



Implications of e-commerce for central banking: A review¹

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The article examines the potential implications of e-commerce for central banks in general and the National Bank of Slovakia in particular. Drawing on the current state of the art in economic literature and available data, both the current situation and future outlook are examined. The main conclusion of the article is that while the immediate impact of e-commerce is not to be overstated, there appears to be a substantial potential of implications relevant to price stability in the long run. The author therefore argues that it would be prudent for central banks to follow developments in e-commerce as well as collect data in this area and study online prices.

INTRODUCTION

Price stability lies at the heart of interests of central banks worldwide. Due to the way, official statistics obtain data on prices, monetary policy tends to reflect the levels of prices of goods sold in traditional, "brick and mortar" stores, but typically do not take e-commerce, hereby understood as trading of goods and services over the Internet either directly to customers or to other businesses/government, into account. The reason for this is that when calculating inflation statistics, the national statistical offices, including the Slovak one, tend to rely mainly on a large number of people visiting physical commerce locations around the country and taking notes of prices of a predefined basket of goods (Cavallo and Rigobon 2016). Only a few statistical offices, Norway is perhaps the most prominent example (Nygaard 2015), have placed special focus on incorporating online prices in the calculation of composite price indices. Such an approach is typically motivated by a relatively small volume of online shopping compared to the traditional retail (ibid).

The following text makes a case why e-commerce should get more attention from central banks in general and the National Bank of Slovakia (NBS) in particular and outlines some potential impacts of e-commerce on areas of interest to central banks. Specifically, the presented discussion draws on the basis of the existing state of the art in the literature to evaluate potential implications of e-commerce for flattening of the Phillips Curve as well as towards individualized price setting online. In the closing section of the article, some policy implications for the future activities of the NBS and central banks, in general, are inferred on the basis of the presented discussion.

SIZE OF THE E-COMMERCE

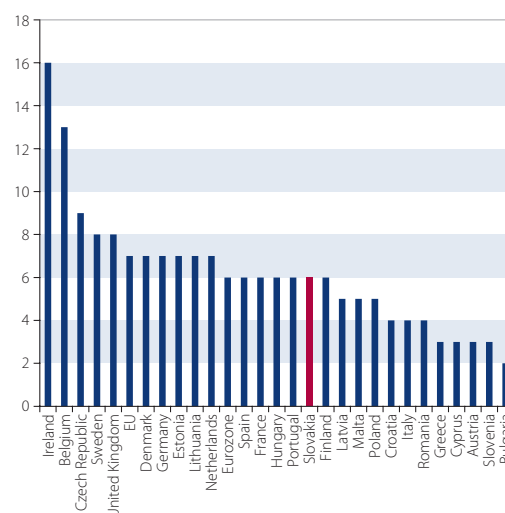
According to the most recent Eurostat data, e-commerce accounts for only about 6% of the total turnover of non-financial companies in Slovakia, which is a figure about equal to the Eurozone average and slightly lower than the EU average (Figure 1).

Nonetheless, there are already European countries where the share is much more substantial. The EU-wide leader of e-commerce utilization is Ireland with 16% share of total turnover, followed by Belgium with 13% (Figure 1). Such numbers are consistent with the equivalent share in the USA, which is around 10%, with above 50% share for several key categories of goods (Goolsbee and Klenow 2018). Interestingly, the country registering the third most widespread utilization of e-commerce is the Czech Republic with 9% share of e-commerce in the turnover of non-financial companies, which suggests that e-commerce can be quite relevant in the CEE region just as it is the case in the Western European countries.

The share of e-commerce is growing dynamically, having doubled or even tripled in several economies over the 2012-2017 period (Figure 2). Slovakia along with Portugal are two countries with the fastest rate of growth over the last five years, while the share of e-commerce has actually decreased over the period of time in Finland

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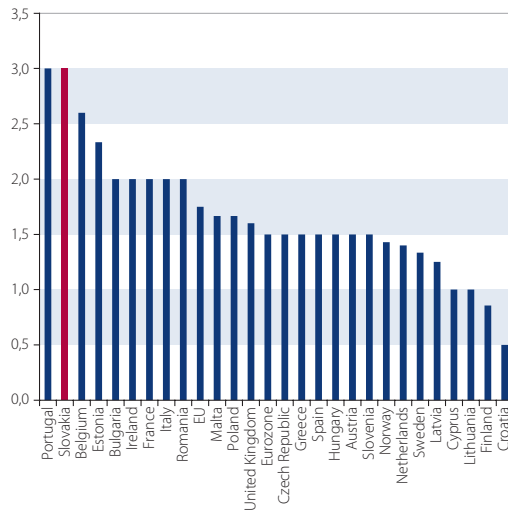
Figure 1 Share of non-financial companies turnover from web sales in 2017 (% total turnover)



Source: Eurostat.



Figure 2 Factor of growth of the share of non-finance companies' turnover from web sales 2012-2017



Source: Eurostat.
Note: A factor of 1 suggests the share remained unchanged.

and Croatia. Overall, e-commerce has grown by 75% in the EU and by 50% in the Eurozone. Once again, the presented numbers are comparable with the situation in the US, where the share of e-commerce has nearly tripled over the course of the last ten years (Goolsbee and Klenow 2018).

The dynamic growth of e-commerce in Slovakia makes it quite feasible to assume that the share of web sales will converge towards the levels we can observe in countries such as Ireland, Belgium and the Czech Republic. Taking into account the position of Slovakia as a relatively small market, where innovations are tested before being deployed elsewhere – as evidenced for instance by early introduction of contactless payments it should not be ruled out that Slovakia might, in fact, reach a high-

er level of share of e-commerce than the one currently observed in the most digitalized countries.

The fast growth of e-commerce importance in Slovakia will be likely further boosted by the global trend towards a continuous growth of e-commerce worldwide. Such growth can draw from the high-quality infrastructure on the ground – the fast internet connection being available to four out of five households in the EU, including in Slovakia (Figure 3). Perhaps more important is the growing share of "Digital Natives", the cohorts who grew up using computers and web for a variety of purposes and gradual retirement of "Digital Immigrant" cohorts, which were raised using traditional, "offline" approaches to doing things (Reid 2018). In consequence, the "Digital Natives" are more likely to participate in e-commerce, which is thus getting bigger through generational replacement. As displayed in Figure 4, already a majority of about 60% in both Slovakia and the entire EU out of Internet users purchases goods and services online. Meanwhile, the share of online customers rises up to 80% in countries such as the UK, Sweden or Denmark.

The rise of e-commerce will not necessarily be linear – the "dot-com" bubble experience warns us against such baseless "techno-optimism". Nonetheless, even if the "brick and mortar" shops retain their lion's share on purchases being made in Slovakia, it is rather likely that the share of e-commerce will keep on growing steadily and should be thus incorporated into our future thinking on price stability.

E-COMMERCE AND THE PHILLIPS CURVE

Having established the importance of considering the e-commerce in analyzing prices, now it is a time to discuss some potential implication of e-commerce on inflation.

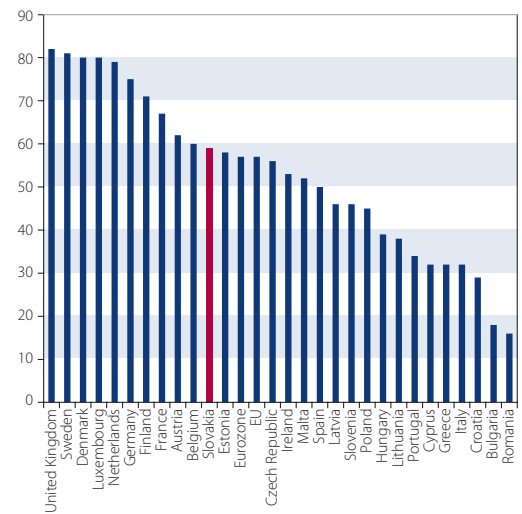
The relationship between inflation and the real economy is commonly modeled through the

Figure 3 Share of households with broadband access 2008-2017 (%)



Source: Eurostat.

Figure 4 Share of Internet users who have made an online purchase over the last 12 months in 2017 (%)



Source: Eurostat.



Figure 5 Channels of digitalization impact on inflation



Source: Own visualization based on a scheme by Riksbank (2015).

Phillips curve, a simple, single-equation empirical model developed in the late 1950s by a New Zealand born economist William Phillips and popularized by Milton Friedman in the 1960s (Phillips 1958; Friedman 1968). The Phillips curve posits that there is, at least in the short run, an inverse relationship between inflation and unemployment. The intuition behind this relationship is that low unemployment causes an upwards pressure on wages driving a growth in inflation.

Since the 1970s onward, the nature and characteristics of a Phillips curve relationship between the key macroeconomic variables is a subject of a passionate debate among economists (Gordon 2010). While the debate is far from over, there is a growing realization that a small output gap (and high employment level) can co-exist with low inflation (Ódor and Jurášeková Kucserová 2014; Borio 2014). A number of explanations of the "inflation puzzle" has appeared, including falling commodity prices, liberalization of international trade, financialization of economies and digitalization (Charbonneau et al. 2017).

According to the literature, digitalization can affect inflation through three channels: (i) decrease of prices of ICT-related goods and services, (ii) changing the market structure and level of competition in certain sectors and (iii) affecting productivity and labour requirements (Charbonneau et al. 2017). With regards to e-commerce, the second channel is relevant.

The rise of e-commerce creates a pressure to lower inflation directly and indirectly (see Figure 5). The indirect effect is due to decrease of search costs for customers (it is much less costly to compare prices of several online sellers than physically visiting several shops), leading to lower information imbalances and thus potentially more optimal customer behavior. The direct effect alludes to the increased competition between sellers for premium spots on major e-commerce platforms. This so-called "Amazon effect" has come about due to the absence of physical barriers to accessing the platform (everybody can access Amazon/eBay/Alibaba website) making the sellers compete not just with competitors located in their immediate geographical proximity, but rather strive to obtain and retain prominent position on platforms vis-à-vis the efforts of many other global competitors (Dinerstein et al. 2018).

Additionally, these e-commerce giants are able to generate significant cost savings for the customers through a combination of such factors as optimized global supply chains, large economies of scale and efficient logistics.

The strong concentration could, in line with economic theory, result in platforms engaging in rent-seeking practices and driving the prices higher. Nonetheless, due to the easy replicability of the business model of such giant online retailers, they appear keen on maintaining their low price competitive advantage (Charbonneau et al. 2017). In consequence, there are potentially spillover effects in countries, where the giants are not strongly present, such as in Slovakia and surrounding countries, where local marketplaces (for instance Alza or Mall in the case of Slovakia) have mushroomed replicating to a maximum possible extent the business model of the global giants. These local e-commerce companies wary of the future entry of the giants and thus have an incentive to keep the prices as low as possible.

Finally, the "Amazon effect" might also push down prices in "brick and mortar" stores due to the need to compete with online alternatives. Interestingly, a recent empirical study has found that in a range of most advanced countries there is little difference between online and offline prices (Cavallo 2017). In consequence, we can likely expect that the progress of e-commerce will push inflation downwards and lead to a flatter Phillips curve relationship in the future.

An uncertainty about the future importance of e-commerce translates into uncertainty over its inflation implications. The existing body of empirical evidence suggests that so far the effect of e-commerce on inflation is limited at best (Charbonneau et al. 2017), suggesting that while e-commerce definitely has a transformative potential on the Phillips curve, the immediate effects are not to be overestimated.

PRICE DISCRIMINATION IN E-COMMERCE

In addition to the macroeconomic impacts of e-commerce, there might be a structural effect in the form of an increase in price discrimination.

In general, economic literature is not particularly worried about this topic. The "law of one price" suggests that in the absence of trade frictions and barriers, any single good shall be traded at the



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Figure 6 Variants of price discrimination



Source: Own visualization based on Heidhues and Kőszegi (2017).

same price. The reason is that differences in pricing create space for arbitrage, that is the goods start flowing from a place where they are cheap to places where they are expensive until an equilibrium is reached (Isard 1977). On the basis of this theoretical assumption, the e-commerce has a potential to lower the friction and contribute to a convergence of prices on a universally low level. One reason for that is that "menu costs" – the costs associated with changing prices are naturally much lower online, where there is no need to print new price labels and where information about prices of competitors is relatively readily available (Smith et al. 2000).

From the perspective of behavioral economics, however, the ability to understand preferences and behavior of customers through "big data" within e-commerce makes e-commerce platforms capable of treating different customers in a different way (see the scheme in Figure 6). This is particularly the case in case of goods that are not subject of arbitrage, such as some digital goods or services (for instance flight tickets that cannot be transferred to another passenger). High-quality information about preferences of customers enables what the literature calls first-degree discrimination that is tailoring prices for individual customers (Heidhues and Kőszegi 2017). Consequentially, customers who are very sensitive to prices will end up paying less at the expense of those customers, who are less invested in getting the best deal. Such realignment would certainly have consequences for welfare, although from the perspective of central banks, it appears of limited relevance.

In addition to preferences, however, the e-commerce platforms can also collect information about "naiveté" of their customers. In other words, they might be interested to know to what extent are individual customers prone to fall for non-transparent pricing schemes, such as bun-

dling of different items, which might on a surface, appear advantageous for the customers but in reality make customers pay more than ideal (Heidhues and Kőszegi 2017). While such practices are well-known from the "offline world", the ability of e-commerce platforms to collect large volumes of behavioral data about their customers makes them particularly relevant for the age of online shopping. Large-scale, increasingly effective of exploitation of customers' naiveté can potentially have implications for price stability. Furthermore, also relevant from the perspective of central banks, it might have future implications for customer protection if such practices become more widespread in the financial sector.

CONCLUSION

The e-commerce sector might be still relatively unimportant vis-à-vis traditional retail, nonetheless, it is likely to grow in importance both in Slovakia and in the EU in general. This process is likely to change the environment in which central banks are operating. It is, therefore, advisable to follow the developments in e-commerce carefully, work towards obtaining internet-based price data and incorporate the impacts of e-commerce among research priorities.

The priorities outlined above broadly apply to NBS too. Of particular interest, here is the dimension of naiveté-based discrimination. As argued by Cupák et al. (2018), it appears that countries in Eastern Europe suffer from lower financial literacy of their citizens due to the legacy of a transformation of education system reflecting state-run planned economy to a free-market economy. Consequentially, Slovak customers of online services might be more likely targeted by non-transparent pricing schemes, which is of particular concern in the financial sector due to the NBS role as the oversight body of the sector.