebvre & Lefebvre, 2002; Kraemer, Gibbs, & Dedrick, 2005). Thus, many companies have adopted electronic commerce (e-commerce) in recent years and invested heavily in it (Chao & Norton, 2016). While most studies on e-commerce focus on consumers, this research takes the company angle and examines the organizational factors influencing the company's decision to adopt, or not, e-commerce technologies. Not all firms enter the online market because of the many obstacles this entails. As adopters and non-adopters hold different viewpoints about the factors affecting their decisions (Hung, Yang, Yang, & Chuang, 2011; Kuan & Chau, 2001; Li, Troutt, Brandyberry, & Wang, 2011), our focus will be on firms that have not yet taken the decision to adopt e-commerce due to a set of restraints (Li, Troutt, Brandyberry, & Wang, 2011).

The aim of this study is therefore to analyze the *overall attitudes towards e-commerce adoption* of EU firms and link specific deterrents of e-commerce adoption and retailers' characteristics. More specifically, our objectives are to:

- identify factors influencing the adoption of e-commerce;
- explore the explanatory power of distinct factors inhibiting the adoption of e-commerce by firms;
- analyze factors that explain the non-adoption of e-commerce by EU firms (e.g., firm size, job position of interviewee, the current engagement, the type of products sold);
- recommend ways to increase the use of e-commerce technologies by EU firms (managerial tools and organizational solutions).

The main research question that motivates this research is: What are the inhibitors of e-commerce adoption in the EU? We analyze national and EU firms' attitudes toward e-commerce adoption by applying a multilevel factorial model to secondary data (European database) collected using a structured questionnaire.

The thesis is structured as follows. The next section reviews the main contributions in the literature to the concept of e-commerce and the factors that companies have identified as deterrents of e-commerce adoption. It begins with a short contextualization of e-commerce before presenting an overview of research conducted on factors influencing the adoption of e-commerce. This analysis highlights differences between contexts and countries. Section 3 introduces the conceptual model, the main concepts and constructs. Section 4 provides a detailed description of the Eurobarometer data set used in this research; Section 5 describes the multilevel framework used to estimate the attitudes towards e-commerce adoption, considering the within- and between-country variability. Factorial and regression models implemented in Mplus 6.12 are applied to Eurobarometer data. Section 6 presents model fit, parameter estimates, and measures of the random effects and discusses managerial implications. The manuscript concludes by summarizing the main findings, the limitations of the study, and further avenues for research. It also provides recommendations on how to increase e-commerce adoption in European firms.

2 Literature review

2.1 E-commerce

E-commerce is performed through web-enabled services and is distinct from offline retail (Cenfetelli, Benbasat, & Al-Natour, 2008). It describes all transactional processes that begin when a consumer visits a website to see products/services until the moment when the consumer receives them, confirms they match their needs, and is satisfied or not (Boyer, Hallowell, & Roth, 2002).

Few firms are purely virtual, “born on the Internet”, like Amazon or eBay (Zhu, Kraemer, & Xu, 2006). The traditional channel (e.g., Wal-Mart or Dell (direct sales)) and multichannel (e.g., Zara and Fnac) are still the main retail channels used by firms (Zhu, Kraemer, & Xu, 2006; Li, Troutt, Brandyberry, & Wang, 2011). Retailers often allow their customers to pick up online orders at brick-and-mortar stores, which combines convenience for customers and retailers (Cao, So, & Yin, 2016). This strategy reduces the costs and delays associated to shipping products to online shoppers. It came about because consumers tend to participate in many *pseudo*-relationships with multiple e-suppliers (Tan, Benbasat, & Cenfetelli, 2016) and has resulted in online firms creating new forms of retailing. For example, Amazon opened its first physical store in the UK; the concept is different from that of the traditional store because customers can buy items without having to wait in the queue or to pay at a physical checkout. The purchases are automatically billed to customers’ accounts, which are tracked by sensors (Farrell, 2016; Neate, 2016; Cao, So, & Yin, 2016).

E-commerce can be defined in different ways depending on the context and research objective (Grandon & Pearson, 2004). Ngai & Wat (2002)’s definition of e-commerce is based on four factors: communication, business process, service, and an online platform. It is a way of delivering information/products/services (communication) using a technological platform that automates transactions and workflows (business process), reduces service costs (service), and provides the capability to buy and sell online (online). Although e-commerce alone is not a source of competitive advantage, this new form of commerce is a fresh way of identifying, attracting and retaining customers and is considered a suitable strategy for marketing, selling and integrating services online (Choshin & Ghaffari, 2017). Piris, Fitzgerlad, & Serrano (2004) conclude that some firms consider e-commerce as an indirect medium to support and enhance the organization’s strategy, and not as a competitive necessity. Firms that obtain profit from online sales are more likely to perceive e-commerce as strategic and see it as both a way to increase and enhance consumer services and a vehicle to communicate and disseminate information and knowledge (Piris, Fitzgerlad, & Serrano, 2004).

Dimensions like managerial knowledge and employees’ expertise, for example, can foster e-commerce and facilitate its adoption (Choshin & Ghaffari, 2017).

The diffusion of innovation has three main phases: the initiation stage (or pre-adoption, where the benefit and costs of potential adoption are evaluated), the adoption itself, and the routinization (post adoption stage, when the innovation becomes part of the firm's activities) (Zhu, Kraemer, & Xu, 2006). Various authors found significant differences between adopter and non-adopter firms in the pre-adoption phase of innovation (Zhu, Kraemer, & Xu, 2006; Zhu, Kraemer, & Xu, 2003). The direct benefits of e-commerce adoption are perceived to be higher by adopter firms than by non-adopters (Kuan & Chau, 2001). Furthermore, relative to firms not yet online, adopter firms have the perception of lower financial costs, higher technical competence and higher government pressure but lower industry pressure (Kuan & Chau, 2001). The deterrents that are the focus of this research are especially important in pre-adoption and adoption stages.

2.1.1 Adoption of e-commerce

Information and communication technologies (ICT) includes email, Internet browsing and e-commerce, among others (Cruz-Jesus, Vicente, & Oliveira, 2016). ICT encompasses both IT (information technology) and communication technology and is therefore used herein as it covers all forms of computers, networks, information and communication (telephony, mobiles and wireless networks). Most firms invest in online sales to expand businesses and to meet and/or exceed their customers' expectations (Nguyen, Newby, & Macaulay, 2015). Cost reduction (of administrative, customer support, marketing processes, and information-processing costs), back-end efficiency (improvement of operational functions) and inventory management can also benefit from e-retailing adoption, though to a lesser extent (Zhuang & Lederer, 2003). Retailers have reaped many benefits from ICT, but it is increasingly important to use instruments that allow managers to assess the strengths and weaknesses of their e-commerce firms (Zhuang & Lederer, 2003). The ability to take advantage of ICT opportunities depends on many factors (OECD, 2001). The decision to adopt e-commerce is influenced not only by an organization's environment (cost benefits, management innovativeness, ICT infrastructure, among others), but also by the external environment (business partners, suppliers, consumers and consultants) (Nguyen, Newby, & Macaulay, 2015). Despite the potential benefits of using ICT, there have been numerous cases where its adoption has been unsuccessful, e.g. the Poundland case, which invested in online commerce to complement their physical offer (Wilmore, 2017; Molla & Licker, 2005). Firms adopting e-commerce must overcome many obstacles, notably technical, cognitive, socio-political, economic, legal, managerial, financial, and cultural challenges (Zhu, Kraemer, & Xu, 2003; Molla & Licker, 2005; Kshetri, 2007). Given the heterogeneity of contexts, the factors that inhibit the adoption of e-commerce are not expected to be the same for all companies or in all countries, or at different stages of innovation diffusion (Zhu, Kraemer, & Xu, 2003; Kraemer, Gibbs, & Dedrick, 2005; Lefebvre & Lefebvre, 2002; Oxley & Yeung, 2001; Zhu, Kraemer, & Xu, 2006; Molla & Licker, 2005). For example,

the challenges faced by firms in developing countries are different from those in developed countries: adoption is easier in developed countries because there is access to affordable infrastructure and a higher level of ICT diffusion (Molla & Licker, 2005). Also governments in developing countries have not intervened to foster e-business¹ (Molla & Licker, 2005). The digital divide reflects various differences within and between countries, and it “refers to the gap between individuals, households, businesses and geographical areas at different socio-economic levels with regard both to their opportunities to access ICT and to their use of the Internet for a wide variety of activities” (OECD, 2001, p. 4).

The context in which a firm operates influences the propensity to adopt e-commerce and its success (Rodríguez-Ardura & Meseguer-Artola, 2010): the number of online shops, the payment solutions and parcel delivery systems, among others (Gomez-Herrera, Martens, & Turlea, 2014). Many studies conclude that the decision to adopt ICT is not only influenced by context, but also by internal resources (Zhu, Kraemer, & Xu, 2006; Zhu, Kraemer, & Xu, 2003). The study on ICT adoption in small businesses by Nguyen, Newby, & Maucaly (2015) concludes there are five main factors: organization (management, staff, their knowledge, acceptance, commitment, and contribution), internal resources (firm’s ICT abilities, capabilities and capacities), external ICT consultants (who contribute with their knowledge and expertise), suppliers, and customers (Nguyen, Newby, & Macauly, 2015). Firms should therefore strive to offer a good e-commerce experience, investing in resources and in the service because failure in one aspect can compromise the consumers’ engagement in future online transactions (Tan, Benbasat, & Cenfetelli, 2016). Some findings also suggest that firms see ICT adoption as an investment in improving product/service quality, which is particularly important for small firms in a competitive market (Nguyen, Newby, & Macauly, 2015). Governments should therefore foster the development of both information and communication technologies and e-commerce as this leads to social and economic development (OECD, 2001).

A number of studies refer to the facilitators and/or inhibitors of e-commerce adoption; these include physical, technological, managerial, institutional, social and economic impediments that encouraged or discouraged e-commerce adoption (Molla & Licker, 2005). The most relevant studies in this area usually distinguish three dimensions: environmental, technological, and organizational (Rodríguez-Ardura & Meseguer-Artola, 2010; Gibbs, Kraemer, & Dedrick, 2003; Zhu, Kraemer, & Xu, 2003; Burt & Sparks, 2003). This research focuses mostly on the environmental (external) and organizational (internal) factors, as in the Molla & Licker (2005) study. As the technological context encompasses both existing and new technologies in firms (Ahmad, Bakar, Faziharudean, & Zaki, 2015), our study includes it in the organizational category because our focus is on internal factors generally (such as the number of computers

¹ E-business is a broader concept as it includes not only e-commerce, but also internal processes such as production, inventory management, or human resources.

in a firm) and, in most cases, failures in the ICT dimension are due to management problems (Zhu, Kraemer, & Xu, 2006; Ahmad, Bakar, Faziharudean, & Zaki, 2015).

2.1.2 Organizational factors

Organizational factors are recognized as one of the most important inhibitors for the adoption of technologies. Molla & Licker (2005) concluded that human, business and technological resources as well as awareness have a greater influence than environmental factors on the initial adoption of e-commerce in developing countries. Tornatsky & Fleischer (1990) developed the TOE (technological-organizational-environmental) framework, which identifies the technological, organizational, and environmental contexts that influence the adoption of technological innovations and measures aspects such as firm size and scope, the quality of human resources, the internal availability of resource slack, centralization, and formalization. According to Rodríguez-Ardura & Meseguer-Artola (2010), this framework has enhanced other studies and models (e.g., Iacavou, Benbasat, & Dexter (1995), Gibbs and Kraemer (2004), Zhu, Kraemer, & Xu (2003), Kuan & Chau (2001), Hsu, Kraemer, & Dunkle (2006), Ahmad, Bakar, Faziharudean, & Zaki (2015) and Grandon & Pearson (2004)). Rogers (1995) also considered the internal characteristics of the organization, namely organizational slack, the size, complexity, formalization, and interconnectedness. The study identified an additional aspect that can be considered an organizational factor: the leader's attitude towards change (Zhu, Kraemer, & Xu, 2003; Hung, Yang, Yang, & Chuang, 2011). Nguyen, Newby, & Maucaly (2015) also conclude that the successful implementation of ICT in small businesses depends upon the organization, the internal resources (ICT investment and acquisition), the people and culture, the management and staff training and their contribution. Zhu, Kraemer, & Xu (2003) advocate that firms with higher levels of technological competence, greater scope and larger size are more likely to adopt e-business. Larger firms tend to be more successful in the initiation stage because they have more resources and invest more in Internet use (OECD, 2001). On the other hand, as SMEs have more limited resources than larger firms, resource slack may play an even more crucial role in their adoption of innovation (Li, Troutt, Brandyberry, & Wang, 2011). High-tech firms usually adopt developing systems and processes that allow them to create or expand their dynamic capabilities (Zhu & Kraemer, 2002). A resource advantage is therefore crucial because conducting innovations requires technical, managerial, and financial resources (Zhu, Kraemer, & Xu, 2006; OECD, 2001). Small businesses can overcome the lack of internal ICT resources by using networking and collaboration with customers or suppliers to exchange knowledge and information (Ahmad, Bakar, Faziharudean, & Zaki, 2015; Nguyen, Newby, & Macauly, 2015). Organizational culture is another important feature in small businesses and it is influenced by the owner-manager's attitude and values (Nguyen, Newby, & Macauly, 2015). Molla & Licker (2005) also state that innovativeness, commitment to innovation and ICT background are imperatives for managers when adopting

e-commerce because they make all or most key decisions and influence employees' commitment: a failure in communication can increase their doubt, fear or negative attitude towards change (Nguyen, Newby, & Macaulay, 2015).

Grandon & Pearson (2004) argue that organizational readiness, which includes the technological and financial resources to adopt e-commerce, is an important factor that should be consistent with the culture, values, and infrastructure of the firm. They conclude that compatibility between e-commerce and the firm's culture and values is an influential factor (Grandon & Pearson, 2004). Gibbs & Kraemer (2004) and Ahmad, Bakar, Faziharudean, & Zaki (2015) also concluded that the lack of organizational compatibility may inhibit the use of e-commerce. Greater e-readiness and the firm's worldwide scope favors e-commerce adoption (Rodríguez-Ardura & Meseguer-Artola, 2010; Zhu, Kraemer, & Xu, 2006).

Most of these studies fail to specify why some firms decide to engage in e-commerce activities rather than using only conventional formats (Rodríguez-Ardura & Meseguer-Artola, 2010). Moreover, there is a tendency to overlook environmental factors (such as language and the quality of legal institutions), openness and the global impact of the Internet (as a means of communication and distribution) that allow customers and firms to connect in a knowledge-based economy (Rodríguez-Ardura & Meseguer-Artola, 2010; Gomez-Herrera, Martens, & Turlea, 2014).

We address organizational factors that influence the adoption of e-commerce and evaluate how this may be inhibited by factors such as the nature of business, need for additional investment, ICT skills, and legal issues. Higher delivery costs, complaints or after sales service are other factors thought to deter the adoption of online sales and are of relevance to the decision of whether or not to adopt the e-commerce channel.

Many firms invest in e-business technologies in the belief that they will facilitate the integration and performance of the supply chain. In addition to improved performance, capturing and sharing real-time information may foster collaboration between entities (Devaraj, Krajewski, & Wei, 2007). As a result, firms expect to gain knowledge through interaction with their producers and suppliers and also customers (Oyelaran-Oyeyinka & Lal, 2004). Although the exchange of information in purely digital businesses is not affected by distance, goods still need to be physically delivered and this can be challenging for firms (Gomez-Herrera, Martens, & Turlea, 2014). When sales deal with physical products, the cost of online sales may be higher than that of offline sales (Gomez-Herrera, Martens, & Turlea, 2014).

Online firms should also focus on the additional need of capital for initial investment. If a firm does not have the necessary resources for ICT investment, its ability to use the innovation is limited (Hsu, Kraemer, & Dunkle, 2006). Prior network investments and financial resources enable the firm to pay for the costs of installation, integration, employee training and maintenance (Forman, 2005; Hsu, Kraemer, & Dunkle, 2006). Forman (2005) concludes that organizations that had made complementary investments in

ICT are more likely to adopt the e-commerce channel. It should be noted that most of the investment in Internet-based initiatives tends to be effective and provides return (Zhu & Kraemer, 2002). Apart from the technological prerequisites (e.g., software, hardware, expertise), most of the effort is devoted to personal and institutional adaptation that entails capital before e-commerce initiatives become productive (Hsu, Kraemer, & Dunkle, 2006; Lefebvre & Lefebvre, 2002; Zhu & Kraemer, 2002; Forman, 2005). The firm should be able to change and adapt quickly to succeed in e-commerce (Hsu, Kraemer, & Dunkle, 2006) because processes in virtual firms are technologically more complex than in other companies: e-commerce demands a profound change in the way business is done, in skills and structures and a period of adjustment and training is essential (Lefebvre & Lefebvre, 2002; Zhu & Kraemer, 2002; Fathian, Akhavan, & Hoorali, 2008; Oyelaran-Oyeyinka & Lal, 2004; Forman, 2005). Larger sized firms have more bureaucratic processes and are less flexible, thus inhibiting innovation (Hsu, Kraemer, & Dunkle, 2006).

The hiring of skilled workers is a key issue for European firms because productivity and competitiveness increases when ICT are used well (Billon, Lera-Lopez, & Marco, 2016): every firm that intends to develop the e-commerce channel needs to know the basics of e-mail and the Internet and this requires training in programming languages and knowledge of security measures such as firewalls (Lefebvre & Lefebvre, 2002). Consideration should also be given to the current employees' negative attitude towards change as they may worry about job security and lack of support, or question the usefulness of the new technology (Ngai & Wat, 2002). This is particularly important in developing countries where there tend to be fewer ICT specialists (Molla & Licker, 2005), making collaboration with suppliers or consultants and a strong network membership essential for success (Nguyen, Newby, & Macaulay, 2015). Technological capability (skills, knowledge, and experience) is necessary to produce, innovate and organize marketing functions, so firms should conduct more training and invest more in skills and knowledge upgrading (Oyelaran-Oyeyinka & Lal, 2004). This is important because employees need enough training to make necessary adjustments to use the applications and systems effectively (Lefebvre & Lefebvre, 2002) and it should articulate internal experience and external acquisition (Nguyen, Newby, & Macaulay, 2015). Although learning-by-doing is the cheapest and easiest process and the most effective mode of knowledge acquisition, it holds back innovation; the other forms of learning require explicit investment to change technical and organizational assets (Oyelaran-Oyeyinka & Lal, 2004). Consultancy firms may also be an alternative as they are able to acquire and absorb knowledge to assist firms that seek their help (Nguyen, Newby, & Macaulay, 2015).

The global expansion of e-commerce by firms also depends on the quality of national and international laws and how well they are enforced (Ndubizu & Arinze, 2002). The OECD emphasizes the importance of strengthening infrastructures (network capacity and quality), the diffusion of access (particularly in schools and public institutions), and improving individuals' and workers' skills (greater computer/Internet literacy

and better vocational training) to reduce the digital divide; this would increase cheap access to ICT, the development of skills, and greater familiarity with new technologies (OECD, 2001). Country-specific regulations and laws have to be understood by firms, notably by those operating in the global marketplace, because countries may have different levels of restrictive regulations and laws. Firms' success depends on this knowledge as non-compliance can be costly (Baumer, Earp, & Poindexter, 2004).

There are growing concerns about privacy when providing personal information for Internet applications (Baumer, Earp, & Poindexter, 2004): customer data must be protected and secured from hackers to ensure trust among citizens and compliance with the law (Ndubizu & Arinze, 2002). Unauthorized access to an e-commerce website represents a security system failure (Tan, Benbasat, & Cenfetelli, 2016) and leads to a loss in sales and reputation (Xiao & Benbasat, 2011). Tsai, Egelman, Cranor, & Acquisti (2011) conclude that some consumers are even willing to pay a premium to purchase from privacy protected websites.

Worldwide policymakers and regulators have sought to harmonize privacy laws (Baumer, Earp, & Poindexter, 2004). However, while policymakers want to encourage the flow of information across borders (the Internet is virtually borderless), they also want to protect privacy, national security, and public ethics (Aaronson, 2015; Baumer, Earp, & Poindexter, 2004). The worldwide web opens new possibilities for fraudulent activities (Lefebvre & Lefebvre, 2002) and the manipulation of data content. For instance, a website may only select positive information and consumers' positive reviews about the product (concealment), provide vague/ambiguous information about the total cost, product return or product refund (equivocation), sell a nonexistent product; they may even contain only fictitious reviews written by staff (falsification) (Xiao & Benbasat, 2011). E-commerce websites can mislead consumers in terms of the presentation of information (media and organization) and data generation, which may lead to deceptive information practices (Xiao & Benbasat, 2011).

Oxley & Yeung (2001) note that e-commerce depends significantly on the strength of the rule of law, but also on the availability of credible payment channels (e.g., credit card option): new dimensions of fraud arise when firms move to an electronic market (Oxley & Yeung, 2001). Credit card companies play an important monitoring and certification role, providing assurance to buyers and sellers and are also essential as credit card and other credible electronic payment channels are facilitators of e-commerce. These difficulties demand the development of new security technology, the adaptation of the existing one or the adoption of safety technology that can serve as deterrents, particularly mainly in transition economies (Lefebvre & Lefebvre, 2002). It is therefore essential to improve safety and international standards of electronic business practices for technology, commerce procedures, legislative corpus, and tax rules (Lefebvre & Lefebvre, 2002).

Ndubizu & Arinze (2002) conclude that the quality of rules, enforcement and rights of the creditor in each country are generally positively related with e-commerce revenues, because fraudulent activities

increase the transaction costs that result in a reduction in e-commerce participants. According to Lefebvre & Lefebvre (2002), governments consider e-commerce an excellent tool to stimulate growth in the economy and employment. In developing countries with autocratic regimes, the support of ICT, legal frameworks and social openness from the government is expected to be weaker. As these countries do not foster ICT and intellectual property laws and regulations, it discourages investment and leads to lower levels of R&D and less technological readiness (Pick & Azari, 2011).

The after sales stage encompasses everything after the sale and should include the possibility of tracking the order, the delivery of the product under agreed conditions and the correction of any error by the firm (guarantee) (Alzola & Robaina, 2010). The physical distance between the web seller and its customers is a concern, as well as the temporal separation of payment and delivery because they cannot immediately check the reliability of the website or whether their orders will arrive (Xiao & Benbasat, 2011; Mollenkopf, Rabinovich, Laseter, & Boyer, 2007). Alzola & Robaina (2010) added the resolution of complaints as a dimension of the after-sales stage and developed a measurement scale. On the other hand, a post-purchase failure can result from an e-commerce website failure to provide information that helps consumers confirm the purchase of the product/service, solicit advice on ways of maximizing the utility of products/services, return products for which delivery data was incorrect, return unwanted or defective products or ones that have been damaged in-transit (Tan, Benbasat, & Cenfetelli, 2016; Mollenkopf, Rabinovich, Laseter, & Boyer, 2007).

Globalization requires more streamlined and efficient firms that are able to take advantage of it as a driver (Hsu, Kraemer, & Dunkle, 2006). The provision of high quality delivery services and well defined product return policies could increase revenues and provide a competitive advantage for Internet retailers (Rao, Griffis, & Goldsby, 2011; Hortaçsu, Martínez-Jerez, & Douglas, 2009; Rabinovich & Bailey, 2004; Mollenkopf, Rabinovich, Laseter, & Boyer, 2007). In particular, the delivery of perishable goods with quality guarantee is the biggest logistical problem for online retailers due to the very short delivery time, cost, and demand constraints (Chintagunta, Chu, & Cebollada, 2009; Campo & Breugelmans, 2015). On the other hand, this is not yet common practice as households tend to visit an offline channel when buying perishable goods so as to inspect the quality prior to purchase (Chintagunta, Chu, & Cebollada, 2009). Despite the immediacy the Internet, online retailing customers are very aware of whether the order has been executed because payment is usually made before goods are dispatched; in other words, retailers are paid before the product is received (Rao, Griffis, & Goldsby, 2011; Mollenkopf, Rabinovich, Laseter, & Boyer, 2007).

Outsourcing or e-collaboration can help firms be successful as they can improve the quality of service and reduce costs (Rao, Griffis, & Goldsby, 2011). Additionally, firms can take advantage of existing

infrastructures for the delivery of physical goods and services (economies of scale) (Kraemer, Gibbs, & Dedrick, 2005; Jean, Sinkovics, & Kim, 2014; Gomez-Herrera, Martens, & Turlea, 2014).

Many factors influence the online customer's overall perception of quality (Alzola & Robaina, 2010). Customer support comes in the order fulfillment and after sales service stages (Alzola & Robaina, 2010) and includes responding to complaints for example. When consumers experience a failure in the e-commerce service, they tend to break off the commercial relationship with e-supplier and abandon all transactions with them due to expenses incurred and inconvenience (Tan, Benbasat, & Cenfetelli, 2016; Mollenkopf, Rabinovich, Laseter, & Boyer, 2007). These situations can compromise the stability and continuity of the firm as the consumers' complaints are publicly expressed through the cheapest mass media: the worldwide web (Ward & Ostrom, 2006). On the other hand, if product returns are handled well, the retailer may be able to remedy the problem and increase customer satisfaction (Mollenkopf, Rabinovich, Laseter, & Boyer, 2007). A prompt and appropriate response, access to knowledgeable customer service representatives (e.g. via online contact), and compensation for the problem affect the customers' perception of the firm (Mollenkopf, Rabinovich, Laseter, & Boyer, 2007). Therefore, firms should give clear information about returns to both staff and customers (Mollenkopf, Rabinovich, Laseter, & Boyer, 2007). Urueña & Hidalgo (2016) suggest providing employees with training and resources (e.g., webcams or telephones) that enable them to recognize the customers' emotions and increase face-to-face interaction (Urueña & Hidalgo, 2016).

In short, physical and cultural distance is a major constraint to online firms because it complicates communication and interaction between buyers and sellers (Hortaçsu, Martínez-Jerez, & Douglas, 2009). For instance, in online auction sites (e.g., eBay) the buyers' willingness to pay will depend on the characteristics of both the goods and the seller, and this includes the seller's geographical proximity to the buyer (Hortaçsu, Martínez-Jerez, & Douglas, 2009). In addition, distance increases contract costs and the risk related with their poor execution, physical transport costs, the cost associated with import tariffs and regulatory barriers (Hortaçsu, Martínez-Jerez, & Douglas, 2009; Jean, Sinkovics, & Kim, 2014; Gomez-Herrera, Martens, & Turlea, 2014). The cost of shipping is a major cause of reduced trading and is likely to increase with distance (Hortaçsu, Martínez-Jerez, & Douglas, 2009). Using the local language is an important way of countering culture distance and increasing trade (Hortaçsu, Martínez-Jerez, & Douglas, 2009; Gomez-Herrera, Martens, & Turlea, 2014), but it leads to higher commercial expenses (Gomez-Herrera, Martens, & Turlea, 2014). Gomez-Herrera, Martens, & Turlea (2014) use a sample where English, French and German are used as the three major spoken languages but only detect a positive effect when the exporter used English or French. This is corroborated by Internet World Stats that concluded that English is the predominant language on the Internet (948.6 million of Internet users used English in 2016) (Miniwatts Marketing Group, 2016). The language barrier is an important deterrent of cross-border sales, together with factors such as the quality of legal institutions (Gomez-Herrera, Martens, & Turlea, 2014). Even though the

range of languages available on websites is important to enhance a strong international presence (Gomez-Herrera, Martens, & Turlea, 2014). Hortaçsu, Martínze-Jerez, & Douglas (2009) conclude that distance still impacts commerce, albeit less in online than offline transactions. Indeed, communication and coordination costs created by geographic distance have been lowered thanks to the Internet (Forman, 2005).

E-commerce is associated with high costs in traditional manufacturing firms and low costs for technology firms (Zhu & Kraemer, 2002). Goods such as agricultural products, fish/meat, automobiles or other heavy equipment, rely on physical distribution. The current trend of shifting to electronic markets can create adverse selection costs, especially for products that are difficult to represent electronically (Overby & Mitra, 2014). To obtain benefits from e-commerce, traditional firms have to enhance alignment between e-commerce and the existing ICT infrastructure by building skills, routines or assets (i.e., dynamic capabilities) that contribute to sustainable competitive advantage (Zhu & Kraemer, 2002). This would allow many retailers to profit from online sales because electronic markets can yield significant economic benefits through the reduction in transaction costs for both parties: they allow the cost of market participation to be lowered, the expansion of potential trading partners and greater convenience (Overby & Mitra, 2014; Chintagunta, Chu, & Cebollada, 2009). Taking this into account, the impact of transaction costs (e.g., travel time, in-store shopping time, cost of transportation, item picking, quality inspection) is considerable in grocery shopping and influences the choice between online or offline channels: consumers usually choose the method with the lowest total cost (direct+transaction cost) (Chintagunta, Chu, & Cebollada, 2009).

Information-intensive services and the public sector have higher penetration rates for e-commerce than transport, storage, retail trade, accommodation, and food services firms. This is confirmed by Billon, Lera-Lopez, & Marco (2016) who highlight the importance of the knowledge-intensive services sector in the diffusion of the use of ICT. Manufacturing firms have average penetration rates (OECD, 2001). Hsu, Kraemer, & Dunkle (2006) researched three industries and concluded that manufacturing was lagging in the diversity of e-business use, whereas distribution (wholesale) and financial sectors were more likely to lead as they are more exposed to end-consumers. Thus, retail and financial firms are more front-end application users (online sales or advertisements), whereas manufacturers focus on the e-business supply chain (more complex and costly to implement) (Hsu, Kraemer, & Dunkle, 2006).

2.1.3 Environmental factors

Within the TOE framework, the environmental context encompasses the industry's external factors and their influence on the firm and on industry (Ahmad, Bakar, Faziharudean, & Zaki, 2015; Tornatzky & Fleischer, 1990). Agents of external change like organization advisors, government, external consultants and e-commerce solution advisors play a vital role in SMEs' e-commerce adoption (Iacavou, Benbasat, & Dexter, 1995; Ahmad, Bakar, Faziharudean, & Zaki, 2015). Environmental factors have been identified as

affecting the adoption of e-commerce. Gibbs, Kraemer, & Dedrick (2003) specify the following types of environmental factors affecting the adoption of B2C e-commerce: global (global production networks, MNC strategies, trade liberalization, and global competition) and national (demographics, information infrastructure, economic and financial resources, industry structure and competition, organizational environment, customer preferences, telecom liberalization, e-commerce promotion, and e-commerce legislation).

While socioeconomic levels are considered to be one of the most important barriers, an adequate information infrastructure drives B2C e-commerce adoption (Gibbs, Kraemer, & Dedrick, 2003). In Xu's (2008) case study of banks in Beijing, Chicago and Dubai, only two of these factors were studied and related: information infrastructure and demographics. The composition of the population, the costs of Internet access, and of the individual credit reference system (not considered by Gibbs, Kraemer, & Dedrick in 2003) affect the bank managers' decision to adopt web-based B2C e-commerce platforms in Beijing, Chicago, and Dubai (Xu, 2008). He concluded that the new factor i.e. cost of the individual credit reference system, proves that factors are not the same across countries (Xu, 2008) and recommends studies on other sectors.

Grandon & Pearson (2004) incorporate five factors in external pressure: competition, social factors, and dependency on other firms already using e-commerce, the industry, and the government. Unlike organizational readiness, environmental pressure was found to be a significant factor in the decision of whether or not to adopt e-commerce. Hung, Yang, Yang, & Chuang (2011) consider environmental aspects such as the intensity of competition in the industry, market scale, popularity of Internet use, contact with more potential customers and pressure from the adoption of an online sales systems in the Taiwan tourism industry. Similarly, Hsu, Kraemer, & Dunkle (2006) conclude that the intensity of competition was a significant inhibitor of e-business use, probably due to the lack of adequate slack resources for innovations. However, trading partner pressure was also identified as the most significant factor influencing the number of business activities handled through internet by U.S. firms (Hsu, Kraemer, & Dunkle, 2006). Ahmad, Bakar, Faziharudean, & Zaki (2015) concluded that firm size is even more important than dependency on partners for Malaysian SMEs.

Buying from a local seller and buying online are distinct experiences and most studies show a "natural" preference for local suppliers (Gomez-Herrera, Martens, & Turlea, 2014). Taking this preference into account, it is easier to find online partners in countries where e-commerce are more prevalent; SMEs in these countries also have more opportunities to be online because more technology is available, executives have more managerial experience and knowledge about the benefits, costs and risks of e-commerce and governments are also gradually improving policies for online businesses (Zhu, Kraemer, & Xu, 2003). In countries with high e-commerce intensity, e-commerce is no longer dominated by larger firms and SMEs

are investing in electronic activities (Zhu, Kraemer, & Xu, 2003). Therefore, both multinational firms and industry competitiveness force firms to be competitive (Kuan & Chau, 2001; Gibbs & Kraemer, 2004).

The external context as defined by national and international legislative bodies and trade agreements, legal and tax frameworks, and international standards influence the adoption of e-commerce (Lefebvre & Lefebvre, 2002; Kuan & Chau, 2001). When consumers buy from foreign firms, they are protected by consumer laws at home rather than the law in the exporting country, so they cannot choose the legal regime in which they operate (Gomez-Herrera, Martens, & Turlea, 2014). The traders' willingness to trade electronically in each country is likely to depend on the conditions in which the transaction can be made using e-commerce; in other words, traders are more likely to engage in e-commerce in countries that have a good legal system and enforcement rules that protect business activities and provide economic incentives than in countries with inadequate trade protection (Ndubizu & Arinze, 2002; Kshetri, Bebenroth, Williamson, & Sharma, 2014). Governments should provide support such as financing, training and technical advice and focus on SMEs as they generally lack the required resources (Ahmad, Bakar, Faziharudean, & Zaki, 2015). Similarly, countries that have a strong and fair legal system, openness, freedom of press and legal rights, clear property rights and governmental interest in ICT diffusion are likely to enjoy internal and external investment, so the progress of technologies will be facilitated (Pick & Azari, 2011). Moreover, the presence of intensive technology and business investment also stimulates the intervention of governments in ICT policies (Pick & Azari, 2011; Oxley & Yeung, 2001). Hung, Yang, Yang, & Chuang (2011) presented two main government-related factors: the regulations for online trade and the government's guidance strategy. Although many studies refer to the importance of regulation to the adoption of e-commerce, they conclude this would not apply to a travel agency's decision to adopt an online trading system. On the other hand, Hsu, Kraemer, & Dunkle (2006) found that government pressure on U.S. firms was not a significant factor for the increase in the number of business activities handled through the internet; however, it was strongly related to the volume of e-commerce because government requirements for businesses or the incentives given boost the volume of e-business use, especially when the client is the government. Nevertheless, business owners must also make efforts to improve technologies, education, experience and skills and they should not depend solely on government incentives (Ahmad, Bakar, Faziharudean, & Zaki, 2015).

The growing percentage of online shopping raises concerns about Internet security (Hartono, Holsapple, Kim, Na, & Simpson, 2014). Electronic data protection requires confidentiality, integrity, authentication, access control, communication security and non-repudiation (Lefebvre & Lefebvre, 2002; Hartono, Holsapple, Kim, Na, & Simpson, 2014), and the consumer should be informed about the type of data to be collected and how it could be used (Ngai & Wat, 2002). Hartono, Holsapple, Kim, Na, & Simpson (2014) conclude that perceived confidentiality, availability, and non-repudiation are important to the

customer's decision to use B2C e-commerce. The buyer's concern about security is a critical issue that determines whether or not e-commerce transactions are maximized (Hartono, Holsapple, Kim, Na, & Simpson, 2014). This issue is of greater concern in countries with a weak rule of law and which give more importance to individual privacy (Steenkamp & Geyskens, 2006); these governments should transmit a balanced message through regulations that protect individual freedoms and rights along with coordinated policies to promote cross-border information for national security and digital rights policies (Aaronson, 2015). A higher level of perceived online security increases purchases on B2C e-commerce sites (Hartono, Holsapple, Kim, Na, & Simpson, 2014).

Taxes also play a significant role in shaping the geography and dynamics of online retail trade. For instance, Einav, Knoepfle, Levin, & Sundaresan (2014) conclude that changes in the national sales tax policy can affect location decisions of online retailers as well as consumer behavior. Zhu, Kraemer, & Xu (2006) also consider the regulatory environment to be an important deterrent that has a stronger impact in developing than in developed countries. For example, trade restrictions make it more expensive to import resources or export products, and this reduces investment and makes a country less attractive as a potential production location (Kshetri, Bebenroth, Williamson, & Sharma, 2014).

Local demand is not only boosted by lower transportation costs but also when buyers value proximity or home-state sellers (Einav, Knoepfle, Levin, & Sundaresan, 2014). On the other hand, firms that conduct business abroad may be more willing to lower their prices and reduce their costs by using information flows to simplify, streamline or substitute the physical flows as this brings considerable savings of money and time (Kraemer, Gibbs, & Dedrick, 2005).

2.2 Cross-country differences

ICT is recognized as a key factor in the transition to a new economic system (Fathian, Akhavan, & Hoorali, 2008). Its influence is not only at the organizational level of the firm but also at the country level, i.e., the society and economy as a whole. However, while the use of different types of technologies can create many opportunities, it may also originate individual, business, social, and economic problems (Weber & Kauffman, 2011). Loss of jobs, rising costs of production and logistics, digital divide, security and lack of computer literacy and cultural barriers, corporate risks and declining environmental resources have been identified as constraints to ICT adoption (Weber & Kauffman, 2011).

Given the heterogeneity of contexts, factors that inhibit the adoption of e-commerce are not expected to be the same for all companies, in all countries, and at all stages of innovation diffusion (Zhu, Kraemer, & Xu, 2003; Kraemer, Gibbs, & Dedrick, 2005; Lefebvre & Lefebvre, 2002; Oxley & Yeung, 2001; Zhu, Kraemer, & Xu, 2006; Fathian, Akhavan, & Hoorali, 2008). The digital divide reflects various differences within and between countries, and it *“refers to the gap between individuals, households, businesses and*

geographical areas at different socio-economic levels with regard both to their opportunities to access ICT and to their use of the Internet for a wide variety of activities” (OECD, 2001, p. 4).

It is known that many macro level factors influence technology adoption: GDP per capita, geographic and demographic characteristics, urbanization, ICT infrastructure, cost associated to online shop, education, cosmopolitanism, human capital and economic/financial resources are all considered potential drivers of cross-country technology adoption (Ho, Kauffman, & Liang, 2007; Zhu, Kraemer, & Xu, 2003; Gibbs, Kraemer, & Dedrick, 2003); these cover many dimensions ranging from economy (e.g., GDP, income, revenue, and return on investment), environment (e.g., geography/demography), people (e.g., human capital, education) to technology (e.g., ICT infrastructure) (Ho, Kauffman, & Liang, 2007). Weber & Kauffman (2011) classify these factors into three groups: economic, social, and other factors; the latter includes country factors connected to technology adoption, notably legal (laws and regulations), environmental (family, religion, and way of life), and cognitive factors (innovativeness and openness to foreign ideas) (Gibbs, Kraemer, & Dedrick, 2003; Weber & Kauffman, 2011).

Fathian, Akhavan, & Hoorali (2008) state that the e-readiness at a macro level in a developing country (Iran) can be summed up as ICT infrastructures (information infrastructure, network speed and quality, ICT services and support and ICT employment opportunities), ICT availability (Internet availability and affordability, people and organizations online and ICT in the workplace), security and legal environment (security and encryption, and legal environment and regulations) and organizational features (skills and human resources, ICT management and policy, revenue on electronic services and investment and financial support for ICT development). They conclude that it is necessary to have a robust ICT infrastructure (network speed and quality), ICT support, ICT opportunities, and availability of internet.

Billon, Lera-Lopez, & Marco (2016), for example, studied the geographical distribution of ICT use in EU firms and concluded that there are differences in the prevalence of users for different EU regions: countries like Portugal, Spain, Greece, and Poland had a lower prevalence of regular Internet users when compared with Sweden, Germany or UK. They also show that Southern and Eastern Europe have the lowest levels of ICT use by firms, and that this can be boosted by public policies and promoting employment in knowledge-based services. Similarly, Verboord (2017) concludes that the highest prevalence of Internet usage belongs to the Nordic and Western-Central countries and this reflects an online buying culture. Analyzing the EU market, Gomez-Herrera, Martens, & Turlea (2014) find that consumers are about 16 times more likely to buy a product on the home market than from cross-border markets. In light of the above, a clearer understanding of the situation in Europe is essential.

The European B2C E-commerce Report 2016 issued by the Ecommerce Foundation provides information on economic indicators, internet penetration or B2C e-commerce turnover and growth in European countries (Table 1). This report identifies 6 key policy areas that should be harmonized at the

European level: internet security & data protection, consumer policies, e-logistics, e-payments, taxation and VAT, and competition. The objective is to break down barriers, especially for firms that want to start cross-border trading in Europe. For example, the Digital Agenda of Europe adopted in 2010 by the European Commission aims to develop a Digital Single Market, to exploit the potential of ICTs in order to foster innovation, economic growth, and progress (European Commission, 2016; Negreiro, 2015). Government policies and a single European law are essential, especially for SMEs (Kuan & Chau, 2001; Negreiro, 2015).

According to this report, 57% of Internet users shop online, but just 16% of SMEs sell online and 7.5% sell across borders (Ecommerce Europe, 2017). EU28's total GDP (Gross Domestic Product) is estimated to have reached nearly €14.9 trillion and the share of e-commerce in the European GDP was 2.6% in 2015 (1.8% in 2014), half of what is forecast for 2020 (Ecommerce Europe, 2017).

Table 1 - Relevant information about European Countries

	Country	VAT	Currency	Population (m)		Country	VAT	Currency	Population (m)
C	Austria	20%	(EUR)	8.6	S	Italy	22%	(EUR)	60.8
W	Belgium	21%	(EUR)	11.3	N	Latvia	21%	(EUR)	2.0
E	Bulgaria	20%	(BGN)	7.2	N	Lithuania	21%	(EUR)	2.9
S	Croatia	25%	(HRK)	4.2	W	Luxembourg	17%	(EUR)	0.6
S	Cyprus	19%	(EUR)	0.8	S	Malta	18%	(EUR)	0.4
C	Czech Rep.	21%	(CZK)	10.5	W	Netherlands	21%	(EUR)	16.9
N	Denmark	25%	(DKK)	5.7	C	Poland	22%	(PLN)	38.0
N	Estonia	20%	(EUR)	1.3	S	Portugal	23%	(EUR)	10.4
N	Finland	24%	(EUR)	5.5	E	Romania	20%	(RON)	19.9
W	France	20%	(EUR)	66.4	C	Slovakia	20%	(EUR)	5.4
C	Germany	19%	(EUR)	81.2	C	Slovenia	22%	(EUR)	2.1
S	Greece	23%	(EUR)	10.9	S	Spain	21%	(EUR)	46.4
C	Hungary	27%	(HUF)	9.9	N	Sweden	25%	(SEK)	9.7
W	Ireland	23%	(EUR)	4.6	W	U. Kingdom	20%	(GBP)	64.9

Note: C - Central Europe, W - Western Europe, S - Southern Europe; E - Eastern Europe, N - Northern Europe.
Source: Ecommerce Europe (2017).

The eGDP (electronic Gross Domestic Product) is particularly high in Northern European countries, with UK clearly above the rest (6.1%), followed by Denmark (4.4%), Finland (3.5%), and Sweden (2.2%) (Ecommerce Europe, 2017). Eurostat data confirm this and show that e-commerce tends to be more prevalent in the North and West of Europe (Eurostat Statistics Explained, 2016). The top five countries for Internet

access in 2015 were: Luxembourg (98%), Netherlands (98%), Denmark (97%), Finland (93%), and United Kingdom (93%). On the other hand, Bulgaria (60%), Romania (62%), and Italy (68%) were the three countries with the lowest Internet penetration rate (Eurostat Statistics Explained, 2016). Additionally, Negreiro (2015) found heterogeneous broadband penetration across the EU with a North-South geographical divide. In Sweden, Netherlands, Luxembourg, Finland, and Denmark (Northern European countries) nearly all citizens have regular access to Internet. In Romania, Bulgaria, Greece, Italy, and Portugal just one third of the population has fixed broadband (Negreiro, 2015). In 2016, 92 % of firms in the EU28 with at least 10 employees were using fixed broadband connection to Internet access, and the market is now saturated (Eurostat Statistics Explained, 2017). This figure is encouraging because consumers with broadband access are more likely to purchase online (Kshetri, Bebenroth, Williamson, & Sharma, 2014) because broadband allows the consumer to enjoy the full potential of e-retailing. Thus, global e-retailers must pay attention to economies with a high level of broadband penetration (Kshetri, Bebenroth, Williamson, & Sharma, 2014). Direct governmental interventions are important because they have a considerable impact on the level of Internet use and penetration (Ahmad, Bakar, Faziharudean, & Zaki, 2015).

According to Eurostat's e-commerce data, the majority of purchases were made in Denmark, United Kingdom, and Germany, where rates were over 75% (Eurostat Statistics Explained, 2016). The lowest figures came from eight Romanian regions and all six Bulgarian regions, where less than 20% of the population shop online (Eurostat Statistics Explained, 2016). In 2015, 80% of EU28's firms sell through a website or app (Eurostat Statistics Explained, 2016). The highest share of total turnover from e-sales is in "Accommodation" and the "Manufacturing Industry" (29 % and 22 %, respectively).

Turning to cross-border sales, 32% of businesses in Ireland have made electronic sales (highest percentage of EU28), with 17% of companies reporting sales to customers in other EU countries. Swedish and Danish companies have a high level of electronic sales (28% and 27%) but sell very little to other EU countries (10% each) (Eurostat Statistics Explained, 2016). In 2015, just 9% of European firms recruited or attempted to recruit ICT professionals and in 2016 just 20% of firms had workers with ICT competencies (Eurostat Statistics Explained, 2017). However, 20% of big firms stated that it was difficult to find specialized workers to fill vacancies. The majority of firms that recruited or attempted to recruit ICT workers (9% in 2015) are in Malta, Spain, Luxembourg, or United Kingdom (13%). In terms of difficulties, Czech and Slovenian firms were more likely to report difficulties in recruiting ICT workers. On the other hand, Spain, Romania, Greece, United Kingdom, Portugal, Poland, and Italy do not report recruitment difficulties (Eurostat Statistics Explained, 2017). Half of EU28's firms outsource ICT operations to external suppliers, and just 19% of ICT employees are employed by the actual firm. ICT outsourcing is less common among

large firms, where 44% mainly use own employees and just 28% predominantly outsource (Eurostat Statistics Explained, 2017).

E-commerce adoption is expected to be the most mature in countries from Northern, Central, and Western Europe and with the most positive attitude towards it (Ecommerce Europe, 2017).

3 Conceptual model

We analyze the *overall attitudes towards e-commerce adoption* by European firms, linking specific deterrents of e-commerce adoption (e.g., higher delivery costs or the nature of business) and retailer/interviewee characteristics (covariates): size, type of product transacted, retail channels, interviewee's position and involved in distance selling. The *overall attitudes towards e-commerce adoption* is the latent variable and is manifested in the deterrents of e-commerce adoption: *extra costs of delivery, complaints and after sales services, consumer protection rules, risk of fraud or non-payment, extra need for ICT skills or capital and the nature of business*. The confirmatory factor model conceptualizes that the *overall attitudes towards e-commerce adoption* is measured by a set of items and is explained by the retailer/interviewee characteristics.

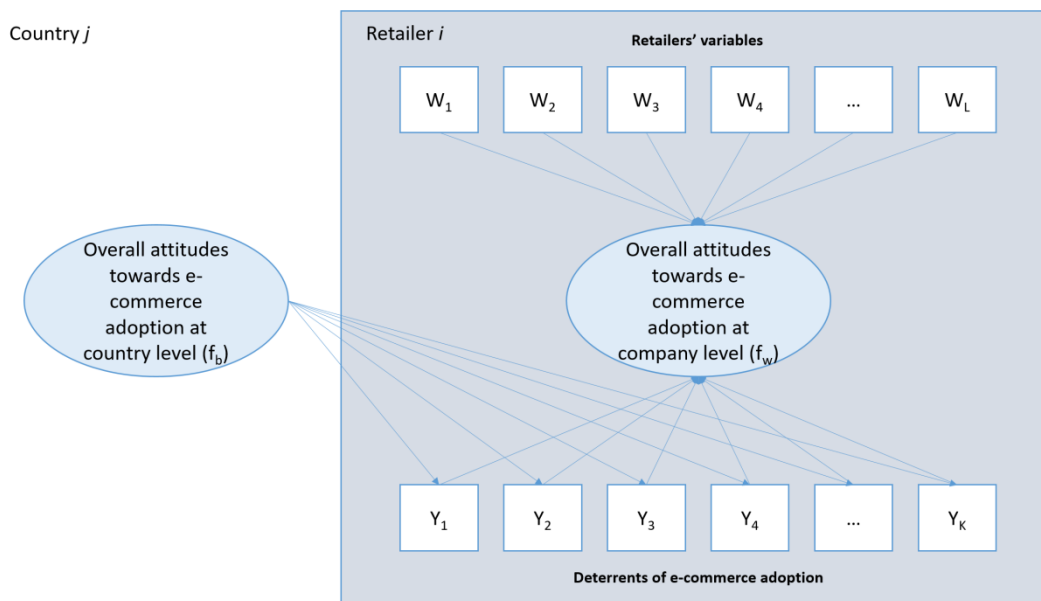


Figure 1 - Conceptual Model

Figure 1 represents the conceptual model used to measure the *overall attitudes towards e-commerce adoption* by European firms. This multilevel model contemplates two latent variables, which consider the within- and between-countries measures of *attitudes towards e-commerce adoption* f_w and f_b respectively. k items measure *attitudes towards e-commerce adoption*, represented by Y_k .

The conceptual model is a combination of a factor model and a regression model. The first relates the individual latent variable with the items. The retailer's characteristics (w_L) explain the *attitudes towards e-commerce adoption* at the retailer level using a regression model in a multilevel setting.

4 Sample

4.1 Eurobarometer data

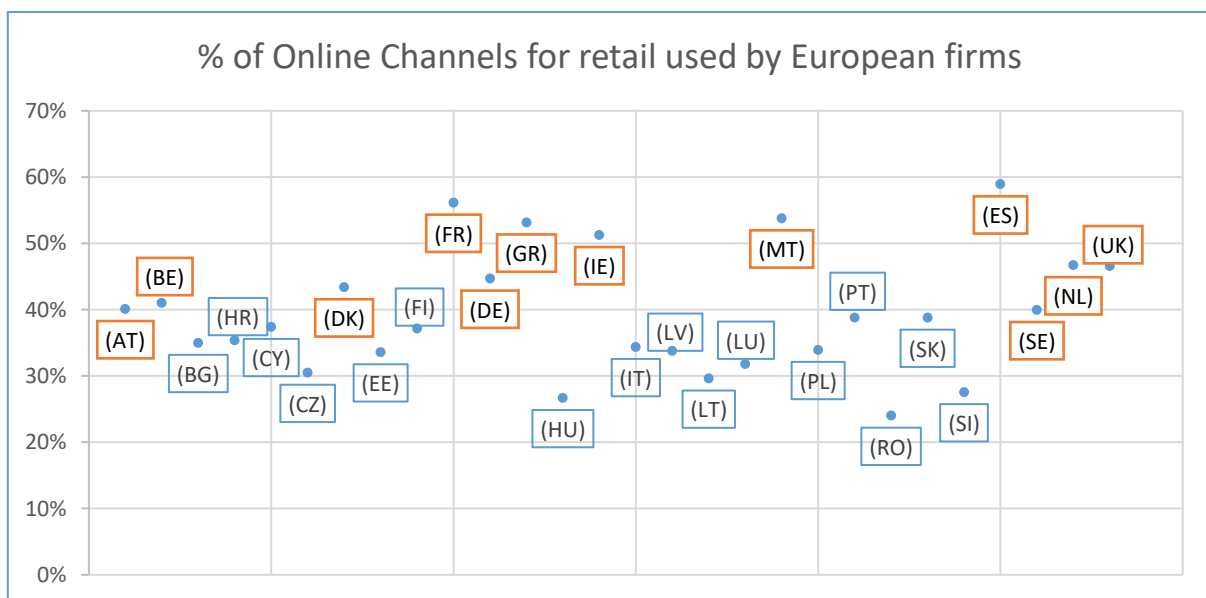
Data comes from the Flash Eurobarometer 396 on *Retailers' attitudes towards cross-border trade and consumer protection* (European Commission, 2015). The survey is designed to enhance the general knowledge base of national and European conditions for consumer and retailer e-commerce; it was part of a series of consumer protection surveys aimed at improving the regulatory framework on product/service safety, the knowledge of consumer rights and enforcement of consumer laws (European Commission, 2015). Fieldwork took place in March and April 2014 at firms in 28 Member States with telephone interviews (landline and mobile phone) conducted by TNS Political & Social on behalf of the European Commission. We will focus on the perceptions and experiences of European firms about starting web sales. This survey involved 11,000 interviews with retailers that sell goods or service to end consumers (B2C) and that employed at least 10 employees, in Retail, Services, Manufacturing or Industry sectors. It was conducted in the 28 countries of European Union: Austria (AT), Belgium (BE), Bulgaria (BG), Croatia (HR), Cyprus (CY), Czech Republic (CZ), Denmark (DK), Estonia (EE), Finland (FI), France (FR), Germany (DE), Greece (GR), Hungary (HU), Ireland (IE), Italy (IT), Latvia (LV), Lithuania (LT), Luxembourg (LU), Malta (MT), Poland (PL), Portugal (PT), Romania (RO), Slovakia (SK), Slovenia (SI), Spain (ES), Sweden (SE), The Netherlands (NL), and United Kingdom (UK). Respondents with decision-making responsibilities were interviewed in a universe of 608,323 firms: around 400 retailers were interviewed in each country except Cyprus, Luxembourg, Malta and Iceland where around 150 were interviewed in each country. Sample weights are available to make results representative of the population and make them comparable across countries.

4.2 Characterization of the sample

Figure 2 represents the percentage of online channel use, where multiple answers were possible. This percentage includes the percentage of e-commerce, m-commerce or both², because e-retailing and m-retailing share many common business operations and operate via the Internet (Chou, Chuang, & Shao, 2016). The lowest proportion of firms using online channels are in Romania (24.0%), Hungary (26.7%), Slovenia (27.6%), Lithuania (29.6%), and Czech Republic (30.5%). The countries with the highest

² Analyses in this section do not use sample weights. M-commerce (mobile commerce) is e-commerce conducted through wireless handheld devices such as cellular telephone and personal digital assistants (PDAs).

proportions of firms with online retail channels are Spain (58.9%), France (56.2%), Malta (53.8%), Greece (53.2%), and Ireland (51.3%). These results are congruent with the findings in Billon, Lera-Lopez, & Marco (2016), where France, and regions of Spain and Greece (Southern countries), as well as Northern European regions had the highest rates for ICT use by firms. In the same study, the authors revealed the disparity between some regions of Spain and Greece, which simultaneously have regions with high and low rates of ICT use by firms. Romania was also identified as one of the countries with the lowest rates of ICT use by firms (Billon, Lera-Lopez, & Marco, 2016). The weighted proportion for EU27 (Croatia was not included) is 39.4%. A coherent conclusion cannot be reached when a comparison is made with the results of the Ecommerce Foundation (2017). Although Billon, Lera-Lopez, & Marco (2016) found significant differences between regions, they could not find a spatial or geographical pattern. Their conclusion is in keeping with our results because the highest proportion of e-commerce use is not expected to be predominantly in Northern, Central or Western countries (Ecommerce Europe, 2017).



Note: **Blue:** below average; **Orange:** above average.
 Figure 2 - Percentage of Online Channels for retail used by European firms

Table 2 - Sales Channels

Country	Sales channels for retail							Online Channels (Yes)
	E-commerce (Yes*)	M-commerce (Yes*)	Mail order (Yes*)	Telesales / call center (Yes*)	Sales at consumers' homes (Yes*)	Direct retail sale (Yes*)	Other (Yes*)	
Austria (AT)	0.393	0.088	0.155	0.258	0.133	0.789	0.098	0.401
Belgium (BE)	0.359	0.159	0.122	0.124	0.276	0.534	0.175	0.410
Bulgaria (BG)	0.313	0.121	0.142	0.184	0.132	0.653	0.163	0.350
Croatia (HR)	0.336	0.063	0.076	0.114	0.177	0.556	0.348	0.354
Cyprus (CY)	0.359	0.160	0.130	0.389	0.061	0.786	0.061	0.374
Czech Republic (CZ)	0.266	0.098	0.176	0.028	0.196	0.638	0.214	0.305
Denmark (DK)	0.410	0.119	0.050	0.291	0.299	0.545	0.217	0.434
Estonia (EE)	0.328	0.055	0.045	0.118	0.028	0.732	0.238	0.336
Finland (FI)	0.346	0.144	0.081	0.304	0.118	0.660	0.149	0.372
France (FR)	0.533	0.285	0.128	0.133	0.154	0.672	0.100	0.562
Germany (DE)	0.419	0.162	0.197	0.225	0.152	0.692	0.111	0.447
Greece (GR)	0.516	0.195	0.157	0.197	0.106	0.623	0.073	0.532
Hungary (HU)	0.256	0.057	0.238	0.091	0.145	0.687	0.176	0.267
Ireland (IE)	0.459	0.335	0.279	0.244	0.137	0.810	0.030	0.513
Italy (IT)	0.323	0.160	0.157	0.084	0.147	0.583	0.234	0.344
Latvia (LV)	0.307	0.115	0.202	0.143	0.115	0.696	0.159	0.338
Lithuania (LT)	0.285	0.098	0.198	0.098	0.057	0.712	0.166	0.296
Luxembourg (LU)	0.272	0.152	0.146	0.179	0.205	0.728	0.099	0.318
Malta (MT)	0.517	0.207	0.221	0.331	0.159	0.745	0.055	0.538
Poland (PL)	0.316	0.124	0.148	0.093	0.109	0.775	0.137	0.339
Portugal (PT)	0.373	0.181	0.189	0.141	0.224	0.806	0.103	0.388
Romania (RO)	0.219	0.082	0.100	0.092	0.103	0.710	0.148	0.240
Slovakia (SK)	0.344	0.148	0.271	0.094	0.177	0.581	0.167	0.388
Slovenia (SI)	0.251	0.076	0.111	0.084	0.143	0.681	0.176	0.276
Spain (ES)	0.579	0.227	0.156	0.423	0.334	0.633	0.082	0.589
Sweden (SE)	0.349	0.198	0.053	0.265	0.122	0.537	0.247	0.399
The Netherlands (NL)	0.443	0.150	0.131	0.131	0.191	0.557	0.180	0.467
United Kingdom (UK)	0.366	0.263	0.242	0.279	0.155	0.705	0.068	0.466
Total**	0.365	0.150	0.153	0.175	0.157	0.667	0.155	0.394

Note: * Multiple answers; ** Sample is not weighted.

Most countries take up the challenge of e-commerce (36.5%), with less than half of these selling in mobile applications (15.0%) (Table 2). This number is congruent with forecasts and shows the firms' lack of commitment to m-commerce (Chou, Chuang, & Shao, 2016). However, we believe this trend will increase rapidly because the m-retail channel is a more convenient way of buying online that can be used anywhere and at any time (Chou, Chuang, & Shao, 2016). These authors also conclude that to the seamless experience through mobile devices has become more of a necessity than a strategic advantage (Chou, Chuang, & Shao, 2016).

The most advanced m-commerce economies are Ireland (33.5%), France (28.5%), and United Kingdom (26.3%). However, Denmark, Netherlands, and Sweden have the highest penetration rate of mobile Internet access (European Commission, 2015). Spain, which has the highest rate of global online channels and e-commerce, appears in just fourth place for m-commerce, with 22.7% of firms using mobile applications for retail. Estonia (5.5%), Hungary (5.7%), Croatia (6.3%), Slovenia (7.6%), and Romania (8.2%) have the lowest rates for the use of m-commerce. This channel is the least used (15%), followed by mail order (15.3%) and visiting consumers at their homes (15.7%) (Figure 3).

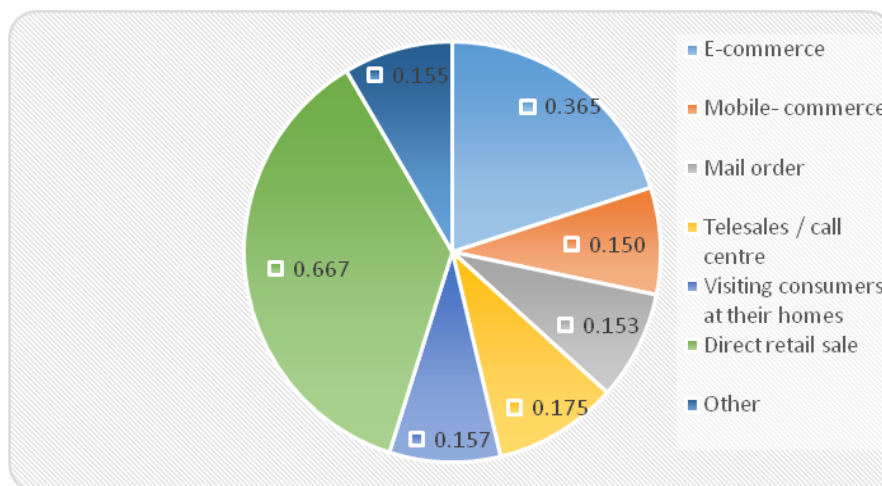


Figure 3- Sales Channel for Retail

The most used channel by European firms is direct retail sale (66.7%); although the differences between direct retail and online sales in most countries are small, e.g., Spain (63.3% vs. 58.9%), Greece (62.3% vs. 53.2%), and The Netherlands (55.7% vs. 46.7%).

The biggest differences are found in Hungary, Poland, Portugal, and Romania where direct sales are higher than online sales.

In relation to firm size (Table 3), 71.7% of the firms in the overall sample are small (10-49 employees), 21.0% medium, and the remaining are large with more than 250 employees (7.3%). Most of the companies without online activities are small (76.7%). This is congruent with the literature: the smallest firms have fewest resources and are less able to invest (Grandon & Pearson, 2004; Zhu, Kraemer, & Xu, 2006; OECD, 2001). Zhu, Kraemer, & Xu (2003) also conclude that larger sized companies are more likely to adopt e-business. In Hungary (90.1%), Slovakia (89.8%), and Romania (87.5%), small firms have the fewest online activities. The Netherlands (29.7%) is at the bottom of the ranking for medium size firms and United Kingdom has the highest percentage of large companies (23.6%) without online channels. Nevertheless, there may be a strong concentration of B2C e-commerce in the UK as the Ecommerce Foundation's Report shows that it is the Western country with the highest turnover (€157,149 million) (Ecommerce Europe, 2017).

Table 3 - Number of employees in the sample of firms in each EU country

Country	Companies without online activities			Overall sample		
	10-49	50-249	250 and above	10-49	50-249	250 and above
Austria (AT)	0.808	0.142	0.050	0.743	0.185	0.073
Belgium (BE)	0.742	0.163	0.094	0.706	0.200	0.095
Bulgaria (BG)	0.760	0.215	0.024	0.710	0.252	0.038
Croatia (HR)	0.766	0.164	0.070	0.725	0.213	0.063
Cyprus (CY)	0.756	0.183	0.061	0.733	0.199	0.068
Czech Republic (CZ)	0.766	0.201	0.033	0.758	0.200	0.043
Denmark (DK)	0.617	0.266	0.117	0.573	0.285	0.143
Estonia (EE)	0.751	0.196	0.053	0.713	0.230	0.058
Finland (FI)	0.850	0.113	0.038	0.754	0.169	0.077
France (FR)	0.778	0.152	0.070	0.731	0.209	0.060
Germany (DE)	0.689	0.219	0.091	0.645	0.248	0.108
Greece (GR)	0.724	0.216	0.059	0.713	0.235	0.053
Hungary (HU)	0.901	0.074	0.025	0.875	0.088	0.038
Ireland (IE)	0.745	0.214	0.042	0.630	0.293	0.078
Italy (IT)	0.720	0.188	0.092	0.683	0.218	0.100
Latvia (LV)	0.822	0.151	0.027	0.796	0.170	0.035
Lithuania (LT)	0.807	0.151	0.042	0.771	0.190	0.040
Luxembourg (LU)	0.825	0.136	0.039	0.768	0.179	0.053
Malta (MT)	0.791	0.149	0.060	0.673	0.240	0.087
Poland (PL)	0.718	0.263	0.020	0.708	0.268	0.025
Portugal (PT)	0.827	0.148	0.025	0.758	0.195	0.048
Romania (RO)	0.875	0.115	0.010	0.848	0.135	0.017
Slovakia (SK)	0.898	0.094	0.009	0.895	0.090	0.015
Slovenia (SI)	0.802	0.153	0.045	0.766	0.160	0.075
Spain (ES)	0.665	0.267	0.068	0.633	0.270	0.098
Sweden (SE)	0.720	0.220	0.059	0.650	0.265	0.085
The Netherlands (NL)	0.621	0.297	0.082	0.590	0.288	0.123
United Kingdom (UK)	0.616	0.148	0.236	0.545	0.210	0.245
Total*	0.767	0.176	0.056	0.717	0.210	0.073

Note: * Sample is not weighted.

If we look at the type of product supplied by firms that do not have online activities (Table 3), we find that 56.0% are services firms, which is the category with fewest online activities. On the other hand, OECD (2001) concludes that information-intensive services and the public sector have the highest penetration rates and a high level of online activity (OECD, 2001). Firms without online activities in Ireland and the United Kingdom are mostly in the food sector (67.7% and 68.5%, respectively). In Cyprus, Hungary, Italy, Luxembourg, Malta, Portugal, and The Netherlands, the non-food firms have the highest percentage of traditional activities (i.e., without online activity).

Most of the firms operate in the services area (61.3%), followed by non-products (48.5%), food products (32.8%), and others (just 1.9%). It should be noted that although companies which sell products usually offer services as well, the reverse is not necessarily true. According to Ecommerce Foundation, the majority of products transacted in EU28 are goods, with the exception of Northern Europe where 50.1% are services and 49.9% goods.

Table 4 - Type of products sold in the EU firms

Country	Companies without online activities				Overall sample			
	Food products (Yes*)	Non-food products (Yes*)	Services (Yes*)	Other (Yes*)	Food products (Yes*)	Non-food products (Yes*)	Services (Yes*)	Other (Yes*)
Austria (AT)	0.318	0.519	0.594	0.013	0.273	0.458	0.675	0.010
Belgium (BE)	0.369	0.571	0.622	0.000	0.344	0.569	0.681	0.000
Bulgaria (BG)	0.357	0.463	0.475	0.016	0.283	0.475	0.490	0.035
Croatia (HR)	0.293	0.535	0.637	0.027	0.283	0.455	0.700	0.023
Cyprus (CY)	0.378	0.524	0.280	0.012	0.313	0.415	0.456	0.014
Czech Republic (CZ)	0.342	0.435	0.665	0.015	0.303	0.486	0.659	0.013
Denmark (DK)	0.182	0.491	0.589	0.089	0.173	0.505	0.603	0.080
Estonia (EE)	0.374	0.408	0.558	0.008	0.353	0.390	0.593	0.020
Finland (FI)	0.404	0.425	0.675	0.000	0.321	0.415	0.684	0.002
France (FR)	0.520	0.544	0.550	0.000	0.484	0.574	0.608	0.000
Germany (DE)	0.361	0.511	0.598	0.032	0.300	0.463	0.683	0.028
Greece (GR)	0.357	0.422	0.519	0.011	0.265	0.353	0.655	0.005
Hungary (HU)	0.297	0.509	0.509	0.021	0.263	0.520	0.555	0.015
Ireland (IE)	0.677	0.625	0.469	0.005	0.559	0.607	0.576	0.008
Italy (IT)	0.321	0.478	0.462	0.056	0.248	0.446	0.549	0.040
Latvia (LV)	0.367	0.525	0.629	0.012	0.309	0.494	0.696	0.010
Lithuania (LT)	0.309	0.440	0.614	0.000	0.257	0.449	0.633	0.002
Luxembourg (LU)	0.388	0.641	0.592	0.010	0.391	0.623	0.589	0.007
Malta (MT)	0.239	0.672	0.567	0.015	0.287	0.493	0.660	0.007
Poland (PL)	0.506	0.482	0.565	0.024	0.385	0.468	0.613	0.020
Portugal (PT)	0.436	0.469	0.551	0.004	0.380	0.505	0.650	0.003
Romania (RO)	0.462	0.566	0.455	0.007	0.419	0.516	0.501	0.010
Slovakia (SK)	0.277	0.421	0.515	0.055	0.256	0.426	0.544	0.050
Slovenia (SI)	0.203	0.333	0.686	0.023	0.170	0.372	0.662	0.036
Spain (ES)	0.304	0.410	0.602	0.006	0.278	0.434	0.669	0.003
Sweden (SE)	0.311	0.468	0.562	0.030	0.286	0.464	0.574	0.025
The Netherlands (NL)	0.469	0.562	0.515	0.031	0.395	0.572	0.574	0.030
United Kingdom (UK)	0.685	0.655	0.448	0.030	0.609	0.674	0.541	0.023
Total**	0.373	0.494	0.561	0.020	0.328	0.485	0.613	0.019

Note: * Multiple answers; **Sample is not weighted.

Table 5 presents the distribution of online sales by country of destination. It shows that most firms in Germany sell to the internal market (97.6%), whereas in Greece most firms sell internally (94.7%), to another EU country (58.4%), and to non-EU countries (53.6%). These figures can be explained by the fact that VAT is 19% and 23% respectively (Ecommerce Europe, 2017). Cypriot firms have the lowest percentage of internal sales (87%), a small penetration in EU countries (58.7%), and a large proportion of companies that only sell in Cyprus (30.6%). However, Cyprus has the largest percentage of firms that only exports online sales to final consumers (12.2%). In Finland we see the opposite: most firms sell only in their own country (77.5%); it has the lowest percentage of sales to other EU countries (13.7%), and 16.9% sell both in Finland and abroad. These percentages are unexpected as VAT in Finland is 24%, which suggests that it may not have appropriate legislation. Moreover, companies from Slovakia show the smallest percentage of sales to non-EU countries (11.9%), and in Sweden 0.6% companies only sell to non-EU countries. As VAT in these countries is 20% and 25%, the results may be explained by Sweden's higher VAT rate.

Table 5 - Cross-border sales in each EU country

Country	Online sales to final consumer in:						
	Your country (YES*)	Other EU country (YES*)	Non EU country (YES*)	Only in your country (YES)	Only in other countries (YES)	Your country and in other (YES)	DK\NA (YES)
Austria (AT)	0.960	0.490	0.424	0.363	0.038	0.544	0.056
Belgium (BE)	0.970	0.363	0.259	0.451	0.025	0.358	0.167
Bulgaria (BG)	0.917	0.256	0.198	0.609	0.075	0.226	0.090
Croatia (HR)	0.883	0.511	0.642	0.293	0.114	0.571	0.021
Cyprus (CY)	0.870	0.304	0.587	0.306	0.122	0.510	0.061
Czech Republic (CZ)	0.945	0.413	0.257	0.475	0.051	0.398	0.076
Denmark (DK)	0.954	0.204	0.204	0.659	0.043	0.226	0.073
Estonia (EE)	0.900	0.323	0.408	0.485	0.097	0.388	0.030
Finland (FI)	0.964	0.137	0.173	0.775	0.035	0.169	0.021
France (FR)	0.967	0.267	0.352	0.584	0.032	0.342	0.041
Germany (DE)	0.976	0.329	0.371	0.520	0.023	0.401	0.056
Greece (GR)	0.947	0.584	0.536	0.352	0.052	0.590	0.005
Hungary (HU)	0.911	0.178	0.189	0.612	0.078	0.184	0.126
Ireland (IE)	0.957	0.476	0.439	0.386	0.040	0.500	0.074
Italy (IT)	0.897	0.317	0.460	0.489	0.099	0.374	0.038
Latvia (LV)	0.946	0.300	0.277	0.629	0.053	0.303	0.015
Lithuania (LT)	0.961	0.301	0.262	0.587	0.037	0.321	0.055
Luxembourg (LU)	0.907	0.558	0.233	0.313	0.083	0.500	0.104
Malta (MT)	0.930	0.535	0.521	0.359	0.064	0.487	0.090
Poland (PL)	0.948	0.233	0.284	0.565	0.046	0.275	0.115
Portugal (PT)	0.961	0.425	0.451	0.429	0.039	0.526	0.006
Romania (RO)	0.906	0.188	0.212	0.626	0.088	0.220	0.066
Slovakia (SK)	0.889	0.274	0.119	0.597	0.101	0.208	0.094
Slovenia (SI)	0.915	0.330	0.255	0.539	0.078	0.304	0.078
Spain (ES)	0.946	0.344	0.379	0.528	0.052	0.390	0.030
Sweden (SE)	0.993	0.308	0.301	0.561	0.006	0.344	0.089
The Netherlands (NL)	0.987	0.373	0.160	0.544	0.012	0.322	0.123
United Kingdom (UK)	0.980	0.230	0.309	0.559	0.017	0.282	0.141
Total**	0.945	0.343	0.337	0.513	0.052	0.368	0.067

Note: * Multiple answers; ** Sample is not weighted.

Table 6 reports the concerns and perceptions of firms that remain offline with regards obstacles to starting online sales in each country. Portuguese and Polish firms are the most concerned about obstacles to online sales and are in the top five most worried about all obstacles except one: “The nature of your business” for Portugal and “Higher risk of fraud and non-payment” for Poland. As these country-level opinions are in line with the wider differences between the proportions for e-commerce and direct retail sales reported in Table 2, we can conclude that consumers in these countries seem to prefer to go to a physical store instead of buying online. Billon, Lera-Lopez, & Marco (2016) also find that Portugal and Poland had the lowest prevalence of regular Internet users, which may explain these figures. On the other hand, countries with a heavy concentration of physical stores are less attractive for e-commerce investments (Kshetri, Bebenroth, Williamson, & Sharma, 2014). The preference for physical stores may be due to the importance local buyers give to touching and feeling products; this means governmental initiatives are required to make these countries more attractive for e-retail. For example, the Chinese government has been developing initiatives to develop the internal market (e.g., many city governments distributed spending vouchers to residents and in some cities, civil servants receive consumer vouchers for up to 10 % of their salaries) that facilitate the expansion of e-commerce (Kshetri, Bebenroth, Williamson, & Sharma, 2014). Nevertheless, the situation is expected to change in these countries given the rising proportion of households with Internet access since 2014 in Portugal (16%) and Poland (11%) (European Commission, 2015). It should be beneficial to e-commerce firms because regions with higher proportions of household Internet access tend to shop more online (Choshin & Ghaffari, 2017). Also a fast broadband Internet infrastructure may raise GDP (10% represents a raise of 1-1.5% of gross domestic product) and improve the quality of regional government (Negreiro, 2015; Billon, Lera-Lopez, & Marco, 2016). Danish firms seem to be the best prepared for the online sales challenge as they give the lowest weight to all obstacles. Indeed, Danish, Swedish, and Finnish firms have no difficulty in hiring ICT specialists (“Extra need for ICT skills”), which may result from the large supply of workers with higher education (Cruz-Jesus, Vicente, Bacao, & Oliveira, 2016). This is congruent with the results of the European B2C E-commerce Report 2016, in which Denmark is the Northern country with the highest e-turnover (Ecommerce Europe, 2017). Estonian and Swedish firms are also unaware of strong obstacles to implementing an online sales strategy. Billon, Lera-Lopez, & Marco (2016) show that Sweden is one of

the countries with the highest prevalence of regular Internet users, together with Germany, UK, and Finland.

Table 6 clearly shows firms in Northern European countries are less worried about e-commerce (Sweden, Estonia, Denmark, Finland, and Lithuania). Moreover, we can conclude that Central European firms (Germany, Hungary, and Czech Republic) are not strongly affected by barriers to e-commerce. While no European region stands out for its concern about barriers to e-commerce, countries like Ireland, Luxembourg, United Kingdom, and Belgium in Western Europe, and Portugal, Malta, Cyprus, and Greece in the South are the most concerned. This is in line with the disparities in broadband penetration across the EU found by Negreiro (2015), with North-South geographical divides. However, while Portugal was expected to consider the “extra need of ICT skills” a deterrent due to low levels of education, this is not the case for Malta and Spain (Cruz-Jesus, VÍcente, Bacao, & Oliveira, 2016).

Table 6 - Countries with the biggest and smallest proportion of “Fairly and Very Important” responses about each obstacle to online sales.

Higher costs of delivery	Additional consumer protection rules	Potentially higher costs involved in resolving complaints and disputes online	Higher risk of fraud and non-payment	Extra costs from after-sales service	Extra need for ICT skills	Extra need for capital for investment in development of ICT applications	The nature of your business	
Ireland (69.4%) Latvia (65.2%) <u>Portugal</u> (67%) Luxembourg (66.3%) <i>Poland</i> (65.7%)	<u>Portugal</u> (75.9%) Romania (75.7%) Luxembourg (74.8%) Ireland (73.8%) <i>Poland</i> (72.9%)	<u>Portugal</u> (69.3%) Malta (63.2%) Luxembourg (62.9%) Romania (61.8%) <i>Poland</i> (59%)	<u>Portugal</u> (76.1%) Luxembourg (75%) Latvia (74.2%) Romania (72.5%) Ireland (71.8%)	<i>Poland</i> (67.8%) <u>Portugal</u> (66.4%) Romania (63.6%) United Kingdom (59.7%) Ireland (58%)	<u>Portugal</u> (71.4%) Cyprus (68.3%) Luxembourg (67.6%) <i>Poland</i> (66.8%) Romania (66.1%)	Cyprus (73.8%) <u>Portugal</u> (71.0%) <i>Poland</i> (67.9%) Malta (65.5%) Greece (63.6%)	Romania (75.4%) Cyprus (74.4%) Belgium (73.1%) Luxembourg (72.0%) <i>Poland</i> (71.6%)	5 Biggest proportions
The Netherlands (42.1%) Germany (32.3%) <u>Sweden</u> (29.7%) <i>Estonia</i> (28.7%) Denmark (22.5%)	Finland (43.9%) Italy (38.3%) <i>Estonia</i> (27.3%) <u>Sweden</u> (21.7%) Denmark (16.4%)	Hungary (37.3%) Germany (36.4%) <u>Sweden</u> (24.5%) <i>Estonia</i> (22.8%) Denmark (22.1%)	Finland (39.6%) <u>Sweden</u> (37%) Germany (36.7%) <i>Estonia</i> (34.8%) Denmark (20.8%)	The Netherlands (33.9%) Finland (30%) Denmark (24.8%) <u>Sweden</u> (24.7%) <i>Estonia</i> (18%)	Lithuania (43.4%) Germany (39.2%) <i>Estonia</i> (33.9%) Czech Republic (29.1%) Denmark (26.8%)	<i>Estonia</i> (40.4%) Czech Republic (39%) The Netherlands (36.6%) <u>Sweden</u> (30.5%) Denmark (22%)	Germany (53.2%) Italy (51.2%) <u>Sweden</u> (50.3%) Lithuania (50%) Denmark (38.2%)	5 Smallest proportions

Table 7 - Proportion of “Fairly and Very Important” of each obstacle to online sales in each country

Country	Higher costs of delivery	Additional consumer protection rules	Potentially higher costs involved in resolving complaints and disputes online	Higher risk of fraud and non-payment	Extra costs from after-sales service	Extra need for ICT skills	Extra need for capital for investment in development of ICT applications	The nature of your business
Austria (AT)	0.486	0.605	0.432	0.603	0.398	0.566	0.534	0.683
Belgium (BE)	0.549	0.588	0.500	0.704	0.483	0.545	0.512	0.731
Bulgaria (BG)	0.505	0.672	0.475	0.680	0.483	0.577	0.516	0.622
Croatia (HR)	0.601	0.639	0.567	0.637	0.575	0.578	0.594	0.706
Cyprus (CY)	0.526	0.649	0.447	0.590	0.452	0.683	0.738	0.744
Czech Republic (CZ)	0.349	0.443	0.384	0.514	0.358	0.291	0.390	0.639
Denmark (DK)	0.225	0.164	0.221	0.208	0.248	0.268	0.220	0.382
Estonia (EE)	0.287	0.273	0.228	0.348	0.180	0.339	0.404	0.621
Finland (FI)	0.446	0.439	0.416	0.396	0.300	0.441	0.449	0.705
France (FR)	0.576	0.667	0.523	0.619	0.537	0.575	0.574	0.652
Germany (DE)	0.323	0.543	0.364	0.367	0.368	0.392	0.413	0.532
Greece (GR)	0.456	0.591	0.508	0.582	0.481	0.657	0.636	0.637
Hungary (HU)	0.548	0.581	0.373	0.600	0.557	0.427	0.493	0.615
Ireland (IE)	0.694	0.738	0.562	0.718	0.580	0.647	0.587	0.712
Italy (IT)	0.455	0.383	0.484	0.487	0.444	0.498	0.533	0.512
Latvia (LV)	0.652	0.621	0.496	0.742	0.544	0.528	0.516	0.653
Lithuania (LT)	0.497	0.506	0.459	0.615	0.404	0.434	0.481	0.500
Luxembourg (LU)	0.663	0.748	0.629	0.750	0.495	0.676	0.606	0.720
Malta (MT)	0.635	0.667	0.632	0.533	0.574	0.550	0.655	0.590
Poland (PL)	0.657	0.729	0.590	0.737	0.678	0.668	0.679	0.716
Portugal (PT)	0.670	0.759	0.693	0.761	0.664	0.714	0.710	0.709
Romania (RO)	0.637	0.757	0.618	0.725	0.636	0.661	0.592	0.754
Slovakia (SK)	0.431	0.592	0.477	0.617	0.483	0.517	0.472	0.563
Slovenia (SI)	0.517	0.588	0.509	0.573	0.540	0.636	0.578	0.588
Spain (ES)	0.596	0.662	0.582	0.699	0.562	0.631	0.635	0.713
Sweden (SE)	0.297	0.217	0.245	0.370	0.247	0.474	0.305	0.503
The Netherlands (NL)	0.421	0.492	0.386	0.563	0.339	0.495	0.366	0.690
United Kingdom (UK)	0.551	0.605	0.563	0.705	0.597	0.558	0.462	0.642
Total*	0.512	0.570	0.480	0.595	0.476	0.534	0.518	0.641

Note: * Sample is not weighted.

5 Methodology – The multilevel framework

This research takes a multilevel approach given respondents are nested within countries as depicted in Figure 1. The individual level models the attitudes towards online barriers within each country; and the country level highlights the similarities (and differences) between European Union countries. As respondents from the same country share the same context, the traditional assumption of independence is violated and multilevel modeling takes that into account (Scott et al., 2013; Dias and Oliveira, 2015).

The value y_{ijk} measures on an ordinal scale the response of individual i from country j on the item k regarding *attitudes towards e-commerce adoption*. Ordinal data is modeled by assuming an underlying continuous latent variable, y_{ijk}^* , that measures the propensity of individual i in country j to choose category m and is related with the ordinal item by thresholds:

$$y_{ijk} = m, \text{ if } \tau_{k,m-1} < y_{ijk}^* \leq \tau_{k,m} \quad (1)$$

where $\tau_{k,m}$ is the threshold for item k that defines the categories $m = 1, \dots, M$, with $\tau_{k,0} = -\infty$ and $\tau_{k,M} = +\infty$. Thus, higher values of y_{ijk}^* indicate higher categories of the observed ordinal variable. For instance, for a 4-level ordinal variable, three thresholds are needed.

At the individual level the two-level factor model is given by:

$$y_{ijk}^* = \mu_{jk} + \lambda_k^W f_{ij}^W + v_{ij} \quad (2)$$

where μ_{jk} is the random intercept of item k for country j . This level models the within-country variation, where λ_k^W is the individual-level loading for item k and f_{ij}^W is the score of the individual-level latent variable. Thus, we assume a unidimensional model in which the perception of attitudes towards e-commerce adoption is manifested on the observed items. The residual random variable is $v_{ij} \sim N(0, \sigma_v^2)$.

At the country level, the factor model gives the structure of the random intercepts that controls between-country variability:

$$\mu_{jk} = \mu_k + \lambda_k^B f_j^B + u_j \quad (3)$$

where μ_k are the intercepts for each item (to be set to zero to identify the threshold). This equation models the between-country variation, where λ_k^B is the country-level loading for item k and f_j^B is the score for country j . The residual random variable is $u_j \sim N(0, \sigma_u^2)$. The residuals v_{ij} and u_j are assumed to be independent.

The single-equation definition of the two-level model is:

$$y_{ijk}^* = \mu_k + \lambda_k^B f_j^B + \lambda_k^W f_{ij}^W + u_j + v_{ij} \quad (4)$$

Particular care needs to be taken when we compare factorial structures across distinct groups or populations (Reeskens & Hooghe, 2008). Our model takes configural invariance into account, i.e., all items are included in the measurement of each country. Second, scale invariance is ensured by defining loadings that are invariant across countries, i.e., λ_k^B and λ_k^W are constant across countries. Hence, an increase of one unit in the latent variable has the same measurement effect in all countries. Finally, we ensure that intercepts are also invariant across countries (see equation (4), i.e., thresholds only vary across items).

Our model allows an MIMIC (Multiple Indicators and Multiple Causes) structure as the individual latent variable is regressed on a set of L individual exogenous covariates

$$f_{ij}^W = \gamma_1 W_{ij1} + \dots + \gamma_L W_{ijL}, \quad (5)$$

where W_{ijl} 's are the individual covariates.

Nine items are used to measure the attitudes towards e-commerce adoption at the individual level: the *extra costs of delivery*, *complaints* and *after sales services*, *consumer protection rules*, *risk of fraud or non-payment*, *extra need for ICT skills* or *capital* and *the nature of business*. These items are measured on a four-point ordinal scale from 1 (“not at all important”) to 4 (“very important”). At the same individual level, seven covariates are included in the model to explain the latent variable: *firm size*, *type of product transacted*, *channels of retail*, *position of the interviewee in the firm* and *the engagement of distance selling*. This model is estimated by the maximum likelihood method using the statistical package Mplus 6.12. Model estimates take country-level weights into account.

6 Results

6.1 Model fit

First, we check model fit without taking country level into account, i.e., we estimate a single-level confirmatory model. The chi-square value for this model is significant ($\chi^2_{(20)} = 141.297$; $p < 0.001$). As this test is sample size sensitive, other fit indices were also applied: Comparative Fit Index (CFI), Tucker-Lewis Index (TLI), and Root Mean Square Error of Approximation (RMSEA). CFI is 0.989, TLI is 0.984, and RMSEA is 0.034, which means that the fit can be considered excellent (Hu & Bentler, 1999). These results (CFI, TLI, and RMSEA) show that one single latent variable (i.e., removing the country-level latent variable) is significant in explaining variations on all of these eight items and the model is invariant across countries.

6.2 Parameter estimates

First, we analyze the measurement component of the model, i.e., the relation between the latent variables and the items. Table 8 shows the impact of the latent variables on each specific item and its magnitude is given by the estimate of the loading. To allow the estimation (due to scale invariance) and interpretation, the loading of the first item (*higher costs of delivery*) on country level is set to equal 1, serving as a reference. Additionally, the estimate of the variance is reported for country level, but the variance at individual-level is fixed so that the factorial model remains identified. The level of significance is set at 0.05. All loadings are significant ($p < 0.05$), i.e., both latent variables impact each item. At country level, we reject that the variance is null, i.e., there is variability between-countries that is not accounted for.

Thus, an increase in the impact of retailers' attitudes on the latent variable e-commerce adoption for an individual variable (*i*) in country (*j*) increases significantly more than the the proportionality of the level of importance retailers give to almost all deterrents of e-commerce adoption (potentially higher costs involved in resolving complaints and disputes online, extra costs from after-sales service, additional consumer protection rules, higher costs of delivery, extra need for capital for investment in development of ICT applications, higher risk of fraud and non-payment, and extra need for ICT skills). Only the loading "nature of your business" increases significantly, but less than proportionally.

Table 8 - Estimated loadings and variances at retailer and country level

Loadings	Individual level			Country level		
	Estimate	S.E.	p-value	Estimate	S.E.	p-value
Higher costs of delivery	1.890	0.122	0.000	1	-	-
Additional consumer protection rules	2.038	0.119	0.000	0.796	0.063	0.000
Potentially higher costs involved in resolving complaints and disputes online	2.394	0.100	0.000	0.790	0.073	0.000
Higher risk of fraud and non-payment	1.865	0.124	0.000	0.852	0.072	0.000
Extra costs from after-sales service	2.235	0.093	0.000	0.854	0.075	0.000
Extra need for ICT skills	1.814	0.080	0.000	0.637	0.088	0.000

Extra need for capital for investment in development of ICT applications	1.866	0.078	0.000	0.666	0.090	0.000
The nature of your business	0.674	0.091	0.000	0.309	0.071	0.000
Variance	1	-	-	0.923	0.321	0.004

At country level, the impact of the latent variable *overall attitude towards e-commerce adoption* on higher costs of delivery is set as the reference (loading equals one). We conclude that at country level all items show smaller loadings than the reference. In particular, *the nature of your business* is the least sensitive to changes in the *overall attitude towards e-commerce adoption* at country level. This applies to all loadings except the *higher costs of delivery*. The variance of the latent variable at the individual level (1) is approximately the same as the dispersion at country level (0.923), which means that the heterogeneity is similar within countries and between countries. The lack of heterogeneity within countries and between countries was expected, mostly because of European directives for convergence purposes. The intraclass correlation coefficient (ICC) gives the proportion of the total variance that is explained by the grouping variable, i.e., $ICC = \sigma_u^2 / (\sigma_v^2 + \sigma_u^2)$, where σ_u^2 is the variance between countries and σ_v^2 is the variance within countries. The estimate of ICC is 0.480, i.e., the multilevel structure (between-country variability), accounts for approximately 48% of the total variability.

Table 9 reports the use of the ordinal scale for each item. The threshold estimate is the estimated cut-point on the latent variable used to differentiate between categories of the ordinal scale. When respondents' answers on a given item are widespread on the scale, the cut points for that item are expected to be more widely spread. For example, respondents with an *attitude towards e-commerce adoption* greater than 0.646 will be classified into category 4 of the item "the nature of business".

Table 9 - Estimated thresholds for each category on each dependent variable

	Threshold1		Threshold2		Threshold3	
	Estimate	S.E.	Estimate	S.E.	Estimate	S.E.
Higher costs of delivery	-1.114	0.190	0.153	0.203	2.071	0.241
Additional consumer protection rules	-0.662	0.169	0.571	0.176	2.374	0.189
Potentially higher costs involved in resolving complaints and disputes online	-0.790	0.201	0.887	0.221	3.091	0.250
Higher risk of fraud and non-payment	-1.244	0.166	-0.031	0.176	1.422	0.203
Extra costs from after-sales service	-0.661	0.196	0.875	0.200	3.005	0.218
Extra need for ICT skills	-0.965	0.153	0.360	0.154	2.231	0.171
Extra need for capital for investment in development of ICT applications	-0.950	0.182	0.504	0.184	2.327	0.194
The nature of your business	-1.149	0.091	-0.395	0.084	0.646	0.097

6.3 Impact of covariates on the individual latent variable

Table 10 reports the impact of the individual covariates on the individual latent variable. When compared with their reference groups, the number of employees and the interviewee's position in the firm do not contribute significantly to explaining the latent variable (attitudes towards e-commerce adoption). Therefore, aspects like firm size and the personal position of the interviewees do not influence *the attitude towards e-commerce adoption*. Maintaining all other factors constant, three covariates point to their aversion to e-commerce: telesales/call center retail channel, direct retail channel, and firms which sell non-food products. Thus, we conclude that firms that sell non-food products in a traditional way (direct retail) or use call centers or telesales channels tend to be more pessimistic about e-commerce adoption. These covariates explain the latent variable negatively.

As for distance selling, firms currently engaged in this are more optimistic than the others, but the magnitude of the impact on the latent variable is small.

Table 10 - Covariate effects on the individual latent variable

	<i>Estimate</i>	<i>S.E.</i>	<i>p-value</i>
Number of employees (ref: 10-49)			
50-249	0.030	0.039	0.447
250 and above	-0.038	0.121	0.755
Interviewee's position (ref: other responsible for decision making)			
General manager	-0.036	0.046	0.430
Commercial/Sales manager	0.023	0.038	0.554
Marketing manager	-0.048	0.091	0.598
Retail sales (ref: online commerce)			
Mail order (by post)	0.137	0.084	0.102
Telesales / call center (e.g. phone sales, TV shopping) excluding e-commerce	0.203	0.079	0.010
Sales through representatives visiting consumers at their homes	-0.025	0.084	0.763
Direct retail sale (i.e. shops)	0.153	0.052	0.003
Other	0.001	0.062	0.990
Currently engaged in distance selling (ref: no)	0.106	0.094	0.257
Product type (ref: food products)			
Non-food products	0.187	0.034	0.000
Services	-0.017	0.034	0.614
Other	0.080	0.111	0.473

6.4 Individual level scores

Figure 4 provides the estimates of individual factorial scores grouped at country level, i.e., the estimated mean and standard deviation (SD) of f_{ij}^W for each country. Thus, countries are depicted in increasing order of the average *attitude towards e-commerce adoption*. The EU28 countries as a whole present negative average attitudes (i.e., below the average, which is zero) about e-commerce adoption (16 of

28 countries). Denmark, Sweden, Estonia, and Italy show the most positive average attitude and consider the majority of the deterrents not at all important; on the other hand, firms in countries such as Portugal, Poland, and Luxembourg have a negative average attitude, and consider most barriers very important. Croatia, Hungary, Slovakia, Slovenia, Italy, and United Kingdom present very high within-country dispersion. Belgium, France, Germany, and Malta have the lowest within-country dispersion. Overall, the ranking of these countries is not in complete agreement with our expectations. For instance, the difference between scores for Luxembourg and Romania was not expected. In 2014, the total online sales of goods and services in Luxembourg increased (Ecommerce Europe, 2017), but the small internal market may not encourage firms to sell online given the short delivery distances. Luxembourg has the second smallest proportion of 55-74 years old who have never used the Internet (Negreiro, 2015). Another unexpected result was the marked difference between the mean for Portugal and Poland. This can be explained by the decrease in the total online sales of goods and services in 2014, and Portuguese firms' fear of adopting e-commerce (Ecommerce Europe, 2017).

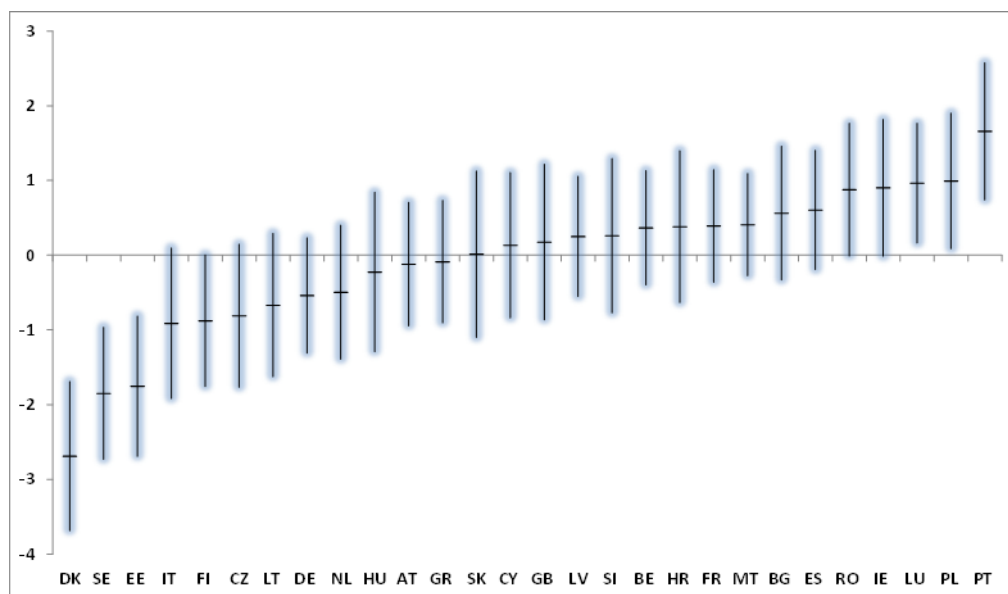


Figure 4 - Distribution of perceived barriers towards e-commerce in the European countries

To sum up, Figure 4 shows a predominance of Northern and Central countries with the best scores on the *attitude towards e-commerce adoption*. This is in agreement with the highest prevalence of Internet usage in Nordic and Central European countries (Verboord, 2017). Managers from Western, Eastern, and Southern European firms are the most concerned about barriers; this partially overlaps with the Southern and Eastern European firms that show the lowest levels of ICT use (Billon, Lera-Lopez, & Marco, 2016). On the other hand, Western countries have the highest prevalence of Internet usage (Verboord, 2017).

7 Conclusion

The focus of this research was on the *overall attitude towards e-commerce adoption* by European firms, linking specific deterrents of e-commerce adoption and retailers' characteristics in a multilevel factor framework. This study also added new insights on how constructs can be measured and successfully compared across distinct countries in cross-cultural research using the multilevel factor model. The latent variable *attitudes towards e-commerce adoption* by European firms manifested nine specific deterrents of e-commerce adoption: *extra costs of delivery, complaints and after sales services, consumer protection rules, risk of fraud or non-payment, extra need for ICT skills or capital and the nature of business*. We conclude that at the individual level, retailers believe the most important deterrent of e-commerce adoption is the nature of business; however, at country level this applies to all loadings except the higher delivery costs.

To explain *attitudes towards e-commerce adoption* by European firms, the following retailer/interviewee characteristics were added: *size, type of product transacted, channels of retail, interviewee's position, and the engagement in distance selling*. According to our results, firm size and the job position of the interviewees do not influence the attitude towards e-commerce adoption. However, firms which use the telesales/call center retail channel and direct retail channel (Retail Sales) or sell non-food products (Product Type) are the most worried about the barriers to e-commerce adoption. The firms currently engaged in distance selling are more optimistic than other firms although the impact is small.

A better understanding of the deterrents to firms' e-commerce adoption will provide relevant information for governmental agencies and European institutions in particular. These results present a unique and comprehensive picture of the barriers to e-commerce in Europe and may have important implications for the fulfillment of the Digital Agenda of Europe 2020. The heterogeneity within countries and between countries was identified but tends to disappear as a result of EU directives fostering convergence and harmonization. However, non-adopting firms from Western, Eastern, and Southern Europe are interested in adopting e-commerce but remain concerned about returns on their investment. This may be due to the risks, lack of knowledge about the benefits, or little support for external agents, such as partners, ICT consultants or consumers.

Although B2C e-commerce is growing rapidly and closing the gap in more mature markets (Chou, Chuang, & Shao, 2016), our results show that e-commerce adoption is still perceived as difficult in Western, Central and Eastern countries. Moreover, managers should take a positive attitude towards adopting e-commerce because it adds strategic value to the firm (Grandon & Pearson, 2004), especially for SMEs. The non-adopters may not appreciate the importance of electronic innovations to firms because they have no understanding of the inherent benefits. The advantages of ICT adoption should be discussed with CEOs, and there should be governmental initiatives and assistance from external agents to support non-adopters with

adopting and maintaining online trading systems (Hung, Yang, Yang, & Chuang, 2011; Molla & Licker, 2005). It is essential to track what retailers think about their firms ability to adopt ICT as a support for decision making by managers and stakeholders. Assistance, experience, and pressure from partners are important drivers of e-business (Hsu, Kraemer, & Dunkle, 2006), especially in the start-up and adoption stages. Investing in ICT allows firms to boost efficiency and improve coordination with the supply chain. Although Internet technologies break down geographic barriers, firms also need investment, skills development, and experience to provide the appropriate financial and technical support that can lead to success (Forman, 2005).

Eurobarometer surveys are policy-oriented surveys that help decision making at the European Commission level. Consequently, although scientific research is not the main purpose of the survey, its population coverage, data collection quality, and empirical relevance makes it an importance source of information for EU countries. Our results show that most Northern and Central European countries have the best scores of attitude towards e-commerce adoption, which may evolve over time. EU investment in infrastructure, harmonizing VAT, or the adoption of the single European currency across the EU may reduce the differences in the scores between countries and increase the intra-EU trading of products/services.

Future research can extend our conceptual model by including more specific items as barriers to the adoption of e-commerce and by using more recent data. The focus of this research was on the attitude towards e-commerce adoption and not on implementation (observed behavior). Consequently, further research can give feedback from firm managers about their experience of implementing the e-commerce retail channel. It can be complemented with qualitative studies that analyze failure (e.g., Poundland). The progress made by firms in their attitude towards e-commerce adoption, e-commerce technologies and their deterrents should be tracked periodically. This study can also be extended to other countries, namely developing countries, where the deterrents have the strongest impact.

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