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Impact of Covid-19 on e-Commerce in the European Union

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Abstract

The advent of the 4th Industrial Revolution has made it inevitable for firms worldwide to modify their business models to integrate ICTs into their operations. The lockdown measures to contain the COVID-19 pandemic appear to have accelerated this process as many businesses, particularly in the hospitality industry, had to shut down their operations. Others also had to resort to conducting their businesses solely online. Thus, it has been argued that e-commerce has thrived during the lockdown period. Concentrating on the current 27 European Union (EU) member countries, this paper seeks to answer the following question: To what extent the COVID-19 impacted e-commerce has? Trend analyses and a paired samples t-test are used to compare the mean percentage of enterprises with e-commerce sales before the pandemic and the first year. The study finds a significant increase in the percentage of enterprises that made e-commerce sales during the first year of the pandemic compared to the previous year ($t=-2.06$; $df=25$). Except for the western EU member countries, all other regions increased the percentage of enterprises that made e-commerce sales, with the southern EU countries witnessing the highest increase.

Keywords: 4th Industrial Revolution, COVID-19, e-commerce, European Union, digital divide

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Introduction

Before the COVID-19 disrupted the global economy, the emergence of the 4th Industrial Revolution had made the transition to conducting various social and business transactions online inevitable. For instance, it had been acknowledged that Information and Communication Technologies (ICTs) are the backbones of this 4th Industrial Revolution and that countries and businesses that embrace these developments as well as anticipate challenges, and strategically deal with them, were the ones that would be most likely to prosper, while those that do not are more likely fall behind (Acheampong, 2020; Samans et al., 2016). ICTs have been an integral part of various economic activities (OECD et al., 2020; UNCTAD, 2021). Similarly, UNCTAD (2021) points out that the last decade has witnessed an unprecedented transition towards a digital economy. This is because ICTs have provided unprecedented opportunities for businesses and countries to improve productivity across all sectors and build new sectors. One of the opportunities that the 4th Industrial Revolution offers is Electronic Commerce, commonly referred to as e-commerce.

It has been acknowledged that countries that take advantage of the potential of e-commerce are more likely to benefit from the new global digital economy, while those that fail to take advantage stand the risk of falling behind. This is because various studies have emphasized that economic prosperity in all countries in the future will inevitably rely on digital technologies (UNCTAD, 2021). As of 2017, the global value of e-commerce was estimated by UNCTAD to have reached \$29 trillion, equivalent to 36 percent of GDP (UNCTAD, 2019a). The digital transmissions associated with e-commerce transactions have made e-commerce markets essentially global and borderless; thereby, providing enormous opportunities and challenges for the global economy. That is why e-commerce has been introduced as a priority issue on the agenda of world trade policymakers (Monteiro et al., 2017).

Due to various lockdown measures to contain the spread of the pandemic, face-to-face interactions were limited, resulting in the situation where many of the daily activities of people and business transactions had to move online (ITU, 2021; WEF, 2020). Thus, UNCTAD (2021) points out the COVID-19 pandemic has fast-tracked digital transformations and increased e-commerce uptake globally. However, even before the pandemic, there were digital divides on various fronts. Empirical evidence suggests a substantial technological gap between developed and developing countries (Acheampong, 2020; Nikoloski, 2016). There are also digital divides, both in developing and developed markets (WEF (2020)). Even within the European Union (EU), there is evidence of a digital divide. For instance, Hallward-Driemeier et al. (2020) have observed that Europe has converged in digital infrastructure, but convergence in the use of digital services has been slow. Regarding e-commerce, UNCTAD (2019b) has noted that countries occupying the top 10 positions concerning total e-commerce sales globally have remained unchanged since 2016, with the United States being the market leader.

Besides the digital divide between countries, WEF (2020) has observed that small and medium-sized enterprises (SMEs) lag behind large corporations. While the pandemic has badly hit businesses in some sectors such as travel and hospitality, other businesses, particularly those enabled by connectivity such as e-commerce, are projected to have grown during the lockdown period (WEF, 2020). For instance, out of the 10 Global Fortune 500 Companies for 2020 – Amazon, an e-commerce company – recorded the highest increase in revenue of 20.5% (Fortune, 2020). In

contrast, other companies in other sectors witnessed a decline during the first year of COVID-19.

In 2020, the coronavirus pandemic affected countries in all regions of the world, as well as all sectors of the global economy and several stakeholders, have cautioned that unless existing digital divides are addressed, the pandemic is likely to result in even more significant inequalities both within and across countries (UNCTAD, 2021; WEF, 2020). Concentrating on the current 27 European Union (EU) member countries, this paper seeks to answer the following questions: What extent has the COVID-19 impacted e-commerce? Were different member states of the EU impacted differently? The study utilizes trend analyses and a paired-samples t-test to compare data on e-commerce sales before the pandemic and during the first year of the pandemic. The following section discusses the concept of e-commerce, this is followed by a discussion of the methodology, key findings, conclusions, and recommendations.

Literature review

Concept of e-commerce

According to OECD et al. (2020), as early as 1998, the concept of 'electronic commerce' (e-commerce) had been introduced into the plan of global trade policymaking as part of the WTO's work program on e-commerce. The concept has since been defined variously and also applied differently by several authors. Chaffey (2015) has defined e-commerce as all types of electronic transactions between organizations and their stakeholders, whether financial transactions or exchanges of information, or other services. Based on this definition, non-financial transactions such as customer support and requests for further information would also be considered part of e-commerce instead of the narrower view of the concept, which only considers the actual buying and selling online as e-commerce (Chaffey, 2015).

According to Turban et al. (2017), e-commerce essentially involves using the Internet and other networks such as intranets to purchase, sell, transport, or trade data, goods, or services. According to UNCTAD (2019a), e-commerce covers goods and services sold and bought online, including transactions via platform-based companies such as ride-hailing apps.

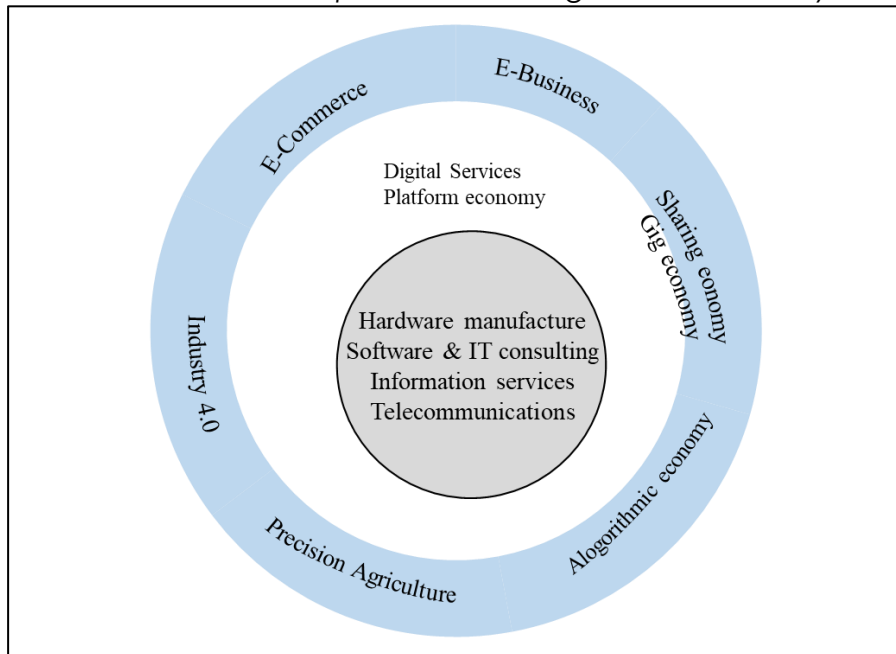
Although e-commerce is conceptualized differently depending on the context, Turban et al. (2017) have observed that e-commerce is at the heart of the new global digital economy, which has also been described as either the Internet economy or an online transaction-based economy. According to Bukht et al. (2017), e-commerce is a subset of the broader perspective of the digital economy which they refer to as the 'digitalized economy,' which among other components include e-business (ICT-enabled business transactions), algorithmic decision-making in business, the use of digitally-automated technologies in manufacturing and agriculture, Industry 4.0, and precision agriculture (See Figure 1).

UNCTAD has developed an E-commerce Readiness Index to measure the extent to which countries participate in e-commerce. The indicators for the index are based on the steps involved in completing an online shopping transaction. The index also measures web presence, the ability to pay for online transactions, and delivery reliability (OECD et al., 2020; UNCTAD, 2019a). The 2019 edition of the UNCTAD Business-to-Consumer (B2C) E-commerce Index report indicates that the Netherlands had the highest readiness to engage in and benefit from e-commerce (UNCTAD, 2019b). Out of 152 countries analyzed, European economies dominate the top-10 list, featuring Singapore and Australia. The report also noted least developed

countries (LDCs) where 18 of the 20 bottom positions in the index, while the gap between countries with the highest and the lowest level of readiness was extensive (UNCTAD, 2019a). This trend provides further evidence of a digital divide.

Figure 1

E-Commerce as a component of the digitalized economy



Source: Author's construct based on Bukht et al. (2017, p. 12)

Available data suggest that a growing share of the world's population is shopping online. For instance, UNCTAD (2019a) has noted that in 2017, an estimated 1.3 billion people, which is about 33% of the world's population aged 15 years and older, shopped online; however, the share of internet users that are shopping online is much lower in developing countries. For instance, whereas more than 80% of Internet users make online purchases in countries such as Denmark, Germany, Netherlands, Norway, Sweden, and the United Kingdom, in over two dozen low and lower-middle-income countries, less than 10% of Internet users make purchases online (UNCTAD, 2019a). Countries in Western Europe have recently found the highest readiness scores in terms of support for e-commerce (UNCTAD, 2021).

E-commerce in the European Union

E-commerce is an integral part of the EU's Digital Single Market policy. As part of the policy, the European Commission (EC) seeks to encourage e-commerce among member states, especially SMEs, to ensure that individuals and enterprises have better access and benefit from digital trade (European Commission, 2015). In their study for the European Commission, Cattaneo et al. (2014) noted that the shift to e-commerce has been steady as the SME's selling online has only increased on average by 1% per year since 2008. This is in recognition that promoting e-commerce by micro-enterprises and SMEs could be one of the major drivers to foster competitive business, growth, and jobs in Europe (Cattaneo et al., 2014).

As of 2019, only 17.5% of SMEs in the EU sold online, following a slight increase of 1.4 percentage points compared to 2016 (European Commission, 2020). Available evidence suggests that larger enterprises benefit more from e-commerce sales compared to SMEs. For instance, in 2019, 39% of large enterprises used online sales

compared to 1.4% of SMEs (European Commission, 2020). The top EU performers in the digitization of businesses as of 2019 were Ireland, Finland, Belgium, and the Netherlands. As indicated earlier, the COVID-19 pandemic has accelerated digital transformations and increased the uptake of e-commerce (UNCTAD, 2021). However, the extent to which the pandemic has impacted e-commerce in the EU remains unclear. Before the pandemic, digital divides existed between countries and enterprises in the EU (Hallward-Driemeier et al., 2020). Considering that e-commerce is also an essential component of the EU's Digital Single Market policy, this study seeks to quantify the impact of the COVID-19 on e-commerce in the EU and investigate whether the different member states of the EU were impacted differently?

Methodology

Data

The study used a quantitative design relying on secondary data. The focus of the study was on the current 27 EU member countries (Table 1). Article 2(1) of the European Business Statistics Regulation requires all EU member states to collect e-commerce data every year. This study, therefore, utilized annual data on the percentage of enterprises with e-commerce sales in EU member countries for the past ten years from 2019 to 2020. The data were obtained from the Eurostat database.

Table 1

List of European Countries Studied

Country Group	List of countries
EU14	Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, Netherlands, Portugal, Spain, Sweden
New EU Members	Bulgaria, Croatia, Cyprus, Czechia, Estonia, Hungary, Latvia, Lithuania, Malta, Poland, Romania, Slovakia, Slovenia
V4 Countries	Czechia, Hungary, Poland, Slovakia
East EU	Bulgaria, Czech Republic, Hungary, Poland, Romania, Slovakia
North EU	Denmark, Estonia, Finland, Ireland, Latvia, Lithuania, Sweden
South EU	Croatia, Cyprus, Greece, Italy, Malta, Portugal, Slovenia, Spain
West EU	Austria, France, Germany, Luxembourg, Netherlands, Belgium

Source: Authors' work

Statistical analysis

In this study, there was the need to understand the percentage of enterprises with e-commerce sales of EU countries before the COVID-19 pandemic and during the first year of the pandemic to determine if there had been any significant change. The study utilized descriptive statistics and a t-test to analyze the data. A Paired-samples t-test is a statistical technique used when there is a need to investigate scores for the same group at different periods. In addition to determining any significant change,

the t-test can also quantify the magnitude of the difference. The analysis was also disaggregated based on the various country groupings in the EU, such as the EU14, New EU members, Visegrad Four (V4) countries, Eastern EU countries, Western EU countries, Northern EU countries, and Southern EU countries as indicated in Table 1. For these analyses, Greece was not included due to unavailable data for 2020.

To determine the magnitude of the competitiveness gap between the country groups studied, the eta square (η^2) also referred to as the effect size for the paired samples t-test were computed using the formula below:

$$\eta^2 = \frac{t^2}{t^2 + (N-1)} \quad (1)$$

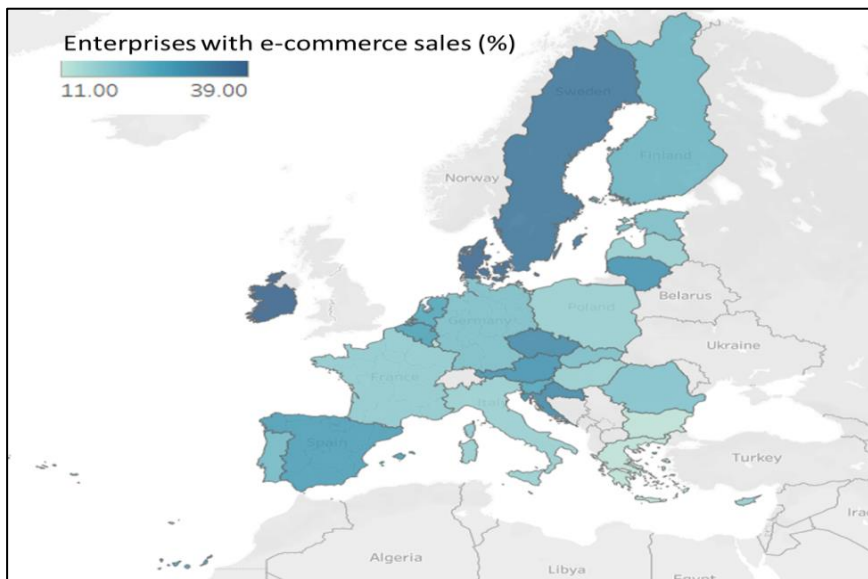
The t represents the t-statistic obtained from the t-test, and N represents the total number of countries analyzed. The guidelines for interpreting this value are as follows: 0.01=small effect; 0.06=moderate effect; and 0.14=large effect.

Results and Discussion

This section presents the results of the study and discusses their implications. The chapter first presents the distribution of enterprises with e-commerce sales in the EU. This is followed by trend analysis and how e-commerce sales in the EU were affected by the COVID-19 pandemic.

Figure 1

Distribution of enterprises with e-commerce sales in the European Union during COVID



Source: Author's construct based on data from Eurostat.

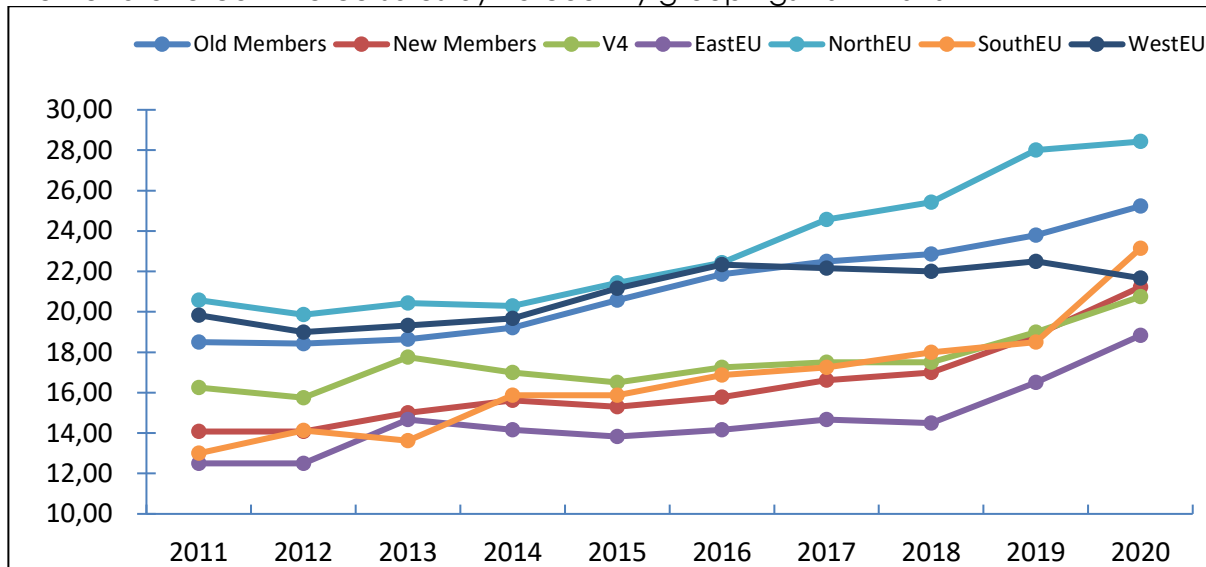
Firstly, the study sought to determine how the various countries fared with e-commerce sales during the first year of the pandemic. Descriptive analysis of the distribution of the percentage of enterprises with e-commerce sales for the EU27 during the first year of the COVID-19 pandemic revealed that the top 3 countries were all northern EU countries - Ireland (39%), Denmark (38%), and Sweden (35%) as indicated in Figure 1. These three countries are also members of the EU14.

A trend analysis of data on enterprises with e-commerce sales over the past ten years also indicates that, except for western EU member countries which

experienced a decline during the first year of the pandemic, in all the other groups, there was a year-on-year increase in the percentage of enterprises with e-commerce sales during the first year of the COVID-19 pandemic when compared with the previous year (Figure 2).

Figure 2

The trend of e-commerce sales by EU country groupings 2011-2020



Source: Author's calculations based on Eurostat data

Further analysis of the percentage of enterprises with e-commerce sales for the various groupings of EU member countries over the last decade indicates that Eastern EU countries lag behind other countries. At the same time, the northern EU member countries have been consistently ahead of the other EU member countries. This is an indication of a digital divide.

Table 2

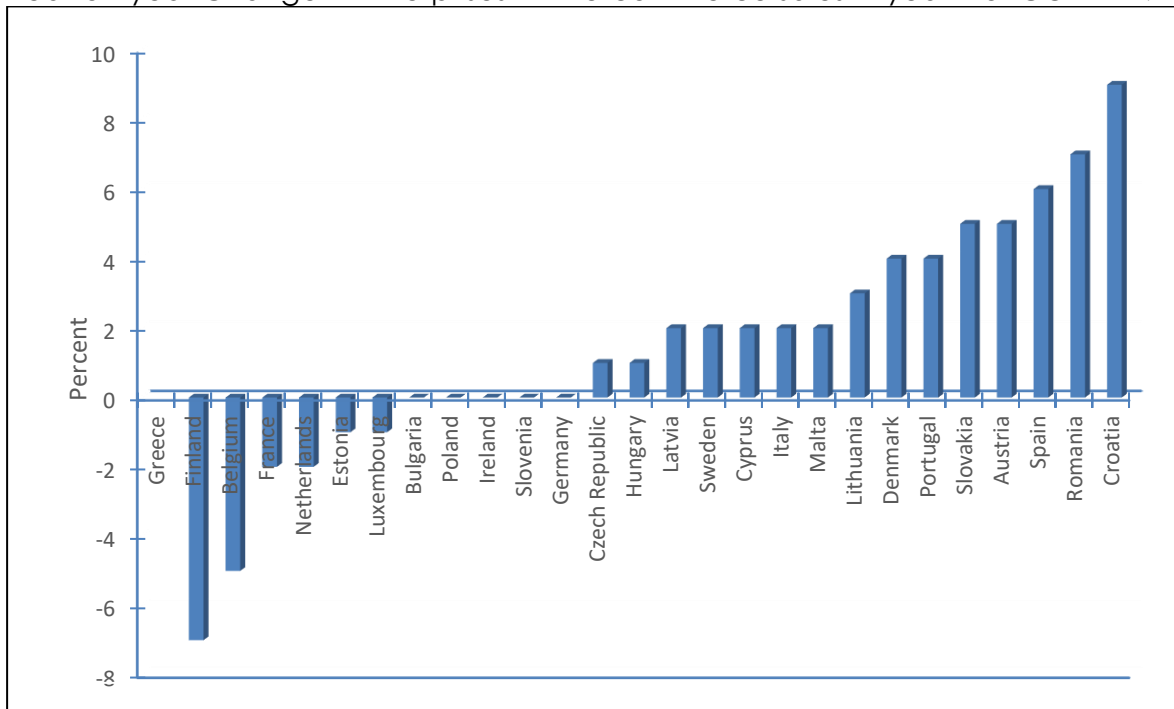
T-test results on the impact of COVID-19 on e-commerce in the EU

Pair	Difference	t	df	P-value	η^2
2019 - 2020	-1.42308	-2.06	25	0.05	0.15
Avg. last 5 yrs - 2020	-3.27692	-4.12	25	0.00	0.40

Source: Author's calculations

To determine if there was any significant change in e-commerce sales before and during the first year of the pandemic, a paired-samples t-test was used (Table 2). It was found that there was a significant increase in the percentage of enterprises with e-commerce sales for the EU member countries as a whole during the first year of the COVID-19 pandemic when compared to the previous year and also when compared with the average for the previous five years leading up to the pandemic. The computed η^2 value of 0.1 and 0.4 respectively means that the effect was significant. This finding suggests that more enterprises in the EU engaged in online transactions during the first year of the pandemic, confirming that many activities had to move online due to lockdown measures.

Figure 3
Year-on-year Change in Enterprises with e-commerce sales in year 1 of COVID-19



Source: Author's calculations based on Eurostat

As indicated in Figure 3, most EU member countries recorded an increase in the percentage of enterprises with e-commerce sales. Only six countries, namely Finland, Belgium, France, Netherlands, Estonia, and Luxembourg, recorded a decrease in the percentage of enterprises with e-commerce sales. In Bulgaria, Poland, Ireland, Slovenia, and Germany, there was no year-on-year change. In contrast, Croatia, Romania, Spain, Austria, and Slovakia were the countries that recorded the highest year-on-year increases during the first year of the pandemic.

Conclusion

The objective of this paper was to investigate the impact of COVID-19 on e-commerce in the EU and whether the impact on the different groups within the EU was different. Data for the past ten years were analyzed using trend analysis and paired samples t-test. The paired-samples t-test was used to compare the mean percentage of enterprises with e-commerce sales before the pandemic and the first year. The study finds a significant increase in the percentage of enterprises that made e-commerce sales during the first year of the COVID-19 pandemic compared to the previous year ($t=-2.06$; $df=25$) compared to the average for the five years before the pandemic ($t=-4.12$; $df=25$).

This finding is consistent with literature that suggests that the COVID-19 pandemic has accelerated the process of digital transformations and contributed to the increasing uptake of e-commerce.

Except for Western EU member countries, countries in all other regions of the EU had an increase in the percentage of enterprises that made e-commerce sales during the first year of the COVID-19 pandemic. This is surprising since the most recent B2C e-commerce index for 2020 suggests that countries in Western Europe are among those with the highest scores concerning the preparedness of their

economies for shopping online. Instead, the findings of this study indicate that the Southern EU countries recorded the highest average year-on-year increase.

It can be concluded from the findings of this study that the COVID-19 has had an effect on e-commerce sales in the EU; however, the impact was different for member states. Whereas most EU member countries recorded an increase, some also recorded a decrease in the percentage of enterprises with e-commerce sales. The trend over the past decade also shows a digital divide in the EU that some stakeholders have cautioned can be exacerbated by the pandemic. Considering that life online is gradually becoming a necessity, there is the need for stakeholders in the member states to collaborate and address the various constraints to effective participation in the digitalized economy if all countries, businesses, and individuals are to fully benefit from the opportunities provided by e-commerce as envisaged in the EU's Digital Single Market policy.

A limitation of cross-country analyses is the inability to account for endogeneity issues that pertain in member countries. Therefore, further studies could use in-depth country-level studies to understand the trends observed in various countries. Furthermore, since this study concentrated only on the first year of the pandemic, it would be interesting for future studies to investigate the long-term impacts.

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