University Of Patras

E-commerce: trends and effects on the Greek economy

Panagiotis Panou

"Applied Economics and Data Analysis"
Department of Economics
School of Economics and Business Administration

A dissertation submitted in partial fulfillment of the requirements for the degree of Master of Science in Applied Economics & Data Analysis

September 2023

University of Patras

School of Economics and Business Administration

Department of Economics

Panagiotis Panou

Three-member Thesis Supervision Committee

Supervisor: Giannakopoulos Nicholaos Professor

Committee Member: Papaioannou Sotirios Assistant Professor

Committee Member: Tzagkarakis Emmanouil Associate professor

The present thesis entitled:

"E-commerce: trends and effects on the Greek economy" was submitted by **Panagiotis Panou, SID 1020134**, for the partial satisfaction of the requirements for obtaining a master's degree in "Applied Economics and Data Analysis" from the Department of Economics of the University of Patras and was approved by the members of the three-member supervisory committee.

I would like to dedicate my dissertation to my family.

Acknowledgements

I would like firstly to thank my supervisor Mr. Giannakopoulos Nikolaos for his undivided support, cooperation and useful advice during the preparation of my thesis.

Furthermore, I would like to thank Mr. Papaioannou Sotirios and Mr. Tzagkarakis Emmanouil for their participation in the evaluation committee of my thesis and finally, especially thanks to all the professors of the master's program for their cooperation and knowledge they transmitted to us.

Περίληψη

Η παρούσα διπλωματική εργασία στοχεύει στη διερεύνηση της εξέλιξης του ηλεκτρονικού εμπορίου και των επιπτώσεών του στην ελληνική οικονομία ενώ αναλύεται επίσης η εξέλιξη της χρήσης του διαδικτύου και της ηλεκτρονικής τραπεζικής στην Ελλάδα. Εργαστήκαμε σε ένα σύνολο ανεξάρτητων διαστρωματικών δεδομένων από το έτος 2009 έως το 2022. Για την εξαγωγή των αποτελεσμάτων μας εφαρμόστηκαν τα μοντέλα probit και multinomial logit. Η έρευνά μας επικεντρώνεται κυρίως στα χαρακτηριστικά που συνθέτουν το προφίλ ενός ατόμου και τελικά επηρεάζουν τις αποφάσεις του ως αγοραστή ή πωλητή στο διαδίκτυο. Τα κεντρικά συμπεράσματα που προκύπτουν συνολικά από αυτή τη διατριβή υποδηλώνουν ότι όσον αφορά τις ηλικιακές ομάδες των ατόμων, παρατηρείται πως όσο μεγαλύτερη είναι η ηλικιακή ομάδα στην οποία ανήκει το άτομο, τόσο λιγότερες είναι οι πιθανότητες να χρησιμοποιήσει το διαδίκτυο, να αγοράσει αγαθά ή υπηρεσίες από το διαδίκτυο, να κάνει οικονομικά συναλλαγές στο διαδίκτυο ή οποιαδήποτε άλλη διαδικτυακή δραστηριότητα που σχετίζεται με αυτές. Το μορφωτικό επίπεδο του ατόμου και το εισόδημα αποτελούν επίσης δύο ζωτικούς παράγοντες που εντείνουν τις πιθανότητές του ατόμου για οποιεσδήποτε διαδικτυακές δραστηριότητες. Τέλος, ως προς την εξέλιξη και τις τάσεις των τριών βασικών μεταβλητών ενδιαφέροντος, παρατηρείται πως η ηλεκτρονική τραπεζική παρουσιάζει ραγδαία εξέλιξη στο χρόνο, σημαντική εξέλιξη σημειώνεται για το ηλεκτρονικό εμπόριο και τέλος σταθερές και αργά αυξανόμενες τάσεις παρατηρούνται στη χρήση του διαδικτύου. Ο Covid-19 και τα capital controls αποτελούν δύο σοκ στην ελληνική οικονομία για τα οποία διαφαίνεται διαγραμματικά η εκτόξευση χρήσης των ποσοστών του ηλεκτρονικού εμπορίου και της ηλεκτρονικής τραπεζικής αντίστοιχα ως αποτέλεσμα αυτών των σοκ.

Λέξεις κλειδιά: χρήση διαδικτύου, ηλεκτρονικό εμπόριο, ηλεκτρονική τραπεζική, θεωρεία καταναλωτή, διαδικτυακές δραστηριότητες, προτιμώμενα αγαθά, προέλευση διαδικτυακού πωλητή

Summary

This thesis aims to investigate the evolution of electronic commerce and its effects on the Greek economy while also analyzing the evolution of the internet use and electronic banking in Greece. We worked on a set of independent cross-sectional data from the year 2009 to 2022. In order to extract our results probit and multinomial logit was applied. Our research primarily focuses on the traits that make up an individual's profile and ultimately affect their decisions as an online buyer or vendor. The more crucial conclusions emerging totally from this thesis suggest that in terms of ages groups results, is observed that the older the age group to which the individual belongs, the less likely to use the internet, purchase goods or services from the internet, make financial transactions on the internet or make any online activity which relates with these. Education level of the person and income are also two vital factors which increases his likelihoods totally for online individual's activities. Finally, in terms of the evolution and trends of the three main variables of interest, is observed that electronic banking has a rapid evolution in time, quite large is noted for electronic commerce and finally steady and slowly increasing trends for the internet usage. Covid-19 and capital controls are two shocks in the Greek economy for which the launch in the use of e-commerce and e-banking percentages because of these shocks are also diagrammatically illustrated respectively.

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Chapter 1. Introduction

This thesis has its foundations in microeconomic theory and more specifically in the scientific field of consumer's theory. The main objective of the thesis is to study the evolution of e-commerce and its effect on the Greek economy, while the evolution of the use of the internet and electronic banking in Greece from the year 2009 to 2022 was also examined, through the way in which the individual's choice for one of these options is influenced by the characteristics that shape his profile.

In order to extract our results, we utilize microdata from the Hellenic Statistical Authority's (ELSTAT) Survey on the Use of Information and Communication Technologies by Households and Individuals (ICT) which totally consists of a set of independent cross-sectional data with 66,667 observations. In order to examine the choice of individuals based on their profile for e-commerce, the internet use, online banking, the person's online activities and the type of products they prefer, the probit model was used while for the place of origin of the online seller, the multinomial logit model was applied. From these results we derive our conclusions about consumer preferences and trends.

The more crucial conclusions emerging totally from this thesis suggest in a general context the following regarding the individual's profile and his preferences. First in terms of ages groups results, we observe that the older the age group to which the individual belongs, the less likely to use the internet, purchase goods or services from the internet, make financial transactions on the internet or make any online activity which relates with these. Based on the person's gender, no big difference is found in these preferences when education level of the person is one of the most vital factors which increases his likelihoods for internet use, electronic commerce, e-banking and generally the totally online individual's activities. Moreover, one other crucial factor is the household income which has a great positive effect on any of the above activities of the individual. All the above-mentioned results are verified all or separately confirmed by the literature from Mills and Whitacre (2003) and De Blasio (2008), Ganning and Green (2021), Zhou and Wang's (2014) and Song and Sun (2020), Bauer and Hein (2006), Watanabe and Omori (2020), Hitt and Frei (2002).

Finally, in terms of the evolution and trends of the three main variables of interest, is observed that electronic banking has a rapid evolution in time, quite large is noted for electronic commerce and finally steady and slowly increasing trends for the internet usage. Covid-19 and capital controls are two shocks in the economy for which the launch in the percentages for the e-commerce and e-banking respectively in the corresponding years, is

also diagrammatically illustrated. The results regarding Covid-19 and the growth of e-commerce are also extensively confirmed by the literature from Chang and Meyerhoefer (2021), Alcedo et al. (2022) and Dolfen et al. (2023).

Since it touches on issues of e-commerce for which there is very limited theoretical or applied literature for the data of Greece, conducting this analysis becomes essential and is useful for the analysis of future research concerns. By examining the types of goods as well as the origin of the online seller, researchers, can learn more about the preferences of those who use the internet to buy goods or services, adding more applied data on microeconomic theory, which is concerned with the theory of the consumer while indirectly affecting all businesses. The state may even use this information to make policies.

This thesis is structed as follows. Our study begins with the examination of internet use, e-commerce and e-banking the three primary variables of interest, as they are the main pillars from which the rest of the variables in the analysis derive as a result. Then we investigate two online activities of individuals. Their profile on making a phone or videocall and their profile on selling goods on internet while the third and fourth part of our analysis delves even more into e-commerce first, studying the type of products that consumers prefer among the household goods, medicines, apparel and footwear and the tech devices and finally, we examine if consumers in Greece prefer the domestic online sellers, EU sellers or outside the EU sellers.

Chapter 2. Literature Review

The following literature review will provide answers to a number of questions raised in the past or which are still current. First, we'll look at how economists' perspectives on markets have been impacted by the Internet, as well as the numerous benefits it has provided and the need for further research in this area. The costs that firms confront both online and offline are then briefly mentioned. The variation in costs between physical stores, online businesses, and between these two is a key area of research. A wide range of empirical characteristics of online prices, including the size and frequency of price changes, price synchronization among sellers and between goods, and the reactions of prices to anticipated fluctuations in demand, are then documented. Studies are then presented on whether market structure is another price determinant. Shopbots and consumer behavior within and outside of them are studied, as well as how a person's place of residence impacts their online purchases. There is a brief discussion of the corona era, when it had an economic shock in terms of how e-commerce

was affected, as well as the pertinent literature regarding the persistence of consumers' urge to shop in physical stores, as well as many more aspects concerning electronic banking and the use of the internet will be analyzed in the following literature review.

2.1 Internet use

Ellison & Ellison (2005) examine how economists' views of markets have changed as a result of the internet. Numerous aspects of economic study have been impacted by the Internet. Every time a brand-new phenomenon emerges, especially one that receives so much coverage in the media, economists are interested in studying it according to Ellison & Ellison (2005). The Internet has aided economists in gaining fresh understanding of how markets function with many ways. First, the Internet has given researchers the chance to examine how markets behave in unusual and extreme situations. A striking illustration is the unexpected appearance of marketplaces with virtually no search expenses as a result of the expansion of the Internet. What makes this pertinent to research? Consumer search costs have long been recognized by economists as having an impact on markets, and empirical research have attempted to contrast markets with higher and lower search costs. However, examples of two marketplaces that are remarkably comparable but only marginally differ in search costs are scarce. Additionally, one cannot test some startling theoretical hypotheses by examining markets with low, medium, and high search costs, such as Diamond's (1971) contention that there may be a significant discontinuity between markets with modest incremental search costs and those with no additional search costs. Moreover, researchers can now take advantage of a variety of intriguing natural experiments thanks to the Internet. For instance, in conventional retail markets, "identical" products sold by various stores were always distinguished by their location, level of customer care, and particular clientele's shopping preferences. As e-retail grew, the last two of those suddenly became the only ways to distinguish things. Economists can thus consider the significance of location as a feature differentiating traditional retail outlets by comparing traditional and internet merchants. Also, conducting field studies has become very simple for researchers thanks to the Internet. One could, for instance, create and run a number of "competing" websites that sell comparable goods. Existing shops already use the mutability of websites to test out various pricing structures, product combinations, and aesthetics. Such experimentation may be a potent technique for determining demand features and vetting consumer decision-making model assumptions. Finally, the Internet has made it possible for economists to utilize new data sources by facilitating the generation of new datasets and facilitating better access to both old and new datasets. Ellison & Ellison (2005)

in their paper and others have created programs to conduct price searches and record the results in order to gather high-frequency data on the prices provided by groups of competing firms (for examples, Ellison and Ellison, 2004). Chevalier, Judith and Goolsbee (2003) downloaded pages from the Barnes&Noble and Amazon websites (which include "sales ranks") at various points in time to get both pricing and quantity data. Private data sources also exist because businesses now compile sizable databases to sell or keep sizable databases of their own clients.

2.2 E-commerce

E-commerce is a new technology and business mode that allows buyers to make online transactions and receive local package delivery or pickup from sellers. (Luo, Wang & Zhang 2019). Is a field that numerous agencies have thoroughly investigated and are still investigating. According to Brynjolfsson & Smith (2000a), e-commerce as well as customer behavior at shopbots is helpful for businesses, entrepreneurs and start-ups, financial institutions, researchers and academics, governmental and regulatory agencies, and finally for consumers. Businesses need to comprehend customer behavior, industry trends, and technological advancements if they want to improve their online presence, make the most of their e-commerce platforms, boost sales, and become more profitable. In order to establish their enterprises, entrepreneurs and start-ups frequently concentrate on e-commerce. By investigating e-commerce, they have the chance to discover new chances or branches with specialty or unspecialized markets in order to build their business strategies. Researchers and academics mostly from the fields of business, marketing, and finance in order to further deepen existing knowledge or create new ones through their research on multidimensional issues. To better understand the evolving dynamics of digital payments, transaction security, and risk management, financial institutions including banks and payment service providers are interested in studying e-commerce. Even governmental and regulatory organizations have an interest in researching e-commerce in order to create the best laws and policies to guarantee data privacy, consumer protection, and fair competition. Finally, e-commerce is crucial and for consumers. There is no need for them to leave their houses to physically visit brick-and-mortar establishments because they can browse and buy goods and services from the comfort of their homes. E-commerce and shopbots give customers access to a wide range of goods and services that might not be readily available in nearby stores. Additionally, they can browse and compare products from various brands and retailers, giving them more

options. E-commerce also breaks down geographical barriers while offering customers several other advantages.

The concept of enterprises pricing at marginal cost is rarely regarded as realistic in industrial organization. Firms in the real world have fixed expenses that must be paid for. Pricing over marginal cost is typically viewed as much more realistic, yet firms can potentially cover fixed costs even while pricing at marginal cost when marginal costs are rising. It seems likely that the Internet would result in more severe price competition because there would be less product differentiation, cheaper search costs, and lower fixed costs, according to Ellison & Ellison (2005). For instance, the spatial factor of product differentiation was essentially eliminated by purchasing and selling via the Internet, which implies that competition should be more ferocious online. Similar to how consumer search costs are reduced by Internet technologies that make it easier to find the best prices, this could result in more heated competition online. Lower search costs are a crucial aspect of e-commerce (Levin 2011). Furthermore, it appeared that Internet companies would have fewer fixed expenses. Wal-Mart, for instance, constructed 276 stores before it surpassed $1 billion in sales, but Amazon only required six warehouses to handle over $3 billion in North American sales in 2003, according to Ellison & Ellison (2005). A market with lower fixed costs is likely to have more competitors, which should result in more intense competition. However, prudent economists would have refrained from making generalizations about industry structure after foreseeing increased price competition Ellison & Ellison (2005). Goldfarb & Tucker (2019) and Bakos (1997), also confirm the presence of these lower costs brought on by digitalization, and this is also the key finding of their research.

Knowledgeable economists would not have had much faith that the Internet would result in the "Law of One Price" in terms of how prices are first distributed across physical stores and online. Even with homogeneous products, empirical research has consistently found price dispersion. Prices for 39 products and services in various categories were randomly selected from the Boston Yellow Pages by Pratt, Wise, and Zeckhauser in (1979). They discovered that the standard deviation between firms was typically 22% of the mean price for the product. Subsequently, comparable outcomes have been discovered in a number of contexts. In his analysis of the prices paid by cash clients for prescription drugs at various pharmacies in the same small town, Sorensen (2000) offers a particularly clear example. He discovers that the average standard deviation of pricing for a prescription across pharmacies is also 22% of the mean, demonstrating that only a small portion of the variance may be attributed to various pharmacies offering various levels of service.

Additionally, there have been a number of theoretical models that forecast price dispersion over time, such as those by Varian (1980), Burdett and Judd (1983), and Stahl (1989). As a result, even those who anticipated increased competition may not have anticipated that dealers would all charge the same price. Brynjolfsson and Smith (2000b), Clay, Krisnan and Wolff (2001), and Baye, Morgan and Scholten (2004) are three of the most notable studies of price dispersion also. Brynjolfsson and Smith (2000b) collected data on the prices for 20 books and 20 CDs at eight Internet retailers (and eight conventional retailers) over 15 months in 1998-1999. Clay, Krisnan and Wolff (2001) collected data on a larger sample of books from Lee (1998) and Bailey (1998) are the earliest studies comparing online versus offline prices that we are aware of, and they found that prices for used automobiles, books, CDs, and software were generally higher online than they were offline. The prices of books and CDs were found to be 9 to 16 percent less expensive online by Brynjolfsson and Smith (2000b), who examined a more representative sample of traditional merchants. Similar research has been done by Scott Morton, Zettelmeyer, and Silva-Risso (2001), who look into how Internet vehicle referral services affect car prices in California. Their information was obtained through Autobytel.com. 324,936 vehicles were purchased between January 1, 1999, and February 28, 2000, according to the pooled dataset. In this dataset, there are 9,545 users who requested a product from Autobytel.com in 1999. They discovered that dealerships are now more likely to give discounted prices to customers who arrive over the Internet as opposed to other customers because of this Internet referral service. They demonstrate that consumers who made an online purchase request pay roughly 1.5% ($355) less than other consumers, subject to the dealer. The difference rises to 2% (or $448 for the typical automobile when taking into account the likelihood of at random visiting a low-price dealership) when taking into account the effect of being referred to a low-price dealer selected by Autobytel.com. Cavallo (2017) conducted a similar study comparing costs across online and physical stores while simultaneously gathering information on more than 24,000 products from 56 of the biggest retailers across 10 countries. Thanks to the collaboration of a smartphone app, crowdsourced labor, and web-scraping methods, this extensive comparison was made possible. More than 370 independent contractors used their phones to manually enter prices, take pictures of price tags, and scan barcodes in actual establishments before uploading the data to their Billion Prices Project servers. The pricing for those exact same products from the website of the same merchant within a seven-day window were then gathered using the barcodes in the offline data. With regard to price levels, frequency, and size of price fluctuations, this direct comparison of online and offline prices found significant similarities.

Approximately 70% of pricing levels were consistently the same in both the offline and online samples. The degree of similarity was greatest in stores selling electronics or clothing, and it was lowest in businesses selling office supplies and medications, which also frequently had varied prices in different offline locations.

Finally, taking into consideration some of the findings of the aforementioned studies, Ellison & Ellison (2005) arrive at 4 conclusions on price dispersion. These findings are as follows. First off, there is a considerable amount of price variation in marketplaces with "branded" websites. Second, even in highly competitive contexts, like markets where customers identify retailers through price comparison websites, price dispersion has been observed. Third, the Internet's price dispersion's intertemporal characteristics seem to contradict the conventional search-based explanations. Fourth, Internet price-cost margins are not absurdly low.

Hackl, Kummer, Winter-Ebmer, & Zulehner (2014) used a novel instrumental variables strategy to examine the relationship between market structure and market performance in e-commerce, which is another highly intriguing e-commerce approach. They use information from www.geizhals.at, the only price comparison website in Austria, which at the time of their investigation provided price offers from an average of 1200 companies for 200,000 products. The product they used for their analysis is digital cameras. Researchers Hackl, Kummer, Winter-Ebmer, and Zulehner (2014) kept track of the firms' retail and input prices as well as all of their movements in the pricing and entry game. They take into consideration the endogenous temporal choice to list a particular product by using prior listing decisions as instruments when calculating the rate at which markups drop towards zero. They also incorporate product fixed effects to record the unnoticed quality and design elements of the particular cameras, as these may be related to markups and the entry of new businesses. They also examine the relationship between the quantity of enterprises and markups during the course of a product's life cycle. Since products in e-commerce are frequently only listed for a brief period of time, they may follow them from conception to expiration. Finally, they look into how substitutes affect markup over the course of a product's life cycle and are particularly interested in how fresh innovations differ from dated technologies that are about to expire, as well as how their own brand differs from competing brands' goods.

A similar study having the same product as the product of this study has been done by Haynes and Thompson (2008). Using data from 400 digital cameras sold in the US, they demonstrate that when more companies enter the market, prices decline, and market dispersion rises. Additionally, their findings are consistent with Haynes and Thompson's (2008) theoretical forecasts for the US internet camera industry. In both situations, an

expanding number of businesses' competitive impacts continue in a uniform goods market. They discover that markups are still falling despite having more than 100 merchants. Additionally, the research of markups over the course of a product cycle reveals much lower markups for goods that have been on the market for longer. Their findings speak to e-tailing when a price-search engine with very specific product definitions is available. Over the course of the product's life cycle, the price leader's markup gets smaller. With one more business in the market, the price leader's markup is reduced by the equivalent of three extra weeks in the product life cycle, allowing them to compare the competitive impact of the number of firms to the effect of time. In other words, a customer will receive the same price decrease by waiting three more weeks as she would if she visited a market with one additional firm, ceteris paribus. In truth, waiting longer usually also results in an increase in the number of businesses, which heightens the benefit of waiting. Finally, their findings support the idea that recently developed technology can be substituted for older, dated ones. The quantity of alternatives tends to lower the markups charged by the businesses.

This paragraph presents the results of the literature on the documentation of a broad range of empirical characteristics of online prices, including the size and frequency of price changes, price synchronization across sellers and between goods, cross-store price dispersion, and price reactions to predicted variations in demand. Gorodnichenko, Sheremirov, and Talavera (2018) used unique data from a leading online-shopping/price-comparison platform7 on daily prices (net of taxes and shipping costs) and clicks for more than 50,000 items in 22 broadly defined consumer categories in the US and the UK between May 2010 and February 2012. This dataset was gathered directly from the shopping platform and is a stratified random sample of products with at least one daily click; as a result, it is trustworthy and unlikely to contain measurement error due to web scraping price observations. Almost all online product categories are covered by the platform and their databases. Fixed Effects and Category Fixed Effects are listed but not disclosed is the methodology they employed. They examine how they connect to different price moments using a rich, cross-sectional variation of the market and favorable features. Their key finding is that, despite the internet's influence, there are significant frictions in online pricing fixing. The level of these frictions should be comparable to offline price setting by several metrics, such the scale and synchronization of price adjustments, price dispersion, or sensitivity to changes in economic conditions. However, they also discover important quantitative differences: Online price adjustments occur more frequently than offline. These findings hold true when the features of online and offline prices for specifically defined product categories are compared, ensuring that the product mix is

comparable across markets. Another conclusion is that when markets are more competitive, there is less price rigidity. This means that as there are more sellers, there are more price variations and a smaller median size. Although the costs of keeping an eye on competitors' prices and the costs of looking for better deals are incredibly low in online markets, there is little evidence of price synchronization across sellers, a crucial statistic for the non-neutrality of nominal shocks, which is incongruous with the concurrently low costs of keeping an eye on competitors' prices and the low costs of looking for better deals. The synchronization rate, in instance, is roughly equal to the frequency of price modification, indicating that internet businesses typically modify their pricing independently of their rivals. Synchronization is weak even across relatively large time horizons. Additionally, Gorodnichenko, Sheremirov, and Talavera (2018) could not discover any evidence of high synchronization of price adjustments among commodities within a seller; in other words, a typical seller does not modify the pricing of all of its goods at once. And finally, for a given seller and a given good, the synchronization rates of sales across goods and across sellers are comparable to the frequency of sales.

The manipulation of inflation statistics in Argentina between 2007 and 2015 served as the inspiration for the first use of online data to create inflation indexes, according to Cavallo & Rigobon (2016). It was clear by 2007 that the official rate of inflation recorded by Argentina's national statistical office did not accurately reflect increases in prices. Cavallo (2013) demonstrated that although Argentina's government reported an average annual inflation rate of 8 percent from 2007 to 2011, online data suggested it was over 20 percent. This finding was consistent with estimates made by some provincial governments and local economists, as well as the findings of surveys of household inflation expectations. Using online data gathered daily from the websites of large retailers Cavallo & Rigobon (2016), they demonstrate that online price indexes can predict changes in the official inflation rate several months in advance. They almost exclusively focus on large multichannel retailers (those that sell both online and offline, like Walmart), and they tend to ignore online-only retailers (like Amazon.com). They compute an impulse response to determine how shocks to the online index affect the official price index over time in order to quantify the degree of anticipation by estimating a straightforward autoregression equation with the US Consumer Price Index as the dependent variable and their online price index as the exogenous variable. The Consumer Price Index and the online index's monthly log changes on the final day of each month are used to calculate the regression's monthly changes. To account for the early availability of the online pricing information, they include six delays for each variable in addition to the

contemporaneous value of the online price index. demonstrates the Consumer Price Index's cumulative impulsive response over time to an online index shock, along with the 95 percent confidence intervals. It takes several months for the Consumer Price Index in the United States to properly reflect the shock of the increase in internet prices. The impact is fastest in gasoline (transportation) and slowest in food and electronics at the sector level. The outcome is unaffected by the vector autoregression's contemporaneous official price index effect removal. The anticipation typically outweighs the official figures' usual publishing delays by a wide margin. Online pricing may be able to predict changes in the consumer price index because of methodology-related delays, variations in the mix of stores sampled, and quicker adjustments of online prices in specific industries or businesses. The findings imply that adding online data to inflation forecasting algorithms can be beneficial.

Aparicio and Bertolotto (2016) investigate this and demonstrate how online data-based out-of-sample inflation projections can outperform a wide range of other forecasting models in the US and UK economies. Finally, it's important to note that applications for measuring inflation are increasingly using internet prices. Numerous national statistical institutions, such as the US Bureau of Labor Statistics (Horrigan 2013), the UK Office of National Statistics (Breton et al. 2015), are experimenting with the use of online data in addition to the Billion Prices Project and PriceStats (Cavallo's databases). Statistics Norway (Nygaard 2015), Statistics New Zealand (Krsinich 2015), and Statistics Netherlands (Griffioen, de Haan, Willenborg 2014) are three more. Jo, Matsumura, and Weinstein (2019) conducted research along similar lines, using data from Rakuten in Japan to demonstrate how e-commerce boosted the rate of inter-city price convergence and decreased relative inflation rates for items sold heavily online. According to Goolsbee and Klenow (2018), between 2014 and 2017, internet inflation was more than 1% lower than it was for the same CPI in the US. Finally, Reinsdorf and Schreyer (2020) document a surge in e-commerce during COVID and conclude that the overstatement of inflation for OECD economies may not be more than 0.5 percentage points per year.

Brynjolfsson, E., & Smith, M. D. (2000a) conducted a thorough investigation into shopbots and consumer purchasing patterns. They examine customer behavior at Kitemet Shopbots using panel data obtained from EvenBetter.com. The multinomial logit model, layered logit models, multinomial probit as an alternative empirical model, and hierarchical Bayesian estimation as an alternative estimation technique were the methods, they employed to derive their data. They discover that, ceteris paribus, branded retailers and retailers a client has previously done business with can charge $1.13 and more than their rivals. Additionally, their

models show that consumers utilize brand recognition as a measure of a retailer's dependability in providing the non-confractible elements of the product bundle that were promised. Consumers are ready to pay an additional $2.49 on average when they shop at a store they have been to before, demonstrating how customer loyalty may also influence price. Differentiating between services based on quality, receiving asymmetric quality information, and cognitive lock-in are potential reasons for the significance of brand and loyalty. Additionally, they discover that, contrary to what would be predicted from a straightforward application of utility theory and rational consumer behavior, shopbot users are substantially more sensitive to changes in shipping costs than they are to changes in item prices. Finally, they discover strong agreement between our data predicted and actual customer behavior, indicating that their models accurately represent important facets of consumer decision-making. They also mention that businesses might be able to personalize services by using the consumer behavior predictability shown in these models.

Chang & Meyerhoefer (2021) use data from the Ubox, the largest agri-food e-commerce platform in Taiwan, information about coronavirus cases in Taiwan, search data from Google, and data on COVID-19 news articles from Taiwan's largest newspapers to examine how the coronavirus pandemic affected the demand for online food shopping services. The fixed effects model was utilized to derive their results. They discover that a second verified COVID-19 case raised sales by 5.7% and client count by 4.9%. The biggest increases in demand were for cereals, fresh fruit and vegetables, and frozen foods, which favored small farms over agribusinesses. During the pandemic, the diversity of products offered on the e-commerce platform also rose, which implies that as more customers are lured to online platforms, the concentration of sales on niche products may also rise. Their analysis of the factors that led to the transition to online food buying reveals that COVID-19 media coverage and online content had a significant impact on sales.

 In their research Alcedo et al., (2022), use aggregated and anonymous transaction-level data from Mastercard that has been scaled to represent total consumer spending to analyze data from a sample of 47 economies and 26 industries during the COVID-19 pandemic. The data are accessible on a daily basis, enabling them to track the dynamics of e-commerce often throughout the epidemic. They discover that the digital divide across economies widened as the proportion of online transactions in total consumption increased more in economies with larger pre-pandemic e-commerce shares. Although there is variance between industries, the most recent data generally indicate that these increases in online expenditure share are fading at the aggregate level. They see a longer-lasting move to digital in retail, restaurants, and

healthcare, but they note a decline in the share of online spending in professional services and recreation relative to its pre-pandemic trend in these categories. Additionally, they discover that internet sales increased across the board in most economies during the COVID-19 pandemic.

Similar research has been done by Dolfen et al. (2023), who estimate that e-commerce spending in the US reached 8% of consumption by 2017 and gave consumers the equivalent of a 1% permanent increase in their consumption. This research used transaction-level data from the US on credit and debit cards from Visa, Inc. between 2007 and 2017. Investigating whether online consumption will continue to rise even when COVID-19 diminishes is the goal of the paper Watanabe, T., & Omori, Y. (2020). Using information from credit card transactions from the "JCB Consumption NOW", they investigate whether this was indeed the case. The following are their primary conclusions. First off, those who were already accustomed to the internet before the pandemic are the main group to blame for the rise in online usage. These consumers raised the proportion of their total spending that was spent online. Second, because of COVID-19, some customers who had never made purchases online decided to do so. The percentage of consumers who made this switch, however, did not deviate significantly from the pattern before to the crisis. Third, younger people than older people were more pronouncedly switching to internet consumption. Finally, these findings imply that it is not the case that many consumers made the initial conversion to online consumption during the pandemic. Accordingly, some of the increase in online consumption is expected to decrease once COVID-19 diminishes.

2.3 E-banking

Internet banking, commonly referred to as online banking (Durkin, 2007), is a type of electronic banking made available over the Internet that enables bank customers to conduct financial transactions in a virtual setting (Bradley and Stewart, 2003). Both banks as service providers and users can profit from using internet banking in several ways. The following are some of the main advantages of Internet banking for banks:

i. Internet banking is an inexpensive substitute for traditional brick and mortar branch banking. It has been extensively explored how affordable Internet banking is when compared to branch banking and other types of banking. The cost to process an account transfer, for instance, is approximately $1.07 through a bank branch, $0.54 through telephone banking, and $0.27 by an ATM, but it costs only $0.01 if the transaction is made on the Internet, according to a study by Gopalakrishnan et al. (2003) that compared the alternative delivery

channels in the retail banking industry in the USA. For typical banking services or transactions like account services or money transfers, internet banking might be seen as the most affordable distribution method (Polasik and Wisniewski, 2009).

ii. The use of multiple distribution channels, i.e. Internet banking combined with other banking channels, enables banks to extend their customer bases and target various banking products and services more effectively at different demographic segments of customers (Bradley and Stewart, 2003; Jayawardhena and Foley, 2000). Internet banking gives banks the opportunity to increase their market coverage. They can effectively create, develop, and offer new financial services and products on their own or in collaboration with their affiliates. Angelakopoulos & Mihiotis (2011)

iii. The Internet banking website can be thought of as a "one-stop" virtual branch that allows banks to provide a variety of financial services that might not be entirely available in physical branches. According to reports, banks' websites that offer a wide range of products and services are linked to more involved banking clients who are more likely to frequent the sites and use the services provided (Nath et al., 2001). Because Internet banking customers would have a higher concentration of the financial products and services offered by the bank, this increases effective cross-selling of services to bank customers (Gopalakrishnan et al., 2003), which increases customer profitability and loyalty.

Customers may be drawn to Internet banking services by several perceived advantages.

i. Because it is readily available around-the-clock, every day of the week, Internet banking offers users a very practical and efficient way to manage their funds. Customers of banks do not need to visit their neighborhood branch and stand in line in order to use Internet banking (Lassar et al., 2005). Customers can therefore choose when and where to bank at their convenience rather than being restricted by set bank hours (Karjaluoto et al., 2002; Ndubisi and Sinti, 2006; Polatoglu and Ekin, 2001).

ii. Customers can save money and gain other financial advantages by conducting banking activities online (Nath et al., 2001). Banks frequently utilize financial incentives, such as decreased costs, to entice customers to use Internet banking and keep their online customer base in order to compete with other competitors. The benefits of Internet banking for banks in terms of cost savings may then be passed on to bank clients as a result of increased market competitiveness (Nath et al., 2001; Polasik and Wisniewski, 2009).

iii. Bank customers can access quick and comprehensive banking services from their banks through internet banking. Customers can, for instance, take advantage of the convenience of keeping tabs on their finances by checking the most recent information about their bank

accounts whenever they want, while also having the option to buy other financial products or services, like making Individual Retirement Account investments on their banks' websites (Nath et al., 2001).

iv. Using Internet banking provides bank customers with greater control over the service delivery, their accounts, and their finances in addition to the convenience and cost-saving advantages mentioned above (Kolodinsky et al., 2004; Lockett and Littler, 1997; Ndubisi and Sinti, 2006). It also eliminates the need to rely on others (such as bank branch staff) when performing banking activities.

One of the first to present evidence that the production function of banks was enhanced by the deployment of technology was Daniel et al. (1973). Financial service providers have long expanded their geographic reach by utilizing remote access technologies. Banks embraced ATMs, as demonstrated by Hannan and McDowell (1990), to increase their market share or to defend their market from other banks that offered ATMs. Similar arguments have been made by Bouckaert and Degryse (1995) and Degryse (1996) about other types of remote banking technologies. The expenses of new technology might go down. Hunter and Timme (1986, 1991) discovered that technology did enhance industry-wide scale economies, which explains why Humphrey and Pulley (1997) discovered that when forced to reorganize their costs, larger banks were more willing to replace employees with technology than were smaller ones. In their 1999 investigation of productivity and efficiency at banks, Wheelock and Wilson discovered deteriorating technical efficiency. The inconsistent deployment of technology across all banks was the main cause of this inefficiency; the banks that embraced new technologies were the most effective. New remote access technologies do have drawbacks, though. Internet banking increases operational, legal, and reputational problems, as well as competitiveness, according to Pennathur (2001). However, consumer acceptance and use of remote access technologies are becoming more and more important for financial service consolidation.

A product, service, or idea gets adopted when it is accepted and continuing to be used M. Sathye (1999). Before, consumers are prepared to adopt a product or service, they go through a process of knowledge, persuasion, decision, and confirmation. The following are the elements that influence the adoption of e-banking:

i. When a consumer first learns about a product, that is when an innovation is either adopted or rejected. As a result, the first factor is that consumers are using Internet banking because they are aware of the service's existence and the advantages it provides. M. Sathye (1999).

ii. "Ease of use" is the second aspect that influences consumer acceptance of new services or products. In his research, Cooper (1997) identifies "ease of adoption" as one of the three crucial factors for customers to adopt innovative services. The Wallis Report (1997) notes that for technical innovation to be adopted or accepted by consumers, it "must be easy to use."

iii. The degree of risk involved is the third crucial aspect that customers take into account before embracing an invention. It speaks to the safety and dependability of online transactions while discussing Internet banking. According to Cooper (1997), "the level of risk" is a crucial factor in determining whether a consumer will adopt an invention.

iv. The cost factor, which includes pricing, is another aspect that affects how innovations are embraced by consumers. There are two different types of charges when it comes to Internet banking. First, the usual expenses related to using the Internet, and then the fees and expenditures linked with banks. According to Cooper (1997), innovative products frequently have better "price/performance characteristics." According to the Wallis Report (1997), new technologies must be reasonably priced relative to alternatives, in order for customers to adopt them.

v. The fifth aspect that influences adoption is whether the current method of service or product distribution effectively satisfies the needs of the clients. The current methods of conducting banking business in the context of Internet banking include telephone banking and physical branches. According to Daniel (1999), "a high level of customer inertia" exists when it comes to altering their current banking practices. According to the Wallis Report (1997), new technology must "fulfill a specific need" for clients to abandon their current methods of operation and adopt it. Consumers might not be willing to alter from their current habits unless such a requirement is met.

vi. Last but not least, using Internet banking requires access to computers and the Internet. The likelihood of using Internet banking increases with the availability of computers and the Internet. Lack of access to computers and the Internet is one of the potential causes of the delayed uptake of Internet banking, according to O'Connell (1996). According to Daniel (1999), the UK and Ireland's limited adoption of electronic banking is due in part to the lack of client access to adequate PCs.

Other issues, such as the need for face-to-face connection with bank employees, technology phobia, the extensive network of current branches, and client computer illiteracy, may also be preventing customers from using Internet banking (Mols et al., 1999).

Based on research done by Angelakopoulos & Mihiotis (2011), which used data from seventeen banks that were members of the Hellenic Bank Association and were listed among the banks that offered Internet banking at the time their questionnaire was to be sent, as well as from desktop research done by visiting the banks' e-banking websites reach the following conclusions. In the beginning, they come to the conclusion that mobile banking is a less desirable alternative channel for Greek banks. Additionally, they discover that banks increase their e-banking offerings in order to remain competitive, keep up with technical advancements, and profit from the cheaper e-banking transactions. The adoption of security and data protection measures and the poor response rate from clients are their two biggest issues. The biggest barriers preventing Greek consumers from using e-banking services are their low Internet usage, lack of experience with technologically sophisticated equipment, and concerns about security and privacy. The development of Business to Business (B2B) commerce is one factor that favorably affects the spread of e-banking. Banks in Greece have not fully capitalized on this business sector as technological advancements and the globalization of trade are the primary drivers of banks' involvement in ecommerce activities, which can be a valuable source of income (such as fees from credit cards used for payment in e-commerce transactions). Finally, e-banking has presented further difficulties for bank management. The Risk Management function must receive a lot of attention from banks as a result of new legislation and directives. Issues with security and privacy, system availability and performance, and customer and employee training must all come first.

The literature research, however, has also demonstrated that there are some drawbacks in addition to all the positives listed, which will continue to influence consumers to make their purchases in physical stores and their transactions in banks. Consumers' propensity for touch and feel (Borenstein and Saloner 2001; De Blasio 2008); or rural inefficiencies in the payment and delivery phases (Kshetri 2001; Angelakopoulos & Mihiotis 2011) may hinder distance buying. Like this, one-stop economies Berger, Humphrey, and Pulley (1996) or consumer preferences for face-to-face interaction may restrict the use of distance banking if some financial services are not offered online and a trip to the nearest branch is required anyhow (Petersen and Rajan 2002; De Blasio, 2008). Furthermore, for e-banking Bauer & Hein (2006) supports that customers are unsure of what will happen when they use a remote access account. There are two distinct sources of the uncertainty. First, there is a risk of illegal access from the technology itself. Additionally, the buyer can doubt their capacity to apply it. Another issue is that many bank clients lack the necessary technological abilities to handle technologically advanced equipment (such as personal computers and new generation

mobile phones) and/or are unfamiliar with using the Internet to browse. As a result, these people are not eligible to use e-banking services. Angelakopoulos & Mihiotis (2011). Finally, Startzy (2016) demonstrates how search and contracting frictions in the trade of differentiated goods can significantly affect welfare in emerging nations. He discovers that visiting suppliers in person is a significant tactic for dealing with information issues using unique data that documents the process of firm-to-firm trade in Nigeria at the transaction level.

2.4 Demographic and other characteristics that influence internet use, e-commerce, and e-banking.

Initially, regarding the demographic characteristics as the age and the sex, characteristics of human capital which concern the individual's education, household financial status such as monthly household income, household structure such as household size and presence of children, and the personal financial situation where in our case it is represented by the variable employment status and the way they influence the use of the internet, the following conclusions have been drawn. Age is insignificant, according to De Blasio (2008), but family wealth and the presence of children are both substantially connected with Internet use. While Mills and Whitacre (2003) found that a household's propensity to utilize the Internet at home is favorably correlated with age income and from the presence of children in household. Education also has a significant role; household heads with only an elementary school graduation are 10% and 15% more likely to use the Internet, respectively, than high school and college graduates. These results are also confirmed from Mills and Whitacre (2003). When household characteristics are taken into account, the influence of city size on Internet use is still very marginal and very significant. According to De Blasio (2008), income and education are substantially positively connected with online shopping, while age has a negative impact and whether or not there are children in the home has no bearing. He also discovers that people who live in big cities utilize e-commerce more frequently. Men are more inclined than women to shop online, according to studies Ganning & Green (2021). These findings are supported by Zhou and Wang's (2014) suggestion that income influences online purchasing through its connection to banking and credit availability, given that credit and debit cards are popular ways of payment for online purchases. Last but not least, Song & Sun (2020) find that those with higher incomes, younger people, women, married couples, people with higher levels of education, and people who live in cities are more likely to shop online. They make this discovery using data from the 2013 and 2015 Chinese Household Financial Survey. Additionally, they discover evidence of a concave positive link between

total consumption and household income. So, as income increases, so does the propensity to consume.

Consumer demand for remote access to banking accounts is examined by Bauer & Hein (2006). They used information from the 1998 poll of Consumer Finances (SCF) for their poll. They look at two different remote access techniques, phone banking and internet banking, to compare the influence of perceived risk of a new technology with an established technology. They employed the conditional logit, multinomial logit models, and Bernoulli distribution functions. Their findings demonstrate that risk perception is not uniform, and that risk plays a role in the decision to use Internet banking. Customers who have used similar technology before show substantially less risk aversion than those who have not. However, the less probable a customer is to use Internet banking, the more risk averse they believe themselves to be. Regarding the demographics, household financial status, and the personal financial situation, it is discovered that the older consumers are, less likely to use Internet banking. This finding is also supported by Watanabe and Omori (2020). The decision to adopt also seems to be significantly influenced by income. According to the notion, people are more likely to adopt Internet banking the higher their income. These findings are also confirmed by Hitt & Frei (2002) who found that PC banking customers are consistently wealthier. They are more likely married and they more likely own a home, and they are also younger from two to six years than customers who do not use PC banking. Finally, Sathye (1999) discovers that there is no connection between the element of occupation and interest in online banking.

This paragraph will review the literature research done about a person's residence and how it may impact their online purchases. Data from the Survey of Household Income and Wealth (SHIW), which is carried out every two years by the Bank of Italy on a representative sample of roughly 8,000 households, were utilized by De Blasio (2008). The SHIW gathers comprehensive data on Italian families, including the family's income, age, and educational level of each member. The probit and iv models were the method he utilized to derive his results. The findings that De Blasio (2008) derived refute the claim that the Internet lessens the importance of distance. Urban customers use the internet far more frequently than their non-urban counterparts. The size of the city where the household resides has little impact on the use of e-commerce. The inability of consumers in remote areas to evaluate products before buying them deters them from doing so. The only products and services for which e-commerce is used more frequently in remote locations are leisure activities and cultural items (such as books, CDs, and tickets for museums and theaters). Finally, the size of the city has no bearing on e-banking. Because bank account holders in rural places are more likely to

have taken out a loan from their bank, non-urban customers value personal relationships with banks more than urban customers do. Similar studies on the internet and geographic distance by Gaspar and Glaeser (1998) suggest that while the Internet can connect two persons via e-mail or matchmaking websites, it may not be able to completely replace cities. They contend that any given two-party encounter can occur face-to-face or electronically. A decrease in the cost of electronic communication due to the Internet will, however, increase the overall amount of interactions, a portion of which will take place face-to-face, if some relationships combine both electronic and face-to-face engagement. Furthermore, Sinai and Waldfogel (2004) contend that information collecting may also undercut the death of distance theory. They emphasize that metropolitan dwellers are favored in the content supply on the Internet. Because the Internet offers information that is disproportionately more beneficial for city dwellers (such as information on events, restaurants, cinema listings, or local news), larger markets have more locally tailored material than smaller markets. Finally, Kolko (2000) discovers that the density of domains is higher in bigger cities using data on commercial Internet domain (.com) registration at the county level. When compared to studies on e-commerce, Farag et al. (2006) show that in The Netherlands, residents of highly urbanized areas and those with limited access to stores are more likely to make purchases online. Couclelis (2004) contends that e-commerce does not aim to free customers from physical restrictions. According to her, shopping can be broken down into a variety of activities, some of which are best carried out physically and others digitally. When according to Luo, X., Wang, Y., & Zhang, X. (2019), by December 2016, urban Internet users accounted for 72.6% of the total in China, which is significantly higher than the share of the urban population (57%) while rural Internet users made up 27.4% of the country's total (731 million) users. Urban areas had a 69.1 percent internet penetration rate, compared to 33.1 percent in rural areas. Urban areas were home to the majority of online stores and Internet users.

Chapter 3. Data

3.1 Data sources

The data set that will be used to generate all results and conclusions is a crucial component of any investigation. Microdata from the Hellenic Statistical Authority's (ELSTAT) Survey on the Use of Information and Communication Technologies by Households and Individuals (ICT) are used in this study. More specifically, without having the same individuals over time, we will work on a set of independent cross-sectional data which consists in total from

66,667 observations and the observations distribution in time is 5,095 for 2009, 4,610 for 2010, 4,803 observations for 2011, 4,108 for 2012, 4,209 for 2013, 4,129 for 2014, 4,667 for 2015, 4,774 for 2016, 5,443 for 2017, 5,205 for 2018, 5,004 for 2019, 5,111 for 2020, 4,731 for the year 2021, and 4,778 for the year 2022. The European Statistical Program, in which all the European Union's member states take part, includes the Survey on the Use of Information and Communication Technologies by Households and Individuals. The primary goal of the research is to examine the extent to which households use information and communication technology at the national and European levels. The benchmarking of the indicators for the information society makes extensive use of the data. The survey is carried out over the phone. The poll collects information on how households utilize a variety of information and communication technologies, including internet access, e-commerce, and interactions with public services online. Greece conducted the poll for the first time in 2002, and it is completely consistent with the other EU members. The poll is conducted over the phone with one randomly chosen household member who must be between the ages of 16 and 74 in order to participate. It is carried out via a questionnaire, in which both general information about the home and details on the chosen member are gathered. The information in this study relates to the years 2009 to 2022 as from 2009 and over are given published data from ELSTAT. The depiction of results on dates will be presented one year later as the survey is conducted in the first quarter of each year for the past year.

3.2.1 Construction and description of variables.

Internet use, e-commerce and e-banking construction and description.

Regarding internet use, we construct a dummy indicator using the question "When did you most recently use the internet?" from the ICT survey, which has the following responses: (a) in the first quarter of the current year, (b) in the time interval April – December of the previous year, (c) before the April of the previous year and (d) never use it. The constructed dummy indicator takes the value of 1 for (a), (b) and (c) and 0 otherwise.

For the e-commerce indicator we use the ICT survey and in particular the question "When did you most recently buy or order goods or services for private use over the internet?" which has the following responses: (a) in the first quarter of the current year, (b) in the time interval April – December of the previous year, (c) before the April of the previous year and (d) never bought or ordered. The constructed dummy indicator takes the value of 1 for (a), (b) and (c) and 0 otherwise (i.e., case d and respondents without access to Internet).

In relation to e-banking, we create a dummy indication utilizing the query "For which of the following activities did you use the internet in the first quarter (of the survey year) for private purpose?" from the ICT survey. In this query the individual must tick all the activities that applied. So, if for him applied the answer "Internet banking (including mobile banking)" in the category "Other 0n-line services" the dummy variable e-banking that we construct in our analysis takes the value 1 and the value 0 if is not applied for the individual.

Demographic, human capital, household financial status, household structure, and personal financial situation variables construction and description.

From literature it is proven that demographic, human capital, household financial status, household structure, and personal financial situation characteristics plays a determine role in individuals' decision for internet use, e-commerce and e-banking Watanabe &Omori (2020), Hitt & Frei (2002), Bauer & Hein (2006), De Blasio (2008), Ganning & Green (2021), Zhou and Wang's (2014), Song & Sun (2020). Based on the given questionnaires, the following independent demographic, human capital, household financial status, household structure, and personal financial situation variables are created which will be used to determine to what extent each of them individually affects the individual's use of the internet, whether the individual does e-commerce and whether the individual does e-banking.

Firstly, for the person's age we create the categorical variable age where the individuals age is categorized into one of 6 age groups: 16-24, 25-34, 35-44, 45-54, 55-64, 65-74. Variable age is also used in a numerous of studies such as these from Song & Sun (2020), Watanabe Omori (2020), Bauer & Hein (2006) and Hitt & Frei (2002).

Sex is also another determine demographic characteristic in the person's choice for internet use e-commerce and e-banking and in literature is used from Ganning & Green (2021) Song & Sun (2020). In our analysis categorical variable gender indicates individuals' sex and takes the values male for men and female for women.

The individual's level of education completed is represented by the categorical variable education level. The categorization of all levels of education is based on the International Standard Classification of Education (ISCED). Education level receives the value low if the person has completed a lower technical school, high school, elementary school, or if he has not completed or attended any level of education ((ISCED 0, 1 or 2), the value medium if the person has completed a public or private IEK, KEK, or all types of high school (ISCED 3 or 4), and the high value if the person has completed a master's degree, a doctorate, a university

or TEI school, or a military school (ISCED 5, 6, 7 or 8). This variable is also used from De Blasio (2008) and Song & Sun (2020).

The categorical variable employment status indicates the person's employment status and takes 4 values. If the person is employed the value is employed, if he is unemployed the value is unemployed, student if he is a student and economic inactive if the person is economically inactive such as for example if he is retired, soldier, or housewife. This variable is used also from Sathye (1999).

Regarding the household income, in our analysis the numeric variable household income indicates the family income, it is expressed in euros per month and is categorized into 4 categories. For the years where these 4 categories were not given but were given more than the existing database, created respectively 4 categories of income for these years so that it is comparable for all years. In these cases, the household income was calculated using the midpoint method. Household income is a characteristic which has been used in many papers in literature. De Blasio (2008), Song & Sun (2020), Hitt & Frei (2002), Watanabe and Omori (2020), Zhou and Wang's (2014), use this variable in order to capture the impact of income in internet use, e-commerce and e-banking. In our analysis in all the regression models will include the log of variable household income. By taking the logarithm of the household income variable, we can transform the data and capture non-linear relationships in linear forms. This can lead to a better fit of the regression model and improve its predictive accuracy. Furthermore, helps us reduce the homoscedasticity. Lastly, because we are going to deal with percentage changes because of the regression models that we are going to use, taking the income logarithm allows the coefficient to represent percentage changes directly.

The numeric household size variable indicates the number of household members while the categoric children in household variable indicates the existence of children or not in the household taking the price 0 if there is no one child in household and the price 1 if exists even one child in household. Both variables are also used from De Blasio (2008).

Finally, regarding these types of variables that we referred; the categorical variable residence area indicates the person's place of residence. Takes the values North, Central, Attica, and Islands if the person resides in Northern Greece, Central Greece, Attica, the Aegean Islands, and Crete respectively. The same variable is also used from De Blasio (2008) in order to examine all three variables of interest and Song & Sun (2020) also use it.

Other variables construction and description.

In addition to the variables already mentioned, more variables that will be used in our analysis and which have again been proven by the literature to influence the individual's choice to do e-commerce, e-banking or use the internet are the following.

Initially, based on the query from the ICT survey "For which of the following activities did you use the internet in the first quarter of (of the survey year) for private purpose?", the individual must tick all the activities that applied. So, if for him applied the answer "Telephoning over the internet / video, calls (via webcam) over the internet (using applications, e.g., Skype or Messenger, Viber, Facetime, Whats App, Snapchat, MS Teams, Webex" in the category communication the categorical dummy variable phone or videocall that we construct in our analysis takes the value 1 and the value 0 otherwise.

We also create another dummy indicator utilizing the query "For which of the following activities did you use the internet in the first quarter (of the survey year) for private purpose?" from the ICT survey. In this query as we have already referred the individual must tick all the activities that applied. If for him applied the answer "Selling goods or services via a website or app (e.g., eBay, Facebook, Marketplace, shpock" in the category "Other 0n-line services" the dummy variable electronic seller that we construct in our analysis takes the value 1 and the value 0 if is not applied for the individual.

Then, in order to determine the frequency of individual's internet use we construct the categorical variable with the name frequency of internet use. We utilize the query "How often, on average, did you use the internet in the first quarter (of the survey year)?" from the ICT survey. Depending on individuals answer it takes four dummy values. More specifically takes the value daily if individual selects the answer "Several times during the day.", or "Once a day or almost every day.", the value weekly if he answers, "At least once a week but not every day" and the value less frequently if he answers, "Less than once a week". Finally takes the value never if individual chooses the answer "Have never used it".

From the query "Did you buy any of the following goods over the internet for private use in the first quarter (of the survey year)? Include goods purchased online from enterprises or private persons, including used goods." we construct the following dummies variables. Firstly, the variable medicines which takes the value 1 if individual applied positively in the category "Medicine or dietary supplements such as vitamins" and 0 otherwise. The variable household goods which take the value 1 if individual applied positively in the category "Furniture, home accessories (e.g., carpets or curtains) or gardening products (e.g., tools, plants)" and 0 otherwise. The variable apparel and footwear which take the value 1 if

individual applied positively in the category "Clothes (including sport clothing), shoes or accessories (e.g., bags, jewellery)" and 0 otherwise. And finally, from this query we construct the dummy variable tech devices which consists of two answers and takes the value 1 if individual applied positively in the category "Consumer electronics (e.g., TV-sets, stereos, cameras) or household appliances (e.g., washing machines)" or in the category "Computers, tablets, mobile phones or accessories" and 0 otherwise. The numeric variable year indicates the year the survey was conducted.

Lastly, the categorical variable that we construct with the name online seller's origin indicates the electronic seller's origin. Takes 4 prices which depends on the answer that applied from the individual in the query "The goods or services you ordered / bought for private purposes over the Internet in the 1rst quarter (of the survey year) were from:". Depending on the 4 answers which exists, the variable online seller's origin takes the value domestics for the answer "National sellers?", the price E.U sellers for the answer "Sellers from other EU countries?", the price outside E.U sellers for the answer "Sellers from the rest of the world?" and finally the value unknown if individual applied "Country of origin of sellers is not known?"

3.2.2 Descriptive statistics

Descriptive statistics for variables Internet use, e-commerce, e-banking and variables which are directly related to them.

The summary statistics for the explanatory variables that will be used in our study are shown in Table 1 below. Prior to that, it should be noted that all the variables in the sample of summary statistics have a total of 66,667 observations. The first variable of main interest, internet use has mean which equals to 0.583. This means that on average the 58.3% of the total percentage of individuals in our sample uses the internet during the survey total years. While from the means of variable frequency of internet use, we conclude that on average the 44.6% of the total percentage of individuals in our sample uses daily the internet while the 8% uses weekly the internet, the 2,8% uses with less frequency the internet and finally the 44.5% have never used the internet during the survey total years. Finally, regarding the variables that relates in internet use we observe that on average the 29,3% of the total percentage of individuals in our sample use the internet for a phone or videocall. Regarding the variable e-commerce we observe that equals to 0.283. This means that on average the 28,3% of the total percentage of individuals in our sample buy or order goods or

services for private use over the internet during the survey total years. While regarding the types of goods or services that individual buy we observe that on average the 4.4% of the total percentage of individuals in our sample buy household goods, the 12.7% buy apparel and footwear, the 3,9% buy medicines while the 8,4% buy tech devices during the survey total years. Regarding the origin of the online seller that individual buy their products or services we conclude that on average the 13.5% of the total percentage of individuals in our sample buy from domestic's online sellers, the 4.9% prefers EU sellers, the 3,7% buy from outside the EU seller and finally the online seller's origin is unknown for the 1,3% during the survey total years. Finally in terms of the variables which relates to e-commerce and more specifically the variable electronic seller we find that on average the 2.2% of the total percentage of individuals in our sample are individuals who sells goods or services via a website or app during the survey total years.

Lastly for variable of interest e-banking we observe that it's mean equals to 0.184, and this means that on average during the survey total years the 18.4% of individuals makes financial transactions over the internet.

Descriptive statistics for demographic, human capital, household financial status, household structure, and personal financial situation variables.

Regarding the variable which indicates the age we observe that the age groups have mean 0,077 for the age group of 16 to 24, 0,104 for ages 25 to 34, 0,174 for the ages 35 to 44 0.190 for the age group 45 to 54, 0,208 for the age group 55 to 64 and finally 0.247 for the age group of 65-74. From these results from age groups means, we can conclude that starting from the last one group that we referred which is the oldest age group and going to the youngest age group, on average the oldest age group has the biggest percentage of individuals during the survey total years, and these percentages decrease gradually going to the younger population group which has the smallest percentage of individuals. More specifically, these percentages are set at 24,7% for the oldest age group of 65 to 74, 20,8% for the 55 to 64 age group, 19% for the 45 to 54 age group, 17,4% for the 35 to 44 age group, 10,4% for the 25 to 34 age group, and finally the lowest proportion for the youngest age group, which equals 7,7%.

As for the variable gender we observe that the majority in our sample are women, and the minority are men on average and during the survey years. This gap isn't big and more specifically, the percentage of women equals to 55,2% when this of men is 44,8%.

Furthermore, we notice that our sample on average during the survey years, consists in majority from individuals who have completed a lower technical school, high school elementary school, or they haven't completed or attended any level of education, and this percentage equals to 40,1%. The 35,2% has completed a public or private IEK, KEK, or all types of high school while the 24,7% has completed a master's degree, a doctorate, a university or TEI school, or a military school on average during the survey years.

The following results which concern the individual's employment status, derive from the average during all the years of the survey. More specifically, we observe that most individuals in our sample are economically inactive (e.g., retired, soldier, housewife) and this percentage equals to 42,3%. The 39,9% are employees, the 10,6% are unemployed and finally the 7,1% are students.

The mean household income equals to 880,507. This means that on average each household in our total sample during the total survey years has income which equals to 880,507 euros per month. The minimum income value of 410, suggests that there is at least one household which has the lowest income in entire dataset and its income equals to 410 euros per month, while the maximum income value of 2013 indicates that there is at least one household which has the highest income in entire dataset and its income equals to 2013 euros per month. Regarding the variable which indicates the members in household it's mean equals to 2.705. This means that on average each household in our total sample during the total survey years has 2,705 members. The minimum value of 1, suggests that there is at least one household which has the minimum number of members in entire dataset and this number equals to1, while the maximum value of 11 indicates that there is at least one household which has the maximum number of members in our sample, and they are equal to 11.

As for the indicator which shows the presence of children in household it's mean equals to 0.229. This means that the 22,9% of the total number of households during the survey years, has at least one child in household.

Finally, in terms of where each person resides, the majority of sample on average during the survey years lives in Attica, followed by Northern Greece, Central Greece and finally the smallest percent of individuals lives in Aegean islands and Crete, with percentages 35.4, 28.2, 26.3 and 10.1 respectively.

Table 1. Summary statistics

Variable	Mean	Standard deviation	Minimum	Maximum

Internet use	.583	.493	0	1
Frequency of internet use				
Daily	.446	.497	0	1
Weekly	.080	.271	0	1
Less frequent	.028	.166	0	1
Never	.445	497	0	1
e-commerce	.283	.451	0	1
Household goods	.044	.206	0	1
Apparel and footwear	.127	.334	0	1
Medicines	.039	.193	0	1
Tech devices	.084	.277	0	1
Online seller's origin				
Domestics	.135	.341	0	1
EU sellers	.049	.215	0	1
Outside E.U sellers	.037	.190	0	1
Unknown	.013	.114	0	1
Phone or videocall	.293	.455	0	1
Electronic seller	.022	.146	0	1
e-banking	.184	.387	0	1
Age				
16-24	.077	.266	0	1
25-34	.104	.305	0	1
35-44	.174	.379	0	1
45-54	.190	.393	0	1
55-64	.208	.406	0	1
65-74	.247	.431	0	1
Gender				
Male	.448	.497	0	1
Female	.552	.497	0	1
Education level				
Low	.401	.490	0	1
Medium	.352	.478	0	1
High	.247	.431	0	1
Employment status				
Employed	.399	.490	0	1
Unemployed	.106	.308	0	1
Student	.071	.257	0	1
Inactive	.423	.494	0	1
Household income				
Euros per month	880.51	397.48	410.00	2013.00
Household size				
Number	2.70	1.25	1	11
Children in household				
Presence	.229	.420	0	1
Residence area				
Northern Greece	.282	.450	0	1
Central Greece	.263	.440	0	1
Attica	.354	.478	0	1

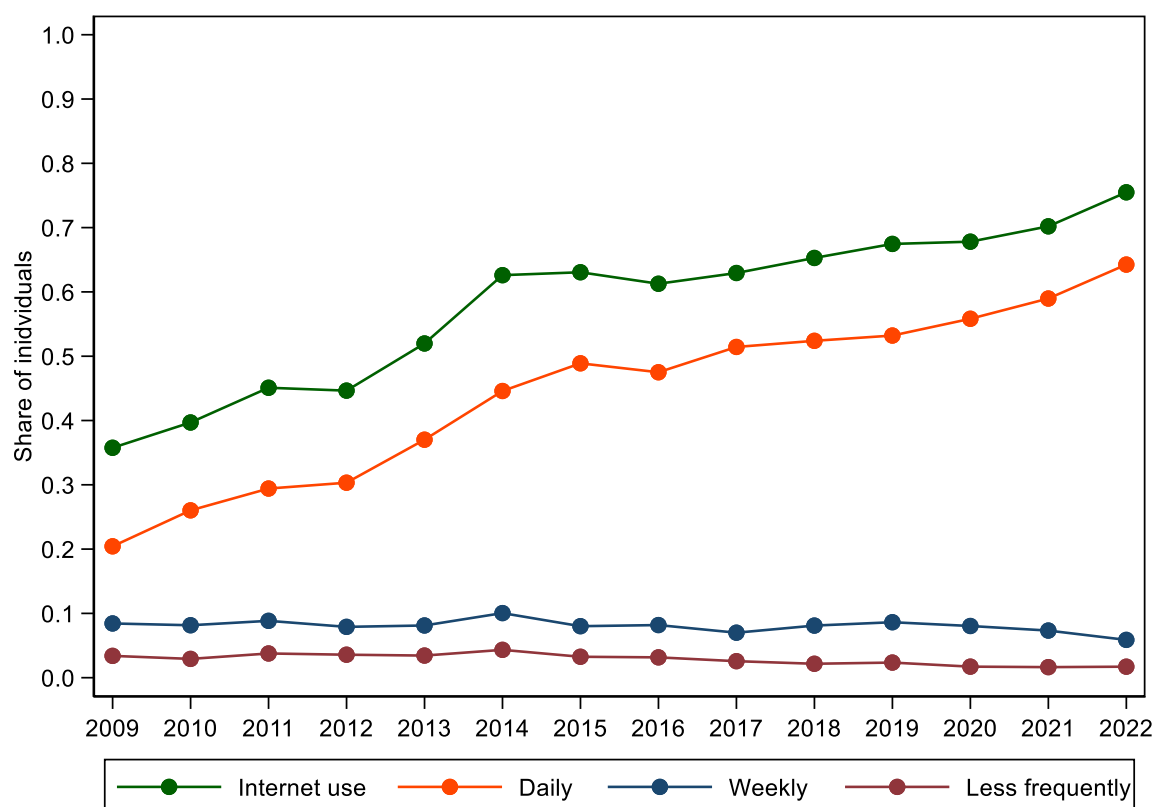|				
Islands and Crete	.101	.301	0	1
Observations	66,667			

Source: Survey on the Use of Information and Communication Technologies by Households and Individuals (ICT, 2009-2022), Hellenic Statistical Authority (EL.STAT.), Public Use Microdata Files.

Internet Use

Figure 1 illustrates the percentage change of Internet use and the frequency of individuals usage over time. This graphical representation allows for a clear comparison in the growth rates over time by using the base year of 2009. On the horizontal axis, the years of the survey are marked, while the vertical axis depicts the percentage change of evolution of each of the four variables in terms of usage share of individuals. Initially from the figure we conclude that internet use has a stable evolution over time and from a percentage 36% in 2009 reaches the 75% in 2022. In terms of the frequency of internet use we observe that the daily use of internet has a rapidly growth when the weekly and the less frequent use seems to have stable low percentages with nonsignificant change over time. The main conclusion is that individuals place more value on internet use and more specifically on daily internet use over time.

Figure 1. The percentage change of Internet use and its frequency over time

Source: Survey on the Use of Information and Communication Technologies by Households and Individuals (ICT, 2009-2022), Hellenic Statistical Authority (EL.STAT.), Public Use Microdata Files.

Activities on the Internet (e-commerce)

A) Electronic buyer - Electronic seller

All the followings graphical representations in this subsection allows for a clear comparison in the growth rates over time by using the base year of 2009. On the horizontal axis, the years of the survey are marked, while the vertical axis depicts the percentage change of evolution of each of the variables of interest in terms of the share of individuals. The depiction of results on dates will be presented one year later as the survey is conducted in the first quarter of each year for the past year.

Firstly, from the Figure 2 which illustrates the percentage change of individual's status on e-commerce over time we can derive the conclusion that individuals use the internet mainly for buying than selling goods or services. More specifically we observe a launch in 2020 on electronic buyers which is, and the year where starts the Covid-19. These results are also confirmed from Chang & Meyerhoefer (2021) and Dolfen et al. (2023), who also finds that during this period the e-buyers had increased. The same period seems not to affect the

electronic sellers in Greece. The main conclusion is that when we refer to e-commerce in Greece we are basically talking about purchases and not sales of products over time.

Figure 2. The percentage change of individual's status on e-commerce over time
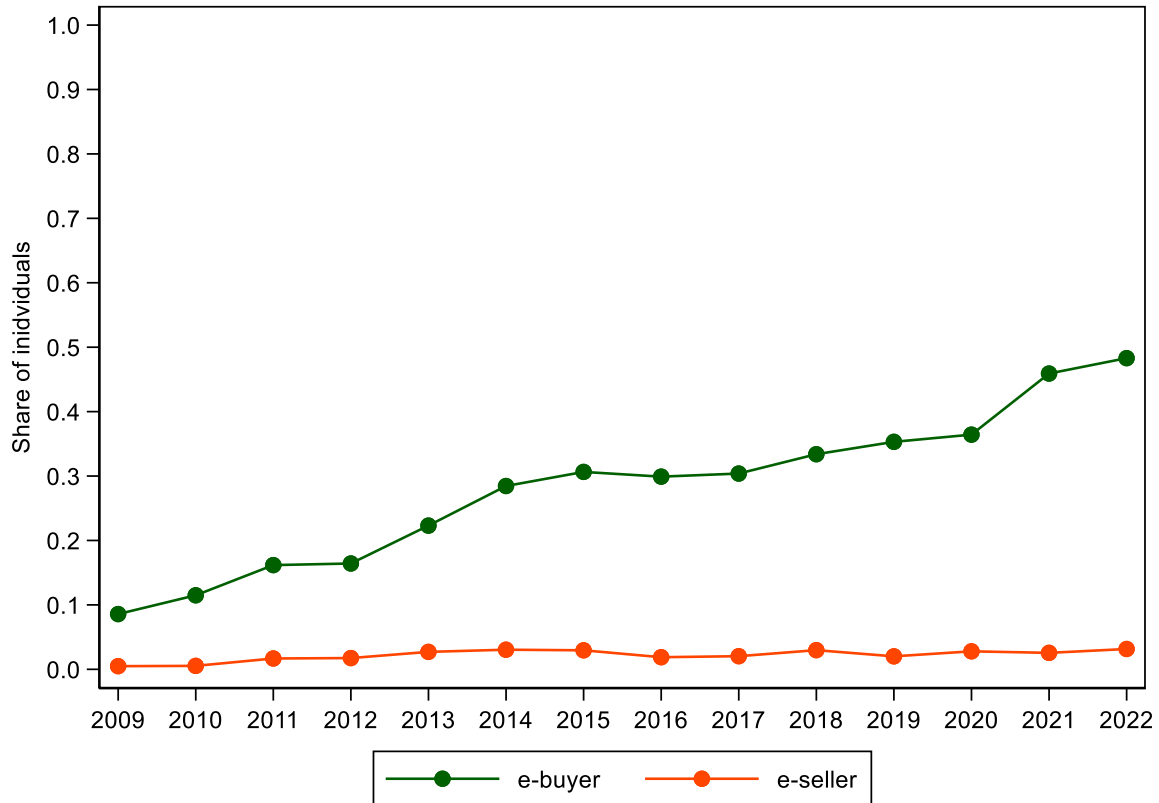
B) Electronic buys by type of goods and services

Figure 3 illustrates the percentage change of types of goods e-purchased over time. We observe that individuals prefer firstly to buy apparel and footwear, and then tech devices over time. Medicines and household goods seem to be less preferred without any great change in demand over time. We also observe a launch in 2020 on apparel and footwear goods which is, and the year where starts the Covid-19 as we referred above. This period the percentage of individuals who buy apparel and footwear reaches almost the 30% when this percentage is near to 10%, 8%, 5% for tech devices, medicines and household goods respectively.

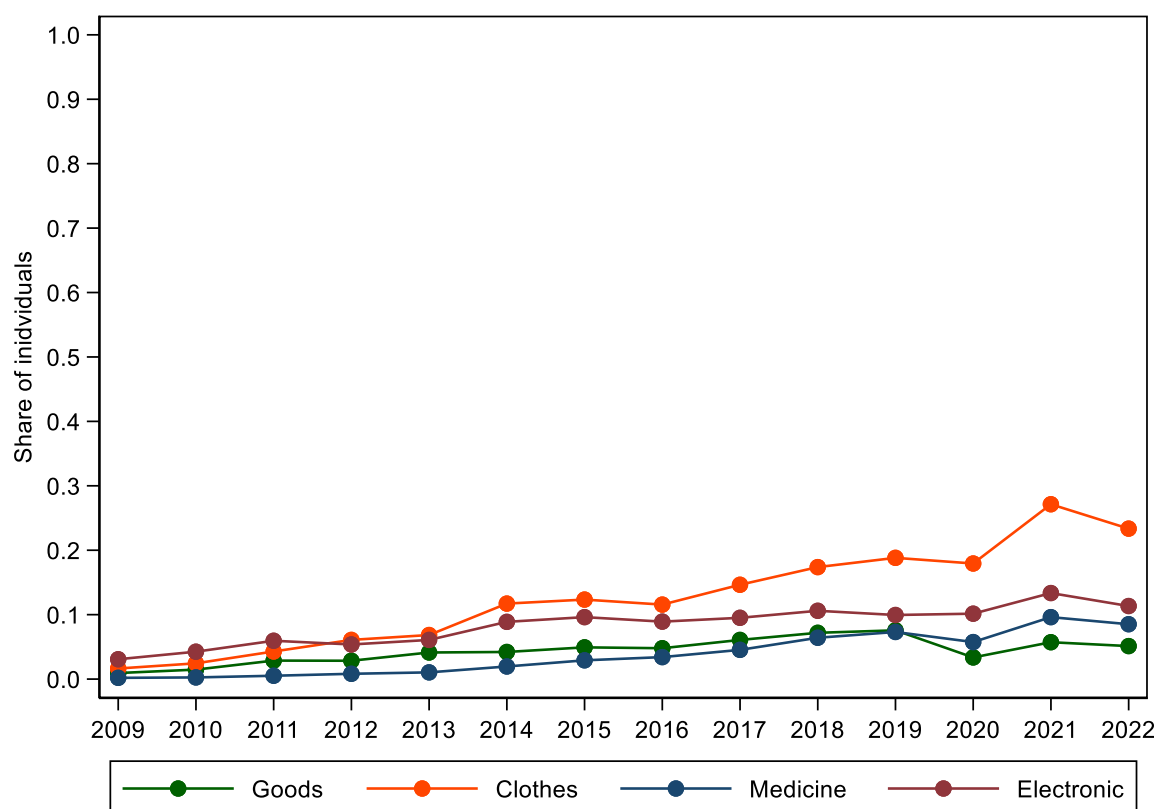Figure 3. The percentage change of types of goods e-purchased over time

Source: Survey on the Use of Information and Communication Technologies by Households and Individuals (ICT, 2009-2022), Hellenic Statistical Authority (EL.STAT.), Public Use Microdata Files.

C) Electronic buys by origin

The following figure 4 illustrates the percentage change of electronic buys by seller's origin over time. The main conclusion that we can derive is that the individuals for all the survey years prefer the domestic online sellers which is the only variable which has and an upward trend in contrast with the other two which seems to have a stable trend over the years where EU sellers preferred than outside the EU sellers. Finally, we also observe a launch in 2020 on domestic online sellers when this period the percentage of individuals who buy goods and services on internet from domestic sellers reaches almost the 30% when this percentage is near to 5%, for both EU and non-EU sellers.

Figure 4. The percentage change of electronic buys by seller's origin over time
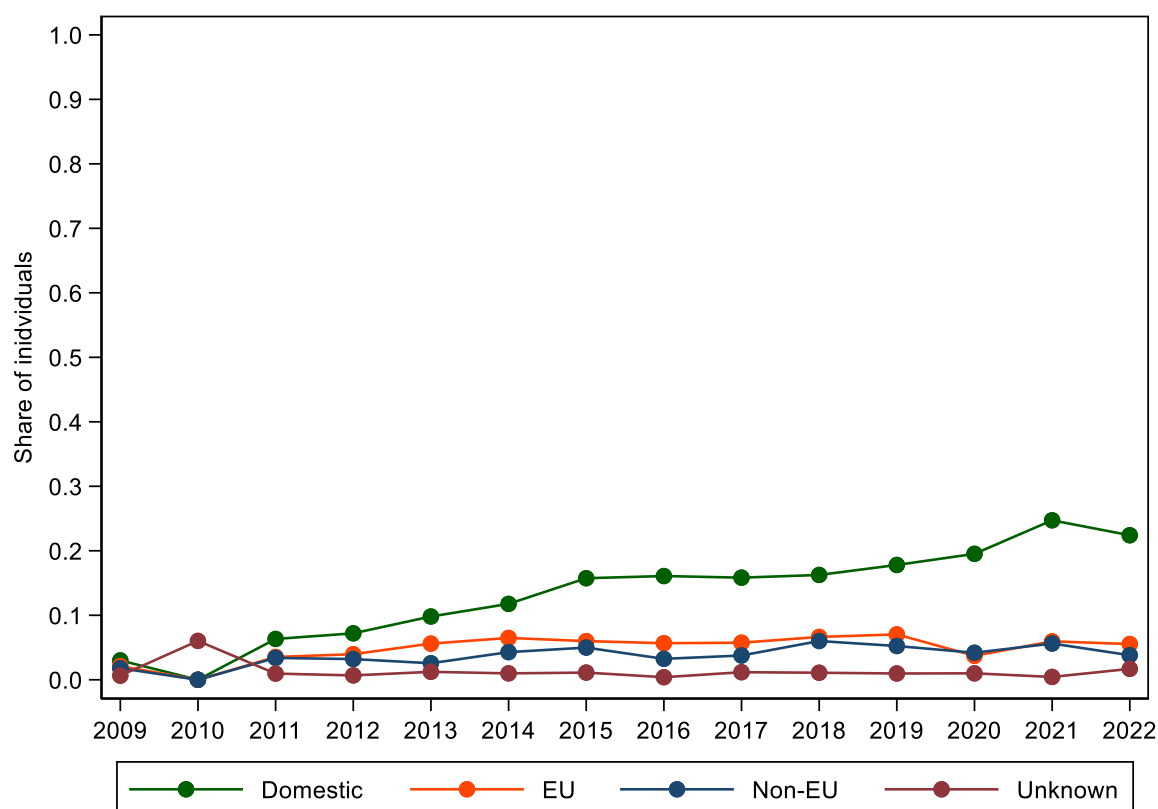

Source: Survey on the Use of Information and Communication Technologies by Households and Individuals (ICT, 2009-2022), Hellenic Statistical Authority (EL.STAT.), Public Use Microdata Files.

E-banking and evolution in comparison with the variables of main interest.

The data presented in Table 2 offers a comprehensive view of the percentage change of e-banking in households over the years as in this section we will focus more on the evolution of the variables than in the percentage changes as we made in the previous subsections, but we will also refer at the percentage change over time for the e-banking. Monitoring these data over time, we observe a continuous increase in the percentages of electronic banking. More specifically we observe that electronic banking, is used almost 11 times and exactly 10,5 times more by households in 2022 compared to 2009, reaching the 42% in comparison to the 4% respectively.

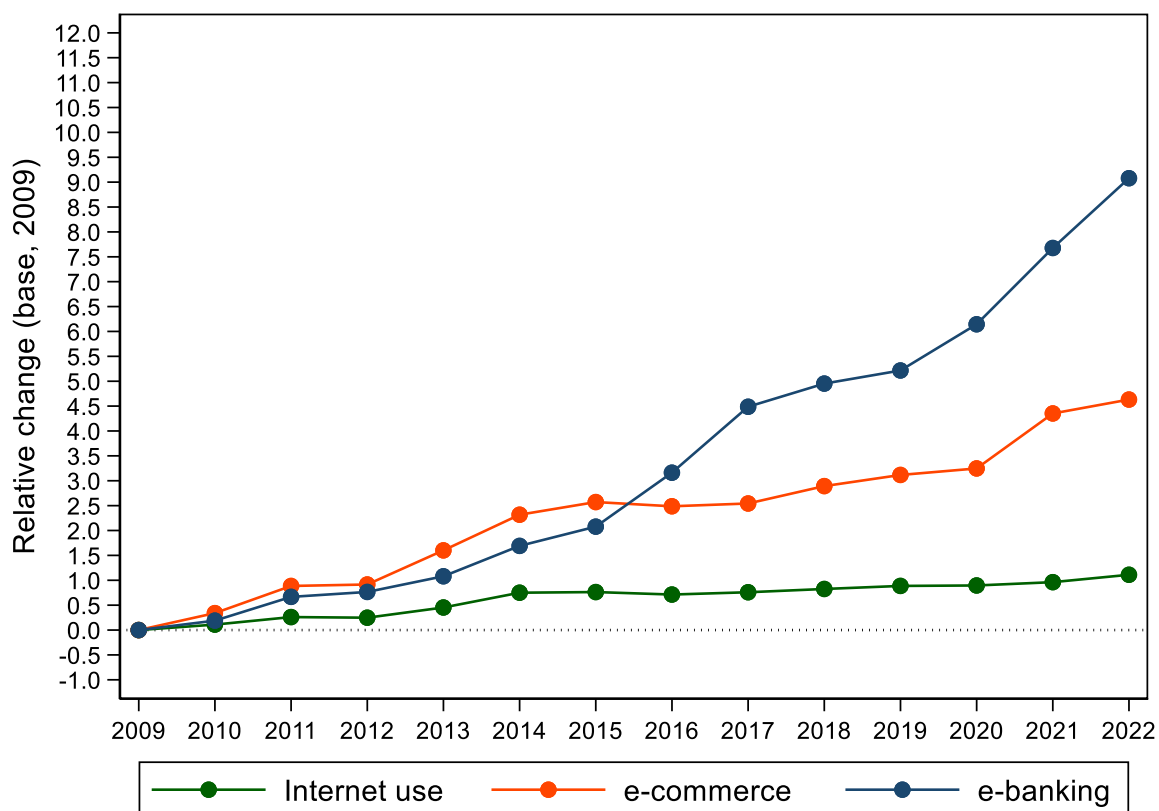Table 2. E-banking (share of households) over time

Year	e-banking
2009	0.04
2010	0.05
2011	0.07
2012	0.07
2013	0.09

2014	0.11
2015	0.13
2016	0.17
2017	0.23
2018	0.25
2019	0.26
2020	0.29
2021	0.36
2022	0.42

Source: Survey on the Use of Information and Communication Technologies by Households and Individuals (ICT, 2009-2022), Hellenic Statistical Authority (EL.STAT.), Public Use Microdata Files.

To visually illustrate the growth rates of the three variables variable of interest, Figure 5 has been included. This graphical representation allows for a clear comparison in the growth rates over time by using the base year of 2009. On the horizontal axis, the years of the survey are marked, while the vertical axis depicts the ratio of evolution of each of the three variables. This visual aid further emphasizes the impressive growth rates of e-banking first and e-commerce then, as well as the stability of the internet usage, over the years.

Figure 5. The evolution of e-banking in comparison with Internet use and e-commerce over time

Source: Survey on the Use of Information and Communication Technologies by Households and Individuals (ICT, 2009-2022), Hellenic Statistical Authority (EL.STAT.), Public Use Microdata Files

4. Empirical modelling

Probit model.

The three variables that are the focus of our analysis—Internet use, e-commerce, and e-banking—have binary forms with just zero and one as possible values, as we have already mentioned. Therefore, we will use a probit model in the first stage of our analysis in order to determine how likely a person is to use the internet, make e-commerce, or e-banking while also examining how his choice is influenced by various demographic, human capital characteristics, the household financial status, the household structure, the personal financial situation and other factors. More specifically, demographic characteristics are referred at the age and the individual's sex, at characteristics of human capital which concern the individual's education, household financial status such as monthly household income, household structure such as household size and presence of children, and the personal financial situation where in our case is represented from variable employment status. Following this initial stage of analysis, we use the data to examine how individuals' decisions to make phone or video calls or sell goods online. Then we examine again how is affected the individual's decision for purchase specific products from the internet (household goods, apparel and footwear, tech device, medicines or food supplements), as well as how the same demographic, human capital characteristics, household financial status, household structure, and personal financial situation affect all the mentioned above decisions. The model that we will apply again in all these cases will be the probit model as all the mentioned variables have dummies form.

Generally, we know that since the Bernoulli model must inevitably define the distribution of the data, binary outcomes are straightforward to predict and are estimated using maximum likelihood. In our analysis if the individual implements one of the three uses which we referred, the dependent variable in the following model will take the value 1 and 0 otherwise. From Cameron, and Trivedi (2005) we know that if the likelihood of one result is p, then the likelihood of the second result must be $(1-p)$. For regression applications the probability p will vary across individuals as a function of regressors. The two standard binary outcome models, the logit and the probit models, specify different functional forms for this probability as a function of regressors where in our case we will use the probit model and the difference

between these estimators is qualitatively similar to use of different functional forms for the conditional mean in least-squares regression.

In this instance, we will begin our analysis in accordance with the literature and, more particularly, the method of De Blasio (2008), who employed the probit model and had a similar sample of microdata.

Illustrating the above probabilities for the dependent variables for individual's choice for internet use, e-commerce and e-banking we have:

$$y = \begin{cases} 1 \text{ with probability } p, \\ 0 \text{ with probability } 1-p. \end{cases}$$

y = 1 with probability p, if the individual use the internet, make e-commerce or e-banking

y = 0 with probability 1-p, if the individual doesn't use the internet, make e-commerce or e-banking

Depending on each time which one of these three will be the dependent variable.

The purpose of the probit model is to estimate the probability that an observation with specific characteristics will be included in one of the 2 values of the dependent variable.

The probit model can be described by the following model:

$$p = \Phi(x'\beta) = \int_{-\infty}^{x'\beta} \varphi(z)dz, \qquad (1)$$

where $\Phi(.)$ is the standard cumulative density function (cdf), with derivative:

$$\varphi(z) = \left(\frac{1}{\sqrt{2\pi}}\right) e^{(-z^2/2)} \qquad (2)$$

which is the standard normal density function.

While the probit model marginal effects are:

$$\frac{\partial p_i}{\partial x_{ij}} = \varphi(x_i'\beta)\beta_j = \varphi\big(\Phi^{-1}(p_i)\big)\beta_j \quad (3)$$

Where:

$$p_i = \Phi(x_i'\beta) \qquad (4)$$

The variables age, gender, education level, employment status, household's income, household members, presence of children in the household, and lastly the residence area, are

the variables that we will include in our analysis as independents variables in order to determine in which grade an individual's choice is affected for internet use, e-commerce, e-banking, phone or video call on internet, sell goods on internet, or which type of goods he will prefer to buy from the internet which will be the dependents variables. More specifically, each time this grade will be specified from the margins that we referred in the above equation (3) which will represent the coefficients from the independent variables. Our standard errors will be corrected for heteroscedasticity and having one of the variables of interest as a dependent variable each time we will estimate the corresponding probit model. Finally, our model will conclude the usual disturbance term.

Multinomial logit model.

Afterward, in our analysis we investigate the consumers choice for the online seller's origin and how this choice is affected from the same aforementioned demographic and human capital characteristics, household financial status, household structure, and personal financial situation. The values that variable online seller's origin takes are the following three. First the price domestics, secondly the price E.U sellers, and finally the price outside E.U sellers. As far as we can observe, these three values give as three unordered outcomes and we consider some possible outcomes, mutually exclusive. In this case we know from the economic theory and the literature that the suitable regression model is the multinomial logit. From Cameron and Trivedi (2005) we know that the multinomial data utilized in micro econometric investigations often arise from individual consumer choice. Consumer choice data may be either revealed preference data, which are data on actual decisions and outcomes, or stated preference data, which are survey responses to hypothetical questions as happens in our case. Furthermore, the same model is used from Bauer & Hein (2006) and Brynjolfsson & Smith (2000a) in their analysis in order to extract their results having as dependent variables, variables of the same class as ours. Multinomial logistic regression is a classification method that generalizes logistic regression to multiclass problems, i.e., with more than two possible discrete outcomes. It is a model that is used to predict the probabilities of the different possible outcomes of a categorically distributed dependent variable, given a set of independent variables.

For the three results which referred from the origin of online sellers we have:
J=3 i.e., domestics=0, E.U sellers=1, and outside E.U sellers=2.

So, we have:

y=0 if the individual buys goods from domestic online sellers

y=1 if the individual buy goods from European Union online sellers

y=2 if the individual buy goods from outside European Union online sellers (5)

The conditional probability for (j= 0,1,2) which results is:

$$Pr(y_1 = j|x_i) \quad (6)$$

The corresponding probabilities in our case in logit form are:

$$\Pr(y = 1|x_i) = \frac{\exp(x_i\beta_1)}{1 + \exp(x_i\beta_1) + \exp(x_i\beta_2)}$$

$$\Pr(y = 2|x_i) = \frac{\exp(x_i\beta_2)}{1 + \exp(x_i\beta_1) + \exp(x_i\beta_2)}$$

$$\Pr(y = 0|x_i) = 1 - \Pr(y_i = 1|x_i) - \Pr(y_i = 2|x_i) = \frac{1}{1 + \exp(x_i\beta_1) + \exp(x_i\beta_2)}$$

(7)

While for the marginal effects we have:

$$\frac{\partial \Pr(y = 1|x_i)}{\partial x_{ik}} = \Pr(y = 1|x_i)\left[\beta_{1k} - \frac{\beta_{1k}\exp(x_i\beta_1) + \beta_{2k}\exp(x_i\beta_2)}{1 + \exp(x_i\beta_1) + \exp(x_i\beta_2)}\right]$$

$$\frac{\partial \Pr(y = 2|x_i)}{\partial x_{ik}} = \Pr(y = 2|x_i)\left[\beta_{2k} - \frac{\beta_{1k}\exp(x_i\beta_1) + \beta_{2k}\exp(x_i\beta_2)}{1 + \exp(x_i\beta_1) + \exp(x_i\beta_2)}\right]$$

$$\frac{\partial \Pr(y = 0|x_i)}{\partial x_{ik}} = \Pr(y = 0|x_i)\left[-\frac{\beta_{1k}\exp(x_i\beta_1) + \beta_{2k}\exp(x_i\beta_2)}{1 + \exp(x_i\beta_1) + \exp(x_i\beta_2)}\right]$$

(8)

5. Estimation results

Determinants for Internet use, e-commerce and e-banking

We start our analysis determining in which grade each one of the independent variables age, gender, education level, employment status, household's income, household members, the presence of children in the household, and lastly the residence area, affects the individual's choice for internet use, e-commerce, or e-banking. In order to estimate the effect of each one of these independent variables we have constructed the following three models where in the

first one model dependent variable is the internet use, in the second is the variable e-commerce and in the third one is the e-banking. The below Table 3 illustrate all these results from the probit model from which we used the margin effects of independent variables. All the following results are extracted from the total data sample which consists of 66.667 observations and all the variables are statistically significant at the 1% significance level except from variable which indicates the residence area Central Greece in the first model and is statistically significant at the 5% significance level.

Initially regarding the first model and the variable age, our reference category is the group 16-24. We observe that all the other oldest age groups have fewer likelihoods for use the internet. More specifically, the age group of 25-34 have 13.5 percent fewer likelihoods for use the internet, when these percents are fewer by 21.4, 31.8, 44.6, and 59.8 for the age groups of 35-44, 45-54, 55-64, 65-74 respectively. Regarding the gender women are less likely to use the internet in likelihood 2.1% than men. Individuals with higher and medium education level are also more likely to use the internet than these with low education level. More precisely, individuals who have completed a public or private IEK, KEK, or all types of high school has 20.7% more likelihoods than the ones who has completed till a lower technical school. The same likelihood is 36.5% for an individual who has completed a master's degree, a university or TEI school, or a military school in contrast with one who has completed till a lower technical school. Regarding the individual's employment status, we define the employees as the reference category. From the results we observe that unemployed individuals have 2.3% less likelihoods for use the internet while the same likelihood is 7.4% less for individuals who are economic inactive. The household income also increases the likelihood for internet use. Households with higher income have more likelihoods for use the internet. We also find that the household size affects negatively the use of internet. Household with more members have less likelihoods for use of internet than the household with less members. The presence of children in household also increases positively the likelihood for internet use. More specifically, households with at least one child have 4.4% more likelihoods for using the internet than households which don't have children. All the mentioned results up to this point are statistically significant at the 1% significance level. Finally, regarding the variable residence area, we set as reference category the region Northern Greece. The results indicates that individuals who reside in Central Greece, Attica, Islands and Crete have 0.1%, 4.5% and 2.1% more likelihoods for making use of the internet than individuals who reside in Northern Greece. The results for Attica, Islands and Crete are statistically significant at the

1% significance level when the result for Central Greece is statistically significant at the 5% significance. The value of pseudo r-squared in this model is 0.495.

In the second model we examine how the same independents variables affect e-commerce. Firstly, for the variable age we observe that as happened with the variable internet use the same results are observed and for the variable e-commerce, that is, the younger the person the more likely he does online purchases for products and services from internet. More specifically, the age group of 25-34 have 10.3 percent fewer likelihoods for use the internet compare with the age group of 16-24, when these percents are fewer by 17.5, 25.8, 36.1, and 44.6 for the age groups of 35-44, 45-54, 55-64, 65-74, respectively in compare with the age group of 16-24. Regarding the gender women are less likely to make online purchases in likelihood 3.4% than men. Furthermore, individuals with higher and medium education level are also more likely to buy online goods and services than these with low education level. More precisely, individuals who have completed a public or private IEK, KEK, or all types of high school has 13.7% more likelihoods than the ones who has completed till a lower technical school. The same likelihood is 29% more for an individual who has completed a master's degree, a university or TEI school, or a military school in contrast with one who has completed till a lower technical school. Regarding the individual's employment status, we define the employees as the reference category. From the results we observe that unemployed individuals have 4.5% less likelihoods for making e-commerce while the same likelihood is 4.7% less for student individuals and 5.4% less for these who are economic inactive comparing all these three categories with the category where the individuals are employees. The household income as we conclude from the results also increases the likelihood for e-commerce. Households with higher income have more likelihoods for purchasing goods or services from the internet. We also find that the household size affects negatively the electronic commerce. Household with more members have less likelihoods for electronic commerce than the household with less members. Regarding with the presence of children in household we observe that they also increase positively the likelihood for e-commerce. More specifically, households with at least one child have 3.6% more likelihoods for making e-commerce than households which don't have children. Finally, regarding the variable residence area, we set as reference category the region Northern Greece. The results indicates that individuals who reside in Central Greece, Attica, Islands and Crete have 2.1%, 3.2% and 4.5% more likelihoods for making electronic commerce than individuals who reside in Northern Greece. The value of pseudo r-squared in the second model is 0.351.

Finally, regarding the third model in table 3 we examine how e-banking is affected from the same independent variables with the previous two models. Initially, for the variable age we observe that individuals whose age is between 35 to 44, 45 to 54, 55 to 64, and 65 to 74 have less likelihoods for making financial transactions on the internet compare with individuals who belongs in the age group of 16 to 24. These less likelihoods calculated exactly at 1,8%, 5.1%, 9,9% and 15,8% for the age groups 35 to 44, 45 to 54, 55 to 64, and 65 to 74 respectively. Women also are less likely to make e-banking in likelihood 3.4% than men. Moreover, individuals with higher and medium education level are also more likely to make financial transactions on internet than these with low education level. More precisely, individuals who have completed a public or private IEK, KEK, or all types of high school has 10.5% more likelihoods than the ones who has completed till a lower technical school. The same likelihood is 22.8% more for an individual who has completed a master's degree, a university or TEI school, or a military school in contrast with one who has completed till a lower technical school. Furthermore, regarding the individual's employment status, we define the employees as the reference category. From the results we observe that unemployed individuals have 6.6% less likelihoods for making e-banking while the same likelihood is again 6.6% less for student individuals and 6.4% less for these who are economic inactive comparing all these three categories with the category where the individuals are employees. The household income as we conclude also increases the likelihood for e-banking. That means that households with higher income have more likelihoods for making financial transactions on the internet. Moreover, we find that the household size affects negatively the electronic banking. Household with more members have less likelihoods for electronic banking than the household with less members. Regarding with the presence of children in household we observe that they increase positively the likelihood for e-banking. More specifically, households with at least one child have 2.8% more likelihoods for making e-banking than households which don't have children. For the variable residence area, we set as reference category the region Northern Greece. The results indicates that individuals who reside in Central Greece, Attica, Islands and Crete have 3%, 5.7% and 2.7% more likelihoods for making electronic banking than individuals who reside in Northern Greece. The value of pseudo r-squared in the second model is 0.344.

Table 3 comprises all three of the major interest factors for our analysis, hence it contains the most significant findings. The pertinent theoretical and applied literature supports the findings for all three models. In particular, the results for the use of the internet are verified both from Mills and Whitacre (2003) and De Blasio (2008) who shows with a similar dataset

both that a household's propensity to utilize the Internet at home is favorably correlated with age, income and from the presence of children in household. Education moreover is positively correlated with the use of internet and the higher the education is the highest likelihoods exists for internet usage. When household characteristics are considered, the influence of city size on Internet use is still very marginal and significant. More specifically, people who live in big cities utilize the internet use more frequently while men are more inclined than women to use the internet. All the above results regarding the variables e-commerce and e-banking are also all or separately confirmed from Ganning and Green (2021), Zhou and Wang's (2014), Song & Sun (2020) for the e-commerce and Bauer and Hein (2006), and Hitt and Frei (2002) for the e-banking.

Table 3. Determinants of Internet use, e-commerce and e-banking (marginal effects, probit).

Variable	Internet use	e-commerce	e-banking
	[1]	[2]	[3]
Age 25-34	-.135*** (.006)	-.103*** (.009)	-.002 (.007)
Age 35-44	-.214*** (.006)	-.175*** (.008)	-.018*** (.007)
Age 45-54	-.318*** (.006)	-.258*** (.008)	-.051*** (.006)
Age 55-64	-.446*** (.006)	-.361*** (.008)	-.099*** (.006)
Age 65-74	-.598*** (.006)	-.446*** (.008)	-.158*** (.006)
Female	-.021*** (.002)	-.034*** (.003)	-.046***(.002)
Medium education	.207***(004)	.137***(003)	.105***(003)
Higher education	.365***(005)	.290***(004)	.228***(004)
Unemployed	-.023***(005)	-.045***(004)	-.066***(004)
Student	-.001(008)	-.047***(006)	-.066***(006)
Inactive	-.074***(004)	-.054***(004)	-.064***(004)
Household income	.138***(004)	.125***(004)	.103***(004)
Household size	-.011***(001)	-.015***(001)	-.015***(001)
Children in household	.044***(004)	.036***(004)	.028***(003)
Region: Central Greece	.001**(003)	.021***(004)	.030***(003)
Region: Attica	.045***(003)	.032***(004)	.057***(003)
Region: Islands and Crete	.021***(005)	.045***(005)	.027***(004)
Pseudo R-squared	.495	.351	.344
Observations	66,667		

Source: Survey on the Use of Information and Communication Technologies by Households and Individuals (ICT, 2009-2022), Hellenic Statistical Authority (EL.STAT.), Public Use Microdata Files.
Notes: Reference category for "Age" is the group "16-24", for "Gender" is the sex "Male", for "Education level" is the level "Low", for the "Employment status" is the status "Employed", and for the "Residence area" is the region "Northern Greece". All models include year dummies.
Robust standard errors in parentheses. * p < .10, ** p < .05, *** p < .01

Determinants of individual's online activities

This section focuses on the online activities that individuals like to perform. Afterward, given the parameter that the person uses the internet our analysis concerns the extent to which the demographic characteristics, the characteristics of human capital, the household financial status, the household structure and finally the personal financial situation influence a person's choice to make a phone call or video call over the internet for private purpose which is represented in the first model, or to sell goods or services via a website or app (e.g., eBay, Facebook, Marketplace) which is represented in the second model. These results are illustrated totally in table 4. The available sample from which our results are derived consists of a total of 36.986 observations and all the following variables are statistically significant. Regarding the activities of individuals on the internet, there is a small literature which analyzes different parameters in each case from the already existing ones.

To a first general conclusion for both two of the following models we observe that as we found with the three variables of interest in table 3, the same in terms of ages groups results observed in the individual's choice for preferring to make a phone call or video call over the Internet, or to sell goods or services via a website or app. More precisely, we conclude that the older the age group to which the individual belongs, the less likely to make a phone or video call over the internet or to sell goods or services via a website or app. In terms of likelihoods, initially for the first model we observe that individuals whose age is between 25 to 34, 35 to 44, 45 to 54, 55 to 64, and 65 to 74 have 9.6%, 17%, 21,7%,27.4% and 33.1% less likelihoods respectively for making a phone or video call over the internet compare with individuals who belongs in the age group of 16 to 24.

Moreover, women also are more likely to make a phone or video call over the internet in likelihood 1.3% than men. Individuals with higher and medium education level are also more likely to make a phone or video call over the internet than these with low education level. More precisely, individuals who have completed a public or private IEK, KEK, or all types of high school (i.e., medium education level) have 4.6% more likelihoods to make a phone or video call over the internet than the ones who has completed till a lower technical school (i.e., low education level). The same likelihoods for an individual who has completed a master's degree, a university or TEI school, or a military school (i.e., high education level) are 12.5% more in comparison with an individual with one who has completed till a lower technical school. Furthermore, regarding the individual's employment status, we define the employees as the reference category. From the results we observe that unemployed individuals have 2.1% less likelihoods for making a phone or video call over the internet while the same

likelihood is reversed for the category of students who have 2.8% more likelihoods for making a phone or video call over the internet in compare with the category where the individuals are employees. The household income as we conclude also increases the likelihood for making a phone or video call over the internet. That means that households with higher income have more likelihoods for making a phone or video call over the internet. Moreover, we find that the household size affects negatively the individual's choice for a phone or video call. Household with more members have less likelihoods for making a phone or video call than the household with less members. Finally, for the variable which indicates the reside individual's area, we have the following results. The results indicates that individuals who reside in Attica, we find that it is 2.9% more likely to make a phone or video call compared to individuals who reside in Northern Greece. This likelihood for individuals who reside in Islands and Crete shows that they have 2.4% more likelihoods making a phone or video call compared to individuals who reside in Northern Greece. The value of pseudo r-squared in the first model is 0.146.

Regarding the second model in table 4, and the variable age the following results are extracted in terms of likelihoods. Individuals whose age is between 35 to 44, 45 to 54, 55 to 64, and 65 to 74 have 0.9%, 2.1%, 2.8% and 3.6% less likelihoods respectively for selling goods or services via a website or app compare with individuals who belongs in the age group of 16 to 24. Moreover, women also are less likely to sell goods or services via a website or app in likelihood 2.5% than men. Individuals with higher and medium education level are also more likely to sell goods or services via a website or app than these with low education level. More precisely, individuals who have completed a public or private IEK, KEK, or all types of high school (i.e., medium education level) have 1.2% more likelihoods to sell goods or services via a website or app than the ones who has completed till a lower technical school (i.e., low education level). The same likelihoods for an individual who has completed a master's degree, a university or TEI school, or a military school (i.e., high education level) are 2.6% more in comparison with an individual with one who has completed till a lower technical school. Furthermore, regarding the individual's employment status we observe that economic inactive individuals have 0,9% less likelihoods for selling goods or services via a website or app in compare with the category where the individuals are employees. The household income as we conclude also increases the likelihood for selling goods or services via a website or app. That means that households with higher income have more likelihoods for selling goods or services via a website or app. Moreover, we find that

the household size affects negatively the individual's choice for selling goods or services on internet. Household with more members have less likelihoods for selling goods or services on internet than the household with less members. Regarding with the presence of children in household we observe that they increase positively in a very small grade the likelihood for individual's choice of selling goods or services on internet. More specifically, households with at least one child have 0.5% more likelihoods for selling goods or services on internet than households which don't have children. Finally, for the variable which indicates the reside individual's area, we have the following results. The results indicates that individuals who reside in Attica, we find that it is 1.1% more likely to sell goods or services via a website or app compared to individuals who reside in Northern Greece. The value of pseudo r-squared in the second model is 0.054.

Table 4. Determinants of phone or videocall and electronic seller (marginal effects, probit) from individuals who use the internet.

Variable	phone or videocall	electronic seller
	[1]	[2]
Age 25-34	-.096***(009)	-.005(006)
Age 35-44	-.170***(009)	-.009*(005)
Age 45-54	-.217***(009)	-.021***(005)
Age 55-64	-.274***(010)	-.028***(005)
Age 65-74	-.331***(012)	-.036***(005)
Female	.013***(005)	-.025***(002)
Medium education	.046***(007)	.012***(002)
Higher education	.125***(007)	.026***(003)
Unemployed	-.021***(008)	-001(003)
Student	.028**(011)	-.006(004)
Inactive	-.009(007)	-.009***(003)
Household income	.048***(007)	.016***(003)
Household size	-.018***(002)	-.005***(001)
Children in household	-.001(006)	.005**(003)
Region: Central Greece	.001(006)	.001(002)
Region: Attica	.029***(006)	.011***(003)
Region: Islands and Crete	.024***(009)	-.001(003)
Pseudo R-squared	.146	.054
Observations	36,986	

Notes: Reference category for "Age" is the group "16-24", for "Gender" is the sex "Male", for "Education level" is the level "Low", for the "Employment status" is the status "Employed", and for the "Residence area" is the region "Northern Greece". All models include year dummies.
Robust standard errors in parentheses. * $p < .10$, ** $p < .05$, *** $p < .01$

Determinants of types of goods e-purchased

Subsequently, given the parameter that the person makes e-commerce our analysis concerns the extent to which the same independent variables with all the above models influence a person's choice to buy a type of good. In the first model of our estimation dependent variable is the variable which represents the household goods, in the second are the medicines as type of good, in the third are the goods of apparel and footwear when finally in the fourth model are the tech devices. All these results are illustrated in table 4, the available sample from which our results are derived consists of a total of 36.986 observations and all the following variables are statistically significant. A direct result of e-commerce is the purchase of goods and services from the Internet. The categories of products that are chosen by consumers is also an object of extensive study in the literature but in each case for a different purpose. Similar data and product categories have been selected by De Blasio (2008) who reaches similar conclusions to us in the common product categories.

Regarding the first model in table 4, for the variable age we observe that individuals whose age is between 25 to 34, 35 to 44, 45 to 54, 55 to 64, and 65 to 74 have more likelihoods for buying household goods from the internet compare with individuals who belongs in the age group of 16 to 24. These more likelihoods calculated exactly at 8.4%, 10.5%, 10.4%,11.2% and 11.2% for the age groups 25 to 34, 35 to 44, 45 to 54, 55 to 64, and 65 to 74 respectively. Moreover, individuals with higher education level are also more likely to buy household goods than these with low education level. More precisely, individuals who have completed a master's degree, a university or TEI school, or a military school has 2.8% more likelihoods than the ones who has completed till a lower technical school. The household income also increases the likelihood for buying household goods from the internet. That means that households with higher income have more likelihoods for buying household goods from the internet. Moreover, we find that the household size affects negatively this likelihood. Household with more members have less likelihoods for buying household goods from the internet than the household with less members. Regarding with the presence of children in household we observe that they increase positively the likelihood for buying household goods from the internet. More specifically, households with at least one child have 2.6% more likelihoods for making e-banking than households which don't have children. The value of pseudo r-squared in the second model is 0.028.

For the second model in table 4, we have the following results. Initially, for the variable age we observe that individuals whose age is between 25 to 34 35 to 44, 45 to 54, 55 to 64, and

65 to 74 have more likelihoods for buying medicines from the internet compare with individuals who belongs in the age group of 16 to 24. These more likelihoods calculated exactly at 3.8%, 6.8%, 5%,6.4% and 6% for the age groups 25 to 34 35 to 44, 45 to 54, 55 to 64, and 65 to 74 respectively. Women also are more likely to buy medicines from the internet in likelihood 7.3% than men. Moreover, individuals with higher and medium education level are also more likely for buying medicines on the internet than these with low education level. More precisely, individuals who have completed a public or private IEK, KEK, or all types of high school has 2.5% more likelihoods than the ones who has completed till a lower technical school. The same likelihood is 4.4% more for an individual who has completed a master's degree, a university or TEI school, or a military school in contrast with one who has completed till a lower technical school. Furthermore, regarding the individual's employment status, from the results we observe that unemployed individuals have 1.6% more likelihoods for buying medicines from the internet comparing with the category where the individuals are employees. The household income as we conclude also increases the likelihood for buying medicines on the internet. That means that households with higher income have more likelihoods for buying medicines on the internet. Regarding with the presence of children in household we observe that they increase positively the likelihood for buying medicines from the internet. More specifically, households with at least one child have 2.4% more likelihoods for buying medicines on the internet than households which don't have children. For the variable residence area, the results indicates that individuals who reside in Central Greece and Attica, have 3.7% and 4.8% more likelihoods for buying medicines from the internet than individuals who reside in Northern Greece. The value of pseudo r-squared in the second model is 0.086.

Regarding the third model in table 4, we have the following results. Initially, for the variable age we observe that individuals whose age is between 35 to 44, 45 to 54, 55 to 64, and 65 to 74 have less likelihoods for buying apparel and footwear on the internet compare with individuals who belongs in the age group of 16 to 24. These less likelihoods calculated exactly at 4.8%, 9.1%,14.3% and 23.7% for the age groups 35 to 44, 45 to 54, 55 to 64, and 65 to 74 respectively. Women also are more likely to buy apparel and footwear on the internet in likelihood 10.3% than men. Moreover, individuals with higher education level are also less likely to buy apparel and footwear than these with low education level. More precisely, individuals who have completed a master's degree, a university or TEI school, or a military school has 2.7% less likelihoods than the ones who has completed till a lower technical school. Furthermore, regarding the individual's employment status, from the results we

observe that unemployed individuals have 4.2% less likelihoods for buying apparel and footwear from the internet while this likelihood for students is 4% less comparing with the category where the individuals are employees. The household income as we conclude also increases the likelihood for buying apparel and footwear on the internet. That means that households with higher income have more likelihoods for buying apparel and footwear from the internet. Moreover, we find that the household size affects positively this likelihood. Household with more members have more likelihoods for buying apparel and footwear from the internet than the household with less members. For the variable residence area, the results indicates that individuals who reside in Central Greece, Attica and Islands and Crete have 2.9%, 5.9% and 2.3% less likelihoods for buying apparel and footwear from the internet than individuals who reside in Northern Greece. The value of pseudo r-squared in the second model is 0.082.

Finally, regarding the fourth model in table 4, we have the following results. Initially, for the variable age we observe that individuals whose age is between 65 to 74 have 4.6% less likelihoods for buying tech devices from the internet compare with individuals who belongs in the age group of 16 to 24. Women also are less likely to buy tech devices from the internet in likelihood 14% than men. Individuals with higher education level are also more likely to buy tech devices than these with low education level. More precisely, individuals who have completed a master's degree, a university or TEI school, or a military school has 3.5% more likelihoods than the ones who has completed till a lower technical school. Furthermore, regarding the individual's employment status, from the results we observe that students have 6.2% more likelihoods for buying tech devices from the internet comparing with the category where the individuals are employees. The household income as we conclude also increases the likelihood for buying tech devices from the internet. That means that households with higher income have more likelihoods for buying tech devices from the internet. For the variable residence area, the results indicates that individuals who reside in Attica and Islands and Crete have 4.6% and 2.7% less likelihoods for buying apparel and footwear on the internet than individuals who reside in Northern Greece. The value of pseudo r-squared in the second model is 0.043.

Table 5. Determinants of types of goods e-purchased (marginal effects, probit) from individuals who makes e-commerce.

Variable	household goods	medicines	apparel and footwear	tech devices
	[1]	[2]	[3]	[4]
Age 25-34	.084***(.011)	.038***(.011)	.012(.016)	.015(.014)
Age 35-44	.105***(.012)	.068***(.012)	-.048***(.016)	.021(.015)
Age 45-54	.104***(.012)	.050***(.011)	-.091***(.016)	.008(.015)
Age 55-64	.112***(.013)	.064***(.013)	-.143***(.018)	-.007(.016)
Age 65-74	.112***(.019)	.060***(.017)	-.237***(.023)	-.046**(.020)
Female	-.006 (.006)	.073***(.006)	.103***(.008)	-.140***(.007)
Medium education	.014(.011)	.025**(.010)	.001(.014)	.002(.012)
Higher education	.028**(.012)	.044***(.010)	-.027*(.014)	.035***(.012)
Unemployed	-.001(.010)	.016*(.010)	-.042***(.013)	-.011(.011)
Student	.024(.016)	-.013(.014)	-.040**(.018)	.062***(.017)
Inactive	.013(.010)	.006(.010)	-.016(.012)	.001(.011)
Household income	.039***(.009)	.031***(.008)	.044***(.011)	.042***(.010)
Household size	-.014***(.003)	-.005(.003)	.010***(.004)	-.002(.003)
Children in household	.026***(.009)	.024***(.008)	.007(.010)	-.009(.009)
Region: Central Greece	-.011(.009)	.037***(.008)	-.029***(.011)	.004(.010)
Region: Attica	-.002(.008)	.048***(.007)	-.059***(.010)	-.046***(.009)
Region: Islands and Crete	.012(.012)	.015(.010)	-.023*(.014)	-.027**(.013)
Pseudo R squared	.028	.086	.082	.043
Observations	15,868			

Source: Survey on the Use of Information and Communication Technologies by Households and Individuals (ICT, 2009-2022), Hellenic Statistical Authority (EL.STAT.), Public Use Microdata Files.

Notes: Reference category for "Age" is the group "16-24", for "Gender" is the sex "Male", for "Education level" is the level "Low", for the "Employment status" is the status "Employed", and for the "Residence area" is the region "Northern Greece". All models include year dummies.

Robust standard errors in parentheses. * $p < .10$, ** $p < .05$, *** $p < .01$

Determinants of online seller's origin choice

In order to specify exactly the grade of effect of the same independent variables as in the above models (i.e., age, gender, education level, employment status, household's income, household members, the presence of children in the household, and lastly the residence area) in the individual's choice for the origin of the online seller we apply the multinomial logit model in order to extract our results. All these results are illustrated in Table 6. and they came

from a data sample which consists of 14,738 observations which includes only the individuals who makes electronic commerce and have bought goods or services from one of the three origin seller's categories (domestic sellers, European Union sellers and the outside of the European Union sellers). All the following variables are statistically significant.

First, to a general conclusion we observe that as we found with the three variables of interest that indicates the use of the internet, electronic commerce, and electronic banking, the same in terms of ages groups results observed in the choice of the origin of the seller. We conclude that the older the age group to which the individual belongs, the less likely to prefer sellers within the EU or even suppliers outside the EU and since these probabilities of preference decrease exponentially, the probabilities of preferring domestic sellers increase exponentially. More detailed, we observe that the age group of 25 to 34 is 4.9% more likely than the age group of 16 to 24 to purchase goods and services online from a domestic seller. However, this percentage is reversed between the two age groups, and it appears that the older age group of 25 to 34 has 3.5% fewer chances of making purchases from a seller whose origin is the European Union than the younger age group of 16 to 24. Regarding the age group of 35 to 44 we note that it is 8.1% more likely to purchase from domestic sellers, 2.8% less likely to purchase from EU sellers and 5.3% less likely to purchase from outside the European Union sellers compared to the 16 to 24 age group. For the age group of 45 to 54 we find that it is 9.7% more likely to purchase from domestic sellers, 5.4% less likely to purchase from EU sellers and 4.2% less likely to purchase from outside the European Union sellers compared to the 16 to 24 age group. Concerning, the age group of 55 to 64 we note that it is 14.3% more likely to purchase from domestic sellers, 6.5% less likely to purchase from EU sellers and 7.7% less likely to purchase from outside the European Union sellers compared to the 16 to 24 age group. Lastly regarding the last age group of 65 to 74 we observe that it is 18.3% more likely to purchase from domestic sellers, 9.3% less likely to purchase from EU sellers and 8.9% less likely to purchase from outside the European Union sellers compared to the 16 to 24 age group. Moreover, regarding the gender women are more likely to prefer domestic sellers in likelihood 8.1% than men, when this likelihood is reversed for the E.U sellers and outside E.U sellers where women have 1,5% and 6,8% less likelihoods to prefer these sellers respectively in comparison with men. Individuals with higher and medium education level are also more likely to prefer sellers from outside or inside the European Union than these with low education level. More precisely, individuals who have completed a public or private IEK, KEK, or all types of high school (i.e., medium education level) have 6% less likelihoods to prefer the domestic sellers, 3,1% more likelihoods to prefer the European Union sellers and

2,1% more likelihoods to prefer the outside of the European Union sellers than the ones who has completed till a lower technical school (i.e., low education level). The same likelihoods for an individual who has completed a master's degree, a university or TEI school, or a military school (i.e., high education level) are 14.6% less, 8.6% and 6% more for an individual to prefer the domestic sellers, the European Union sellers and the outside of the European Union sellers respectively, in comparison with an individual with one who has completed till a lower technical school. Moreover, for the variable which indicates the household income per month, we extract the following results. Higher household income is associated with less likelihood of preferring a domestic seller. The reverse is true for the European Union sellers and the outside of the European Union sellers where higher monthly household income is associated with a higher probability of preference from the individual. Household size also affects the individual's choice for the origin of online seller. More specifically we observe that the more members have a household there is has positive likelihoods in individual choice for a domestic seller and negative likelihoods in individual choice for a European Union or outside of the European Union seller. The presence of children in household is observed that they decrease the likelihood for individual's choice for an EU seller and positively (i.e., increases) the same likelihood for an outside the European Union seller. More specifically, households with at least one child have 1.7% less likelihoods for preferring an EU seller and 1.5% more likelihoods for preferring an outside the EU seller in comparison with the households which don't have children. Finally, for the variable which indicates the reside individual's area, we have the following results. The results indicates that individuals who reside in Central Greece, we note that it is 3.6% less likely to purchase from domestic sellers, and 3.4% more likely to purchase from outside the European Union sellers compared to individuals who reside in Northern Greece. Furthermore, for the individuals who reside in Attica, we find that it is 9% less likely to purchase from domestic sellers, 2.2% more likely to purchase from the European Union sellers, and 6,8% more likely to purchase from outside the European Union sellers compared to individuals who reside in Northern Greece. The value of pseudo r-squared in our model is 0.042.

Finally, another issue that has been raised by the literature concerns the choice of the consumer regarding the origin of the online seller. Not enough research has been done on this topic but similar research which has been done by Mu and Zhang (2021) verifies the following results in table 6 regarding the consumer's choice for the origin of the online seller.

Table 6: Determinants of online seller's origin choice (marginal effects, multinomial logit), individuals who makes electronic commerce and have bought goods or services from one of the three origin seller's categories.

Variable	Domestics	E.U sellers	Outside E.U sellers
Age 25-34	.049***(.017)	-.035**(.016)	-.014(.015)
Age 35-44	.081***(.017)	-.028*(.016)	-.053***(.015)
Age 45-54	.097***(.018)	-.054***(.016)	-.042***(.015)
Age 55-64	.143***(.018)	-.065***(.017)	-.077***(.015)
Age 65-74	.183***(.023)	-.093***(.020)	-.089***(.018)
Female	.083***(.008)	-.015**(.007)	-.068***(.006)
Medium education	-.060***(.014)	.031***(.012)	.028***(.011)
Higher education	-.146***(.015)	.086***(.012)	.060***(.011)
Unemployed	.002(.013)	-.008(.011)	.006(.011)
Student	-.023(.018)	.013(.016)	.010(.014)
Inactive	-.002(.013)	-.005(.011)	.007(.011)
Household income	-.093***(.012)	.039***(.011)	.054***(.010)
Household size	.021***(004)	-.007**(003)	-.014***(003)
Children in household	.002(.011)	-.017*(.010)	.015*(.009)
Region: Central Greece	-.036***(.011)	.002(.010)	.034***(.008)
Region: Attica	-.090***(.010)	.022*(.009)	.068***(.008)
Region: Islands and Crete	.022(.014)	-.031(.012)	.009(.011)
Pseudo R-squared	0.042		
Observations	14,738		

Source: Survey on the Use of Information and Communication Technologies by Households and Individuals (ICT, 2009-2022), Hellenic Statistical Authority (EL.STAT.), Public Use Microdata Files.

Notes: Reference category for "Age" is the group "16-24", for "Gender" is the sex "Male", for "Education level" is the level "Low", for the "Employment status" is the status "Employed", and for the "Residence area" is the region "Northern Greece". All models include year dummies.

Robust standard errors in parentheses. * $p < .10$, ** $p < .05$, *** $p < .01$

6. Conclusions

In this thesis, the main question is the analysis of the evolution of electronic commerce and its effect on the Greek economy, while was also examined the evolution of internet use, and electronic banking in Greece from the year 2009 to 2022, as well as the way in which the individual's choice for one of them is affected from the demographic characteristics (i.e., age and the individual's sex), human capital characteristics (i.e., individual's education), the household financial status (i.e., monthly household income), the household structure (i.e., household size and presence of children), the personal financial situation (i.e., the individuals employment status) and the individuals residence area. All these characteristics form the

person's profile throughout our analysis. Beyond this fundamental query, based on the literature we delve further into the profile of individuals to identify how this initially affects the activities where the individual can perform online, while then, to inquire deeper into the field of e-commerce, we examine the individual's preferences for a specific type of product and finally the individual's choice for the country of the e-seller's origin.

In order to extract our results, we utilize microdata from the Hellenic Statistical Authority's (ELSTAT) Survey on the Use of Information and Communication Technologies by Households and Individuals (ICT) which totally consists of a set of independent cross-sectional data with 66,667 observations.

In order to examine the choice of individuals based on their profile for e-commerce, the internet use, online banking, the person's online activities and the type of products they prefer, the probit model was used while for the place of origin of the online seller, the multinomial logit model was applied. From these results we derive our conclusions about consumer preferences and trends. More specifically, our study begins with the examination of internet use, e-commerce and e-banking the three primary variables of interest, as they are the main pillars from which the rest of the variables in the analysis derive as a result. Then we investigate two online activities of individuals. Their profile on making a phone or videocall and their profile on selling goods on internet. The third and fourth part of our analysis as we mentioned delves even more into e-commerce. First, we study the type of products that consumers prefer among the household goods, medicines, apparel and footwear and the tech devices. Finally, we examine if consumers in Greece prefer the domestic online sellers, EU sellers or outside the EU sellers.

The primary conclusions emerging from the first part of our analysis regarding the variables of interest suggest the following. First, it is worth noting that the person's profile is presented the same in all three of these models, with the only difference being found in the degree to which each characteristic it will affect the likelihood of their selection. In terms of ages groups results, we observe that the older the age group to which the individual belongs, the less likely to use the internet, purchase goods or services from the internet or make financial transactions on the internet. More specifically, these age differences seem to affect more the probability for the variables concerning the use of the internet and e-commerce where the age group 65 to 74 has 59.8% and 44.6% respectively less probability of using the internet and e-commerce in comparison with the 16 to 24 age group, when the same probabilities are 15.8% less for the electronic banking variable. Based on the person's gender, no big difference is found in the probability of using any of the three variables, with women, however, having

somewhat less likelihoods. The education level of the person is one of the variables where it is also worth observing as there is a discrepancy in the likelihood of using the variables between people with low, medium and high education. We notice that as the educational level of the individual increases, so does the probability of using the internet, e-commerce or electronic banking. The gap in the probabilities of their use between people with high education and those with low education reaches 36.5%, 29% and 22.8% respectively for the three variables. In relation to the individual's employment status, unemployed, students and individuals who are economically inactive have a few lower likelihoods of using the Internet, e-commerce and e-banking compared to employees. Income as well as the presence of children at home are also two variables that increase the probability of using the three variables of interest with income playing a decisive role in contrast to the presence of children at home where its effect seems much smaller on the corresponding likelihoods. Finally, regarding the individual's area of residence, slightly increased probabilities of using the variables of interest are observed by the residents of central Greece, Attica and the islands and Crete compared to the residents of northern Greece.

All the above-mentioned results are verified all or separately confirmed by the existing theoretical and available relevant applied literature from Mills and Whitacre (2003) and De Blasio (2008) regarding the variable which indicates the internet use, from De Blasio (2008), Ganning and Green (2021), Zhou and Wang's (2014) and Song and Sun (2020) for the variable which indicates the electronic commerce and from De Blasio (2008), Bauer and Hein (2006), Watanabe and Omori (2020), Hitt and Frei (2002) for the variable which indicates the electronic banking.

In terms of the evolution and trends of the three main variables of interest, is observed that electronic banking has a rapid evolution in time, quite large is noted for electronic commerce and finally steady and slowly increasing trends for the internet usage. Covid-19 and capital controls are two shocks in the economy for which the launch in the percentages for the e-commerce and e-banking respectively in the corresponding years, is also diagrammatically illustrated. The results regarding Covid-19 and the growth of e-commerce are also extensively confirmed by the literature from Chang and Meyerhoefer (2021), Alcedo et al. (2022) and Dolfen et al. (2023).

Regarding the second part of our analysis which concerns the individual's online activities the main conclusions are initially focused on the age group to which the person belongs as we observe that the older the age group to which the individual belongs, the less likely to make any online activity. The person's education level also seems to influence the likelihood of

online activities as the higher the individual's level of education the higher the corresponding probability. Income also increases the likelihood of online activities which means that the higher the income there are most likelihoods for online activities by the individuals as opposed to household size which decreases them. Regarding the above-mentioned results for the second part there is a literature which analyzes different parameters regarding the online individual's activities but where in all cases is analyzed a different online activity.

In the third part of our analysis which concerns the types of online purchased goods the main conclusion in relation to the age of the individual, is that we notice that older age groups are more likely to prefer to buy household goods and medicines from the internet, while younger age groups are more likely to buy apparel and footwear. Regarding the sex we observe that women have more likelihoods to purchase medicines and apparel and footwear comparing to men who has more possibilities to buy tech devices from the internet. Individuals with higher education level is also more likely to buy household goods, medicines, tech devices, while they have less likelihoods to buy apparel and footwear from the internet in contrast with individuals with lower education level. Finally, income as in all our models increases the likelihood for online purchases for all the types of goods and the higher the income is there are most likelihoods for online purchases by the individuals. The categories of products that are chosen by consumers is also an object of extensive study in the literature but in each case for a different purpose. Similar data and product categories have been selected by De Blasio (2008) who reaches similar conclusions to us in the common product categories.

In the last part of our analysis where we examine the individual's profile regarding his choice for the online seller's origin, we note that in terms of age all the age's group which belongs from the age group 25 to 34 and above has more likelihoods to purchase their goods or services from a domestic online seller in comparison with the age group 16 to 24 which have more likelihoods to make their buys from sellers in or outside the European Union. Moreover, women seem to have more likelihoods to make their purchases from domestic online sellers in comparison with men who are more likely to prefer a seller from the EU or outside it. In addition, we conclude that the higher the education of the individual, the more likely it is to prefer an online seller from the European Union or outside it. Finally, higher household income is associated with less likelihood of preferring a domestic seller. The reverse is true for the European Union sellers and the outside of the European Union sellers where higher monthly household income is associated with a higher probability of preference from the individual. Not enough research has been done on this topic but similar research which has

been done by Mu and Zhang (2021) verifies the results regarding the consumer's choice for the origin of the online seller.

Conducting the specific analysis becomes crucial and has utility for the analysis of future research questions as it touches on aspects of e-commerce for which there is no available theoretical and applied literature specifically for the data of Greece. The identification of the profile of the people who go from the simplest stage of making purchases of goods or services through the internet, going deeper into their preferences by examining the types of goods but also the origin of the online seller contributes to the addition of the existing applied elements of the microeconomic theory which concerns the theory of the consumer while indirectly interest all the enterprises, when even the state can use this data to take some useful government policies.

Some of the policies for enterprises knowing the profile of the consumers concerns the target marketing and personalization of the consumer, the development of new products or the improvement of existing ones, the segmentation of the market, the appropriate design of its advertising media and others. On the part of the state, knowing the profile of consumers in e-commerce, some government policies could also be taken. For example, even more targeted digital literacy and education programs could be created, optimization of digital infrastructures that improve internet connectivity and accessibility and more targeted financial support programs for vulnerable consumers.

Our results, as useful as they may be considered, constitute in terms of the study and the methods followed, a small part of the broadest branches of the consumer's theory. Nevertheless, they can be the trigger and the basis for further study on the subject not only of electronic commerce with applied data for Greece but mainly for deepening in the online activities of the individuals where there is no literature on the specific online activities we studied for our country, but also and the consumer's preferences for online products and the place of origin of online sellers where the literature is limited.

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