Analysis on the effect of e-commerce increase on inflation

Abstract. The paper examines the effect of e-commerce increase on inflation in Russia. The paper provides an analysis of theoretically substantiated mechanisms of the influence and finds out predominantly downward pressure of e-commerce development on prices. To test this hypothesis and measure the impact of e-commerce spread on prices in Russian regions, the paper uses panel data. The result indicates that factor of e-commerce development in Russia currently doesn't have a statistically significant effect on prices in the regions. However, the study remains promising, and the impact may become clearer when official statistics reflect the leap in e-commerce development during the years of coronavirus restrictions.

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In recent times there is a rapid development of goods and services e-commerce in Russia and around the world. E-commerce reached 3.2 trillion rubles in 2020 (versus 2.1 trillion rubles in 2019) and 3.9% of total retail turnover (versus 2% a year earlier) (Akit, 2020). The potential of further expansion is not exhausted: in 2020, 80% of Russian population has access to the Internet, but only 40% of population uses Internet to order goods and services (Fedstat, 2021).

The rapid spread of e-commerce actualizes the problem of its influence on inflation. A literature review shows that the main sources of the influence of e-commerce on inflation and prices are changes in total factor productivity; international trade volume; firms' monopoly power; consumers' search frictions; amount of the exchange rate pass-through effect. Theoretically substantiated mechanisms of these influence are presented in Table 1. Most of the mechanisms are in favor of the downward pressure of e-commerce development on prices, although upward pressure can't also be excluded.

Table 1 – Theoretically substantiated mechanisms of the influence of e-commerce increase on inflation

Source of influence	Mechanism of influence	Authors
Factor productivity	Factor productivity increases → production costs decrease → downward pressure on prices	(Riksbank, 2015)
	Costs of factors of production (capital, labor) decrease → production costs decrease → downward pressure on prices	(Autor & Dorn, 2013), (Csonto, et al., 2019)
International trade volume	Cross-border trade barriers decrease → price arbitration → prices decrease in exporting country and increase in importing country	(Jo, et al., 2019), (Jensen, 2007)
	Transport cost of international trade decreases → prices decrease	(He, et al., 2011), (Krugman, 1991)
Monopoly power of firms	Variety of goods increases → elasticity of demand decreases → market competitiveness increases, firms' markup decreases → prices decrease	(Csonto, et al., 2019), (Dinerstein, et al., 2018)
	Appearance of large e-commerce firms → benefits of the economy on scale and network effect → prices decrease	(Charbonneau, et al., 2017)
Search frictions	Consumers' search frictions decrease, consumers' market power increases → prices decrease	(Dinerstein, et al., 2018)
	Maintenance of search frictions, firms' incentives to supply differentiation and obfuscation → maintenance of price dispersion	(Glenn & Wolitzky, 2012)
Exchange rate pass-through	Significantly higher exchange rate pass-through effect of goods trades online → upward pressure on prices (given the asymmetry of the pass-through)	(Gorodnichenko, 2018)

Source: compiled by the authors.

Review of relevant empirical approaches reveals the problem of the lack of sufficient amount of comparable data of e-commerce, as well as the lack of assessment methodology. A lot of studies are based on working with panel data and fixed effects models: (Calson-Öhman, 2018), (Kulakov & Vinogradov, 2020), (Yi & Choi, 2005) etc.

A similar approach is used by the authors to measure the impact of e-commerce development on inflation in Russian regions in 2014-2019. The empirical strategy is based on the approaches outlined in (Perevyshin, et al., 2017), (Sinelnikov-Murylev, et al., 2020). The first pool of estimated regressions is represented by equation (1), the second – by equation (2):

$$Infl_{it} = \gamma_i + \beta_1 External_t + \beta_2 Ecommerce_{it} + \beta_3 RegDebtGRP_{it} + \\ + \beta_4 Policy_{it} + \varepsilon_{it} \tag{1}$$

$$InflDev_{it} = \gamma_i + \beta_1 Wages_{it} + \beta_2 Ecommerce_{it} + \beta_3 RegDebtGRP_{it} + \\ + \beta_4 Policy_{it} + \beta_5 ImportGRP_{it} + \beta_6 Product_{it-1} + \beta_7 RegExpGRP_{it} + \varepsilon_{it} \tag{2}$$

Explanation of regressors in equations (1) and (2) is presented in Table 2.

Table 2 – Variables of estimated models

Name	Variable
Dependent variable:	
$Infl$	Regional CPI, % y/y
$InflDev$	Deviation of regional CPI from official CPI, % y/y
Variable of interest:	
$Ecommerce$	Share of e-commerce sales in total retail turnover, %
External sector variables ($External$):	
$Brent$	Brent oil price change, % y/y
$Dollar$	RUB/USD exchange rate change, % y/y
$BinCurr$	Dual-currency basket value change, % y/y
Economic activity variables ($Economy$):	
$GRPgrowth$	Gross regional product growth rate, % y/y
$Unemp$	Unemployment rate, % y/y
Other control variables:	
$Wages$	Wages in regions growth rate, %
$RegExpGRP$	Share of regional expenses in gross regional product, %
$ImportGrp$	Share of import in gross regional product, %
$RegDebtGRP$	Share of government debt in gross regional product, %
$Product$	Cost of a fixed set of consumer goods, rubles

Source: compiled by the authors.

The result of models (1) and (2) estimation is summarized in Table 3.

Table 3 – Estimation of influence of e-commerce increase on Russian regions inflation

Dependent variable: $Infl_{it}$ (pooled OLS)				Dependent variable: $InflDev_{it}$ (fixed effects model)			
Variable	Model №1	Model №2	Model №3	Variable	Model №1	Model №2	Model №3
$BinCurr$	0.107*** (0.005)			$GRPgrowth$		–	0.012 (0.013)
$Brent$		-0.080*** (0.003)		$Unemp$	-0.002 (0.092)	-0.771 (0.510)	
$Dollar$			0.099*** (0.004)	$RegDebtGRP$	-0.033 (0.080)	-0.396 (0.295)	
$Ecommerce$	-0.003 (0.002)	-0.003 (0.002)	-0.002 (0.002)	$Ecommerce$	-0.068 (0.049)	0.007 (0.095)	-0.071* (0.040)
$RegDebtGRP$	0.001** (0.0004)	0.001** (0.0004)	0.001** (0.0004)	$Wages$	0.013 (0.026)	-0.135 (0.112)	-0.002 (0.024)
$GRPgrowth$				$ImportGRP$	0.001 (0.0005)	-0.0001 (0.001)	-0.003 (0.017)
$Unemp$	-0.0001 (0.0005)	-0.0001 (0.001)	-0.0001 (0.0005)	$Product$	0.0000 (0.00004)		0.0001 (0.0001)
Constant	0.054*** (0.006)	0.068*** (0.006)	0.052*** (0.005)	$RegExpGRP$	-0.023 (0.050)	0.191 (0.121)	0.033 (0.078)

Source: authors calculations.

Obtained results indicate rather the insignificance of the influence of e-commerce on regional CPI in the period up to 2020, regardless of the specifications of the models. The authors believe that this result is conditioned by a still small share of e-commerce in Russian regions, despite the great potential for its further spread.