

Technical efficiency in the Russian textile industry: the role of digital platforms

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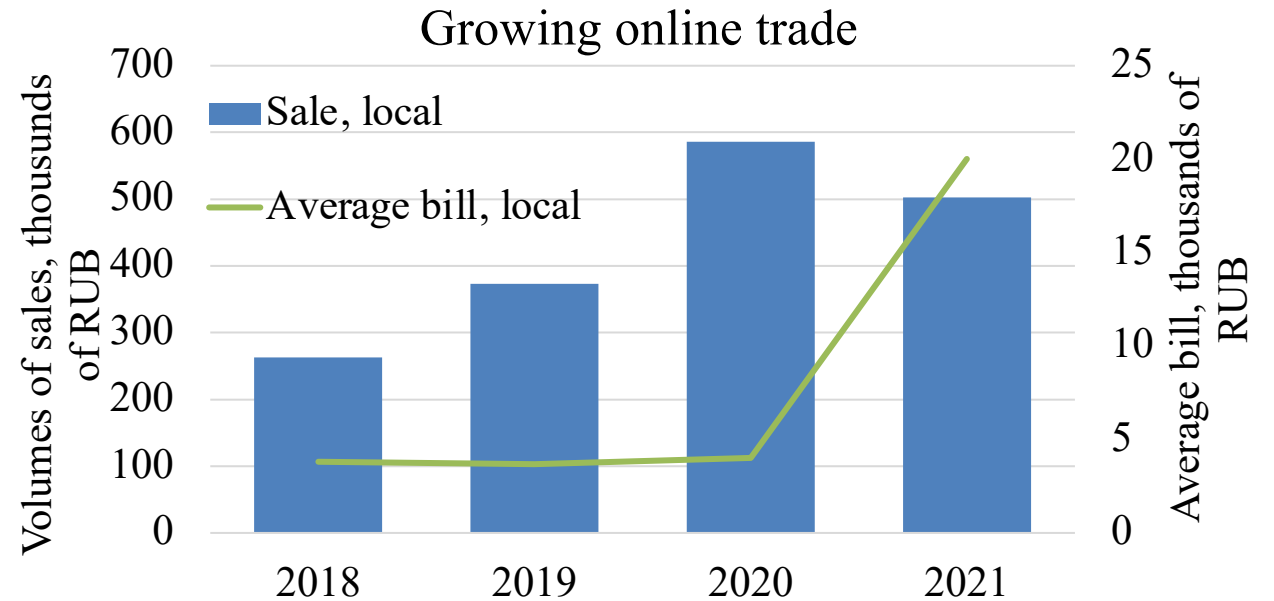
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Motivation

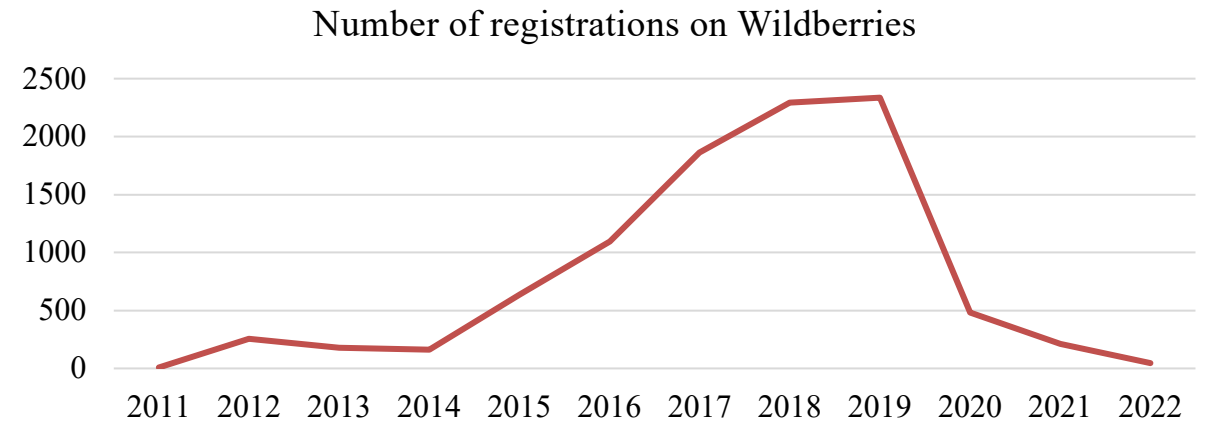
Rapid growth of online trade

Platforms constantly develop and penetrate many industries

Platforms influence firms in the downstream market



Source: Association of Internet Trade Companies, clothes and shoes



Source: Wildberries parsed data

Platforms' influence on incumbents and entrants is unambiguous

1. Positive influence: create investment incentives for incumbent companies
 - Reallocate labour towards more efficient firms, stimulate productivity growth in the industry and exit of less efficient firms (Rivares et al., 2019)
 - Decrease in information asymmetry (Liu, Brynjolfsson and Dowlatabadi, 2018; Aguiar and Waldfogel, 2018), enhance quality of products distributed via platforms.
 - Decreasing costs of incumbents: centralized delivery, inventory management and booking systems, promoting and other services.
2. Negative influence:
 - Reduce entry costs for less productive firms and thus decrease average quality of goods and services in the industry (Schwellnus et al., 2019).
 - Disruptor platforms may decrease the survival rates of incumbent firms especially of small firms (Andronova, Rey, Akzhigitova, 2021).
 - Dominant platforms are associated with lower productivity (Rivares et al., 2019).

Empirical strategy

Stochastic frontier model with time-variable inefficiency (Greene, 2005; Wang, Ho, 2010)

– resistant to the incidental parameters problem (Neyman, Scott, 1948)

$$y_{it} = \alpha_i + x_{it}\beta + \varepsilon_{it}, \quad (1)$$

$$\varepsilon_{it} = \vartheta_{it} - u_{it}, \quad \begin{array}{l} \text{stochastic variable} \\ \text{measuring inefficiency} \end{array} \quad (2)$$

$$\vartheta_{it} \sim N(0, \sigma_{\vartheta}^2), \quad (3)$$

$$u_{it} = h_{it} * u_i^*, \quad (4)$$

$$h_{it} = f(z_{it}\delta), \quad \begin{array}{l} \text{non-stochastic} \\ \text{inefficiency determinants} \end{array} \quad (5)$$

$$u_i^* \sim N^+(\mu, \sigma_u^2), \quad i = 1, \dots, N, \quad t = 1, \dots, T \quad (6)$$

Data

Source	Variables	Description
Spark Interfax	ln_revenue	Log revenue (thousands of RUB)
	Ln_capital	Log fixed assets (thousands of RUB)
	Ln_labour	Number of workers
	Ln_materials	Log current assets (thousands of RUB)
Association of Internet Trade Companies, clothes and shoes	locsale_w_1	Log of local yearly internet trade turnover by product categories (clothes and shoes) and region, mln RUB
	locbill_w_1	Log of local average bill of goods bought via internet by product categories (clothes and shoes) and region, RUB
Wildberries (parsed from the platform website) for 2018 – 2020	wildberries	Presence of a firm on a platform, binary

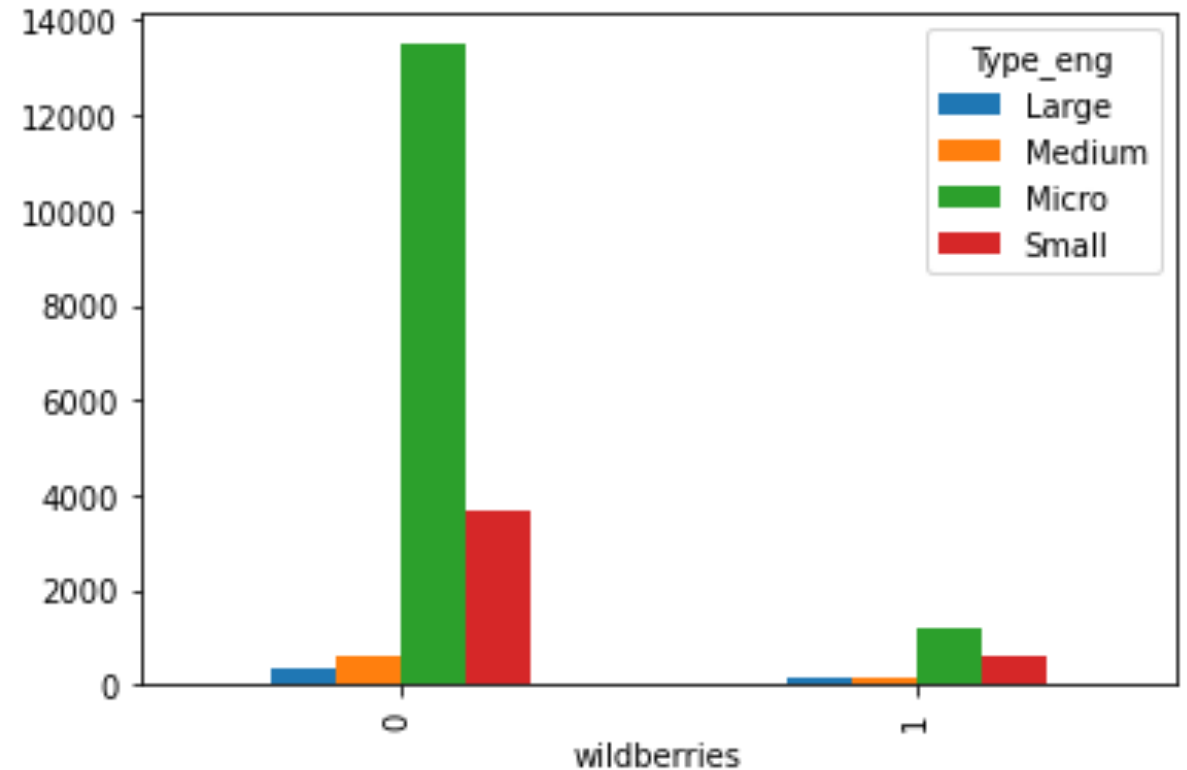
Working with the data

Industries:

- Textiles
- Manufacture of wearing apparel, dressing and dyeing of fur
- Leather, leather products and footwear
- Retail trade

Regions:

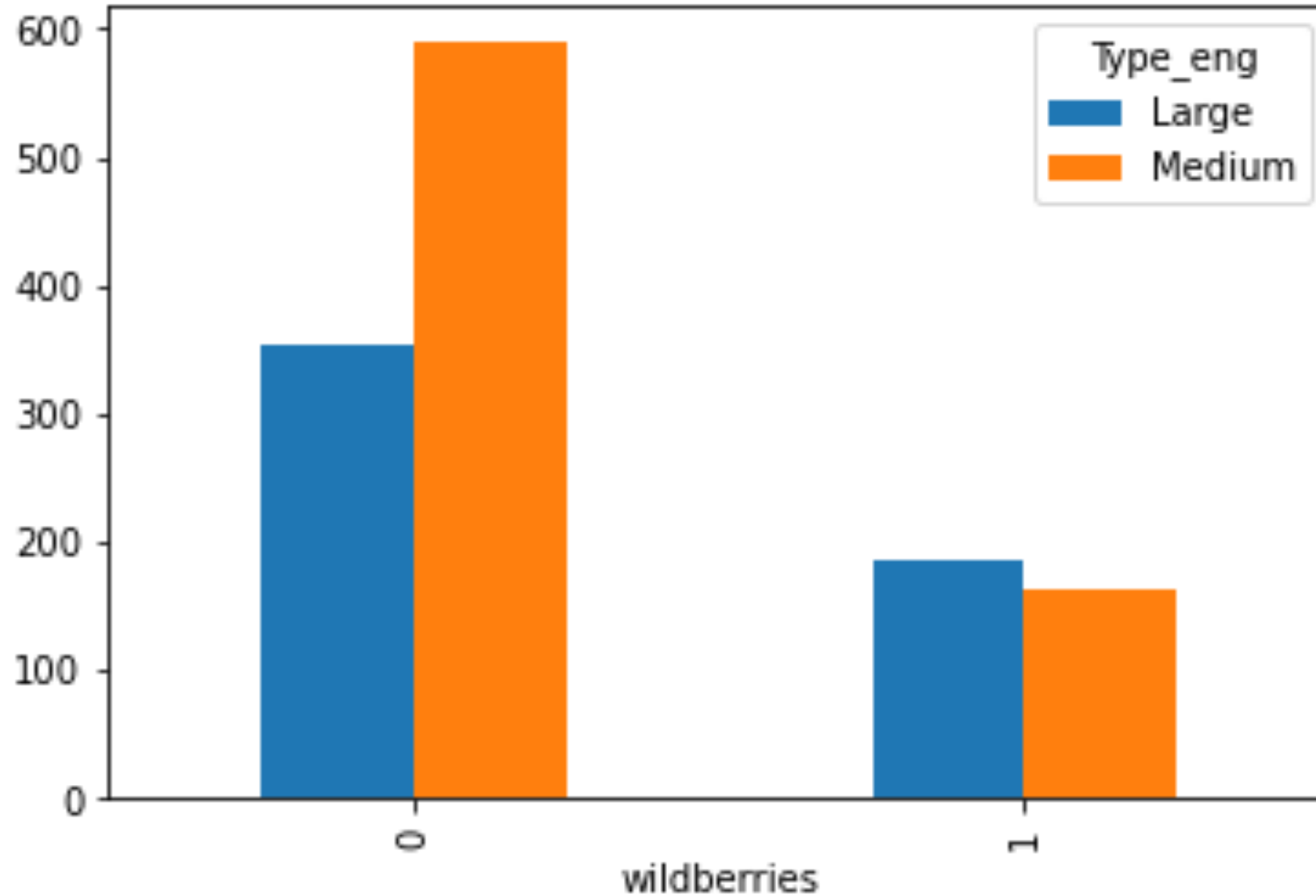
- All, except Moscow, Saint Petersburg, Sevastopol and Krym



N = 323 (large and medium)

T = 4

Descriptive statistics - 1



Descriptive statistics - 2

Variable	Obs	Mean	Std. Dev.	Min	Max
Ln capital	1292	17.319	2.391	9.547	22.426
Ln labour	1292	4.917	1.444	0	8.442
Ln materials	1292	20.419	1.047	15.411	23.839
TR log	1292	21.114	.954	15.113	23.971
locsale w	1292	10.112	1.533	6.113	11.839
locbill w 1	1292	8.73	.775	7.236	10.285

Results

VARIABLES	(1) frontier	(2) h1eq	(3) vsigmas	(4) usigmas
locsale_w		-0.324*** (0.000)		
locbill_w		-0.577*** (0.008)		
wildberries		-1.462*** (0.001)		
year2019		-0.281*** (0.001)		
year2020		-0.351** (0.027)		
year2021		0.407 (0.399)		
Ln_capital	-0.007 (0.551)			
Ln_labour	0.320*** (0.000)			
Ln_materials	0.455*** (0.000)			
Constant			-2.922*** (0.000)	15.123*** (0.000)

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Drawbacks and future plans

1. Do not know the exact effect of platform => matching
2. Effects on large and medium enterprises does not depict an overall effect of Wildberries => use the whole dataset with firm type dummies or matching
3. Biased estimated: we use balanced panel and do not account for entry and exit decisions => SFA with unbalanced panels and try (Olley & Pakes, 1996) and others

Conclusions

- Online platforms are an important contributor to firm efficiency in the textile industry along with the internet trade volumes and average bill in that region
- We observe a tendency of continuously increasing efficiency during 2018-2020 with a slight decrease in 2021

For a discussion

Are there any methods of SFA that account for entry and exit?
Additional variable?

Literature

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