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FIRMS' EFFICIENCY, EXITS AND GOVERNMENT PROCUREMENT CONTRACTS

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Motivation

Recent cross-country studies based on firm level data attribute the productivity growth slowdown to the ***increasing gap in productivity*** levels between the most and least efficient firms within the same industries rather than to a decline in the rate of technological progress.

Two questions:

1. Why has technological diffusion from leading companies to the less efficient ones slowed down and why has it become more difficult for the less efficient firms to replicate best practices?
2. Why ***do inefficient firms not exit the market***, continuing to use scarce production factors in their operations?

This study concentrates on the analysis of firm dynamics in the Russian economy and the factors enabling inefficient firms to stay in the market.

I regard the ***public procurement system as a possible source of supporting inefficient companies*** in various industries.

Government procurement contracts are widely used to support domestic firms via increasing demand.

In Russia, government purchasing contracts accounted for 21% of GDP in 2018, with a significant share of firms involved in public procurement. Thus, government financial support through public procurement is quite substantial and could have a considerable impact on the Russian economy.

Related literature

Two strands of literature on recent productivity growth trends and on public procurement as an instrument of industrial policy.

1. Recent productivity growth trends. A number of studies provide evidence of an increasing productivity gap among firms within industries, provoking a discussion about whether this has an effect on firms' entry and exit rates and slows aggregate GDP growth.

   Andrews, Criscuolo and Gal (2016) looking at the TFP trends within an economy, finds that the mechanism of the diffusion of leading technologies from leaders to laggard firms has changed, while the productivity gap between these groups has been widening since 2000 in OECD countries.

2. The second line of the recent literature focuses on the efficiency of support for various types of firms via industrial policy or the public procurement system and its effect on firm dynamics.

   Acemoglu, Akcigit, Alp, Bloom and Kerr (2018): an optimal industrial policy should be designed in such a way as to allow resources from the low-type firms move freely to the innovation activity of high-type firms, and this can be brought about by motivating low-productivity firms to exit the market.

   Aghion, Cai, Dewatripont, Du, Harrison and Legros (2015): demonstrate that sectoral government support promotes productivity growth more effectively where it focuses on more competitive sectors, and especially when it is not confined to just one or a handful of firms within the sector.

   Andrews, Criscuolo and Gal (2016): the increase in productivity gap was larger in sectors where market reforms fostering competition were less comprehensive.

   Thus, current research in this area shows that industrial policy should be targeted in such a way as to support the most efficient players.

Main findings

- Productivity growth trends in Russia are similar to those in other countries where technology leaders enjoy productivity growth with a gap increasing between them and other companies.
- The most efficient firms quit the market at a faster rate than firms in other efficiency groups in the Russian economy.
- Survival functions of the least efficient firm do not always differ significantly from those of other companies.
- Financing from government procurement contracts helps both the most and the least efficient firms to survive and shelters them from competitive pressure.
- In the short run, the positive effect of winning government procurement contracts for leaders seems in to be only observed in their home regions, providing indirect evidence that the public procurement system does not support all types of firms with growth potential but only those affiliated with local authorities.

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1

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DATA

Data

Firm level data

- RUSLANA dataset
- Russian firms' balance sheets from 2008 to 2015.
- The sample includes data on the non-farm non-financial sectors

Data on entry and exit

- SPARK dataset
- Information on the date of firm incorporation (entry) and liquidation (exit)

Government procurement contracts

- SPARK dataset
- Data on the auction winner, contract sum, date of the contract, region of the contract supplier

The final sample ranges from 127,570 firms in 2008 to 187,960 in 2015 and fairly accurately represents the industrial structure

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2

EMPIRICAL STRATEGY

Stochastic Frontier Analysis (SFA)

$$Y = F(L, K, t) \cdot e^{-u(t)}$$

standard production function

inefficiency

Not all the firms succeed in organizing their production in an efficient way, and some of them could operate below the production possibility frontier determined by the most efficient firms

Simultaneously, productivity growth rates and the distance to the technological frontier are estimated for individual firms

TFP Growth Decomposition

Kumbhakar and Lovell (2003)

$$TFP\ Growth = \Delta TP + \Delta TE + RTS$$

$$\Delta TP = \frac{\partial \ln F(K, L, t)}{\partial t}$$

technological progress
(shift of the production frontier between two periods)

$$\Delta TE = -\frac{\partial u_{it}}{\partial t}$$

change in technological inefficiency
(change in the distance to the frontier which is moving itself)

$$RTS = (\varepsilon - 1)\left(\frac{\eta_K}{\varepsilon}\frac{\Delta K}{K} + \frac{\eta_L}{\varepsilon}\frac{\Delta L}{L}\right)$$

return to scale term

$\epsilon = \eta_K + \eta_L$ – return to scale

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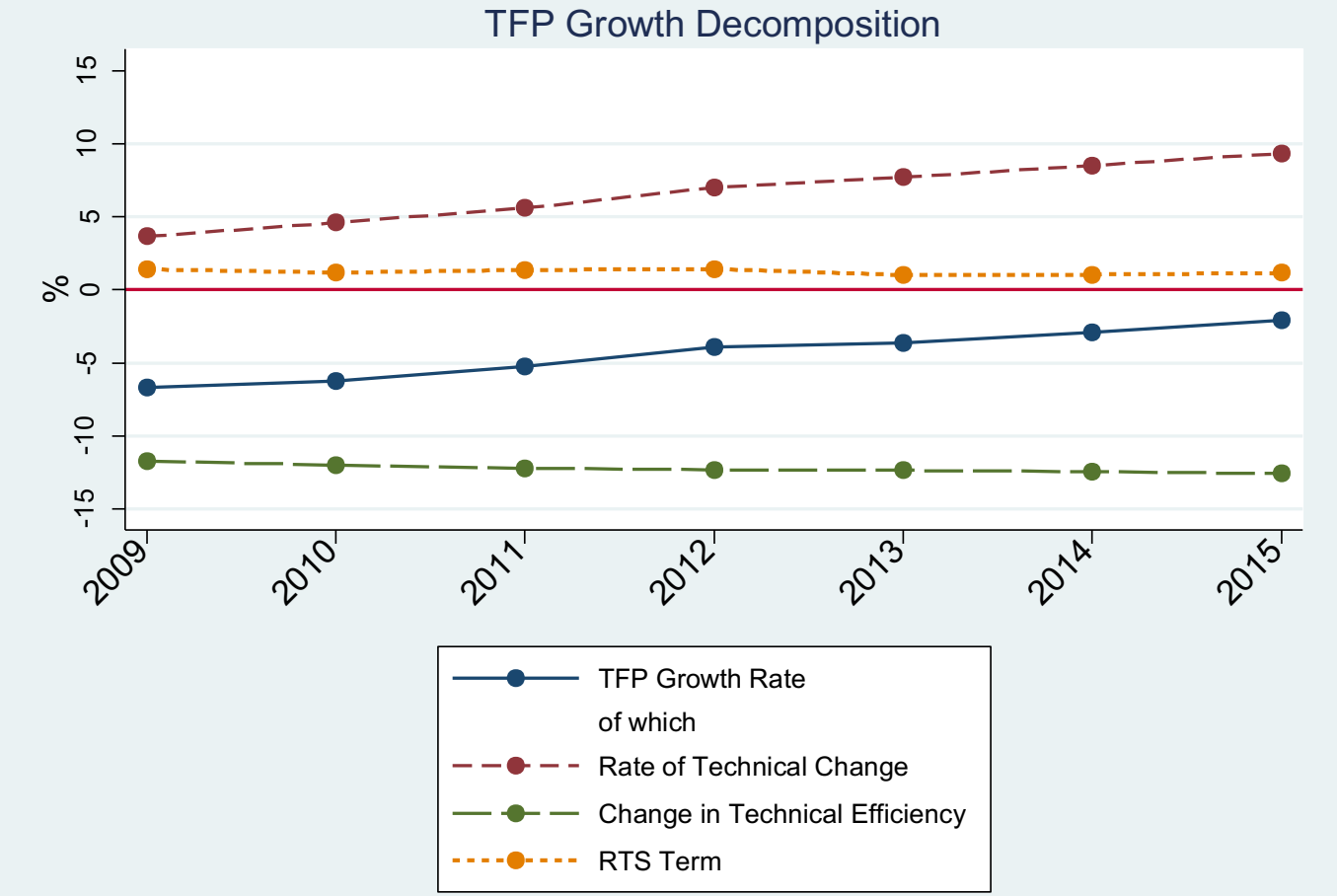
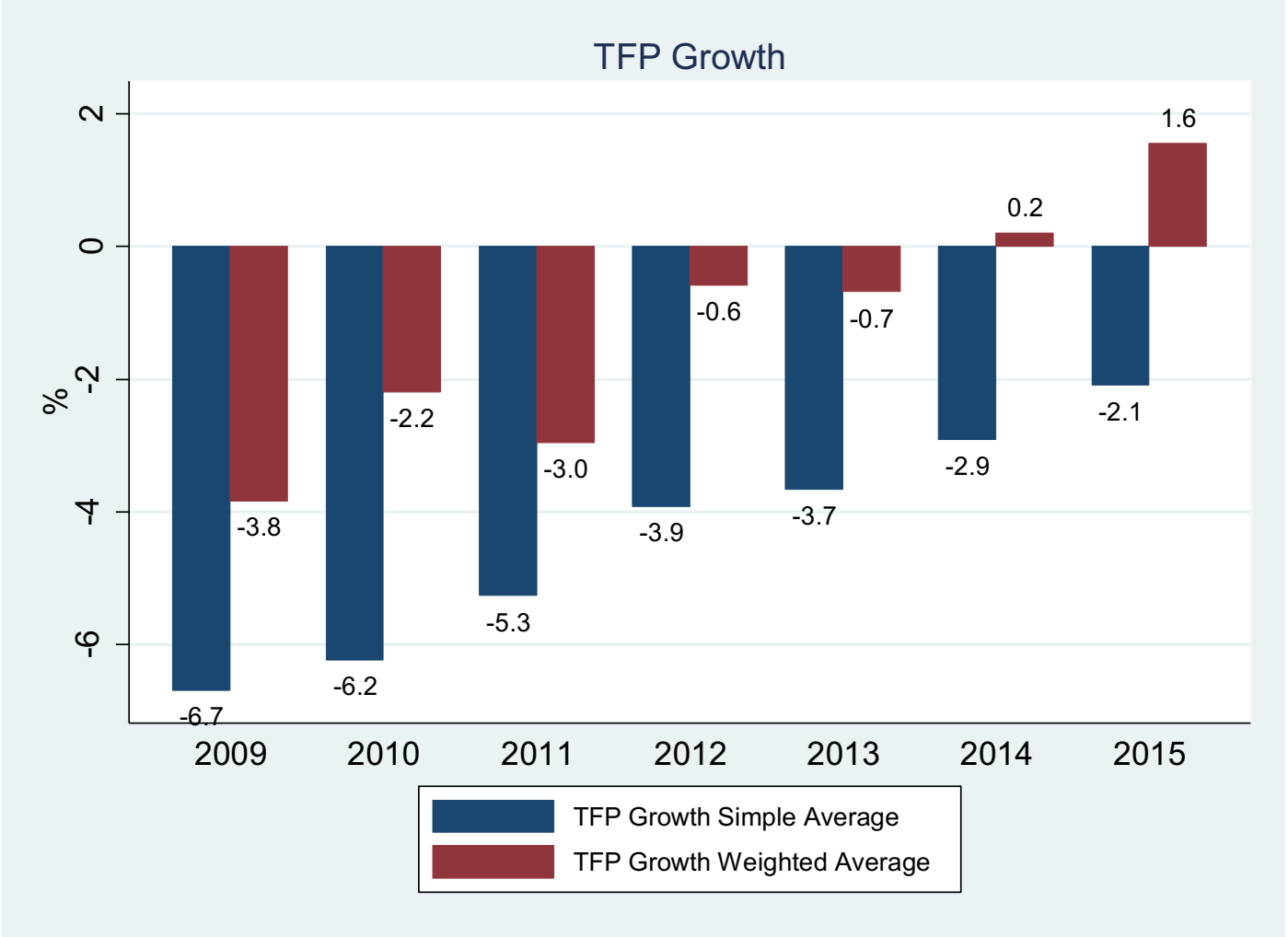
PRODUCTIVITY TRENDS IN 2009-2015

Average TFP growth and its decomposition



TFP growth trends



TFP growth in efficiency groups

Efficiency level – distance to the frontier (TE)

Efficiency groups

- **Leaders**

  top 10% of firms with the highest technological efficiency (closest to the frontier in the industry)

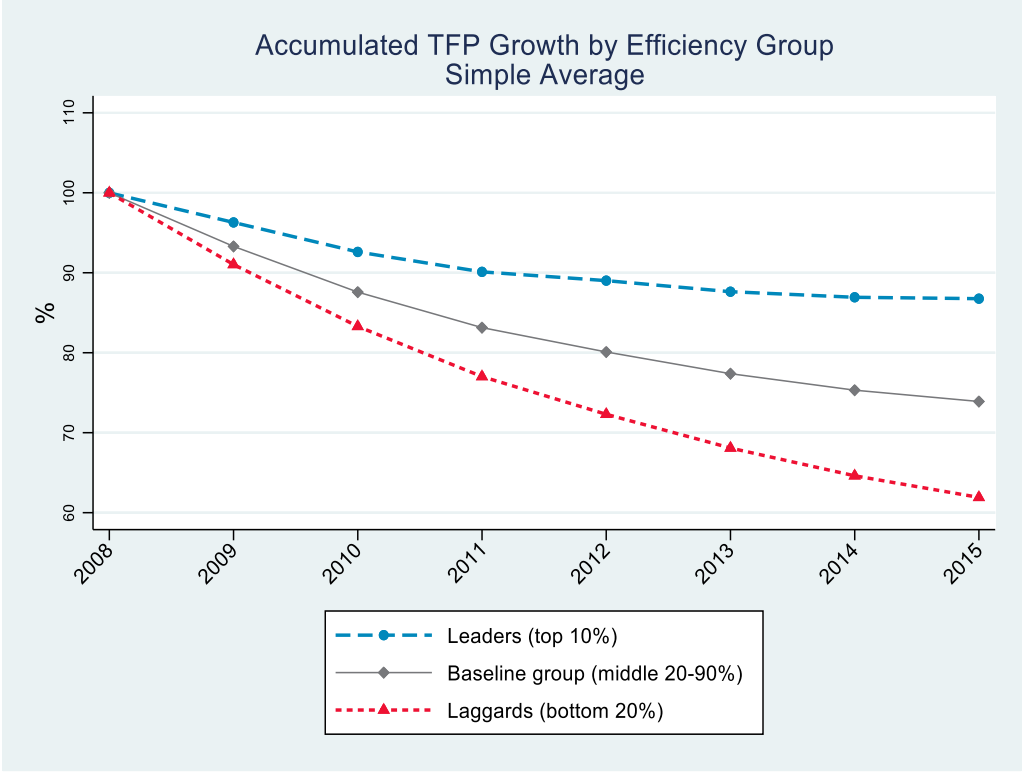
- **Baseline group**

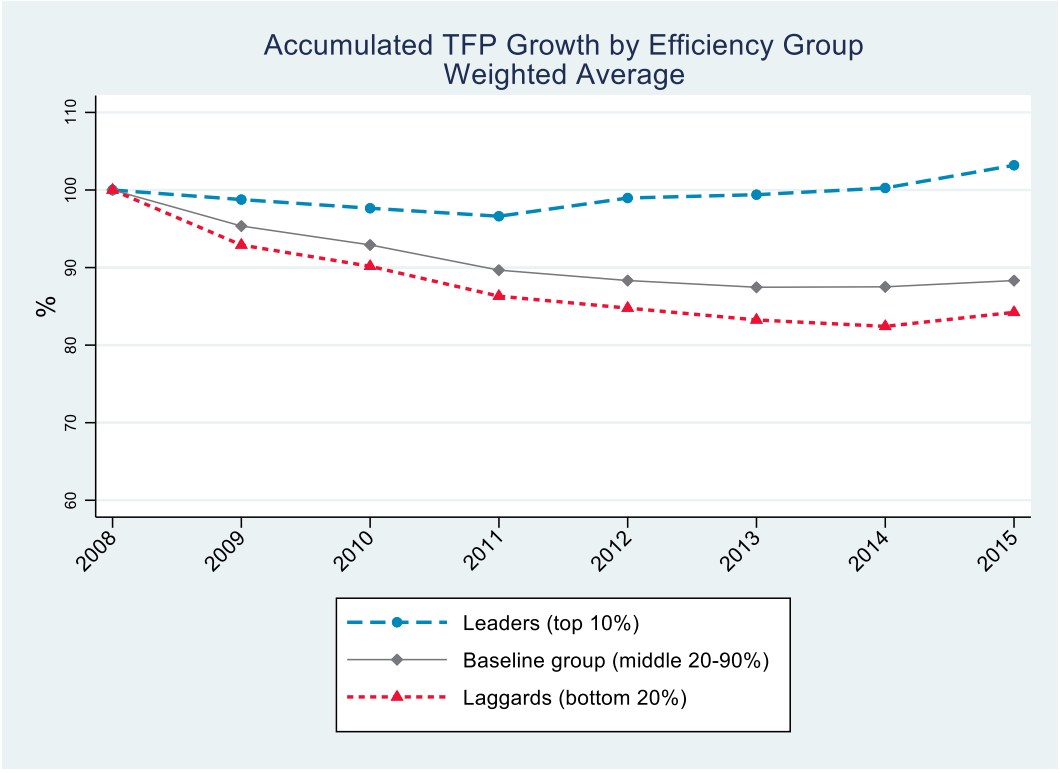
  firms with an efficiency level of **20-90%**

- **Laggards**

  bottom 20% of firms with the lowest technological efficiency

Accumulated TFP growth by efficiency group





Productivity growth trends among technology leaders and laggards

- The most efficient firms push up the production possibility frontier …
- … but a significant part of firms in the economy do not innovate and laggards do not show a catching-up behavior
- As a result, the average TFP growth rates appear to be negative over the entire period in question, although positive dynamics are observed, with the decline slowing towards the end of the period
- Firms showing high rates of productivity growth increase their market shares
- The market share of less efficient firms shrink over time but they do not exit the market. As a result, the scarce recourses stay locked in inefficient production

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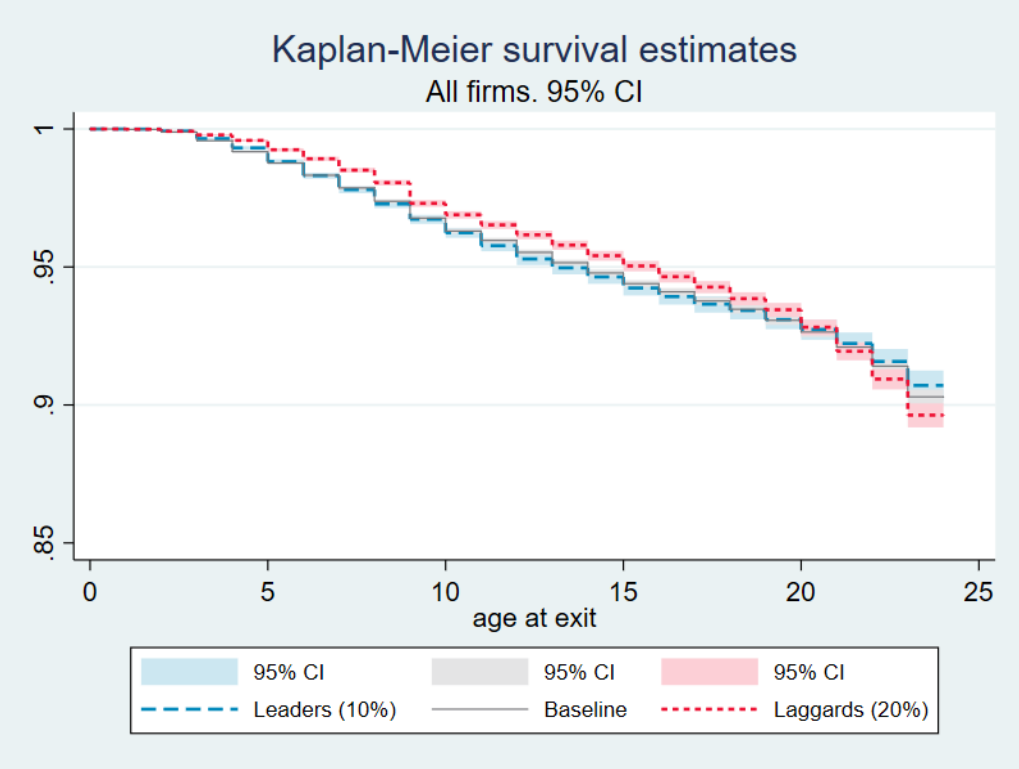
4

EXITS AND EFFICIENCY LEVELS. SURVIVAL ANALYSIS

Firms' efficiency and exit rates

Exit by 2016



The most efficient companies quit markets at a faster pace than average companies in the economy.

In Russia the creative destruction mechanism seems to work in the way opposite to what is conventionally expected.

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5

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EXITS AND GOVERNMENT PROCUREMENT CONTRACTS. SURVIVAL ANALYSIS

Government procurement contracts

Government contract dummy

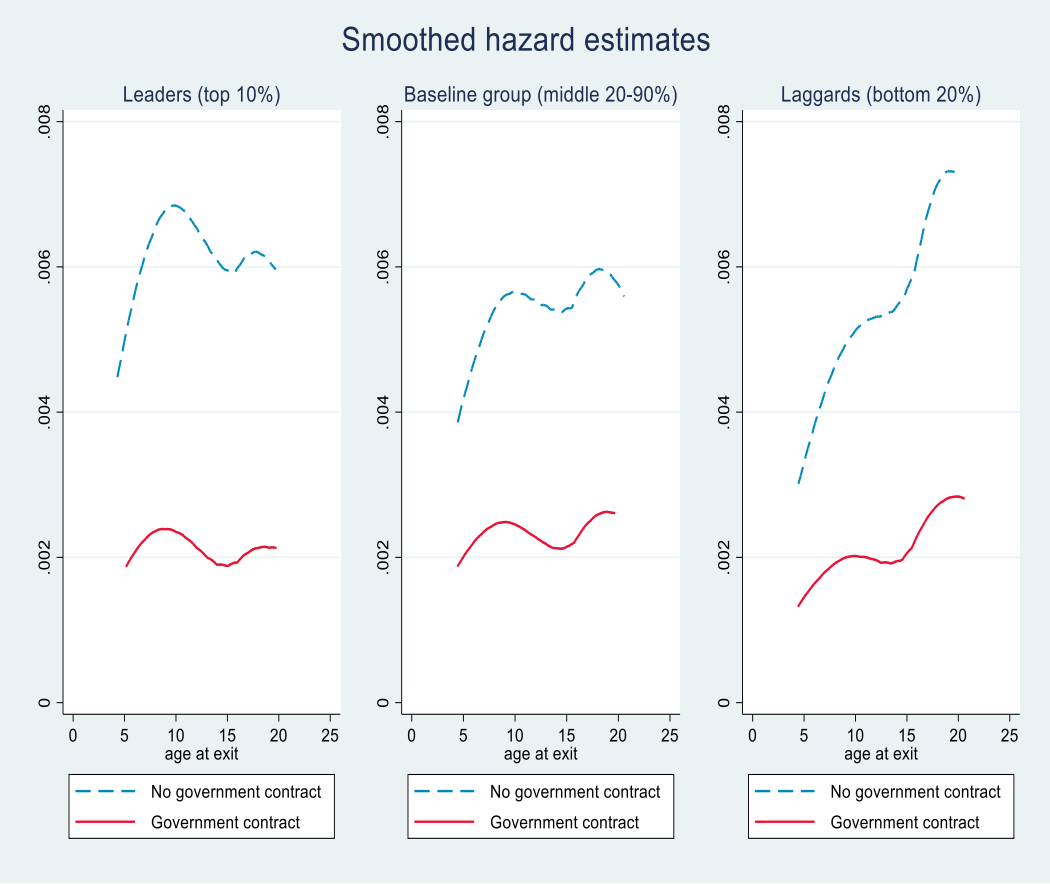
i. **Entire period setup:** 1 if the firm won a government procurement contract at least once in the 2011-2016 period; 0 otherwise

ii. **Yearly setup:** 1 if the firm won a government procurement contract at least once in any year from 2011 to 2016; 0 otherwise

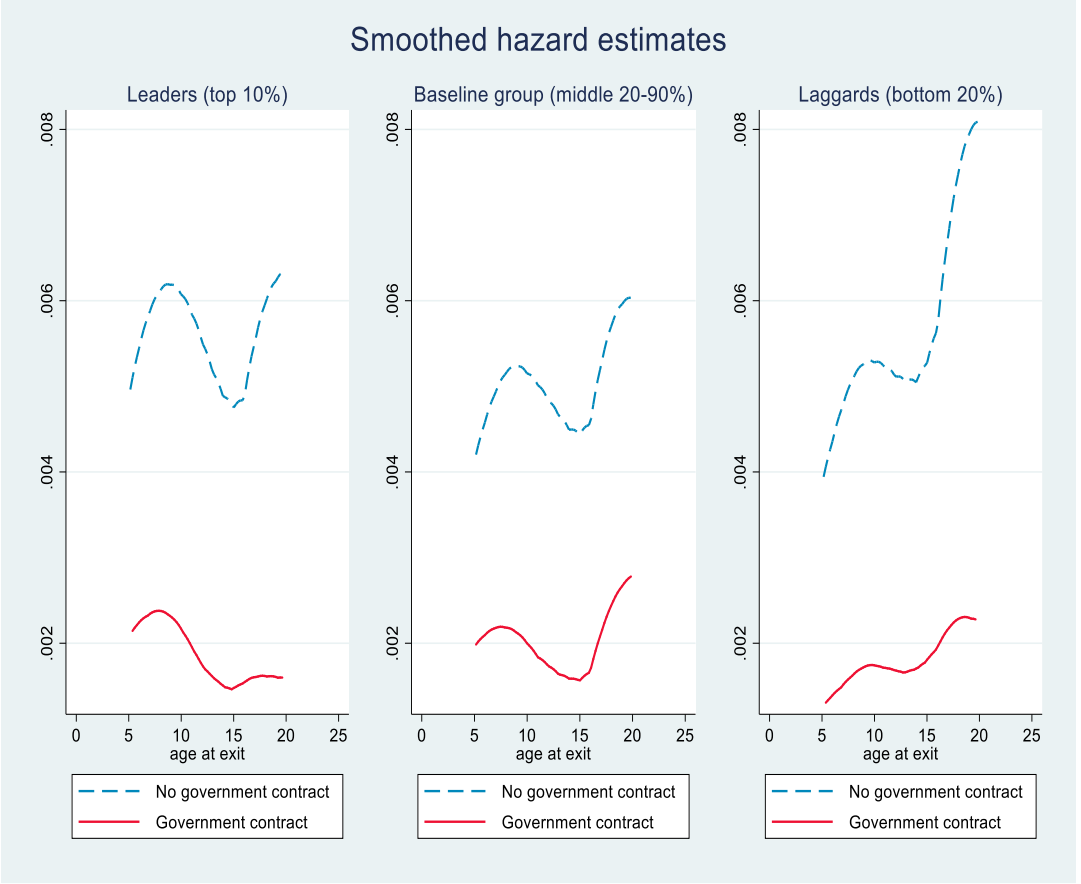
	Entire period setup (exit by 2016) Government contract		Yearly setup(exits in 2011-2016) Government contract	
	no	*yes*	*no*	*yes*
All firms	64.8	35.3	83.2	16.8
Leaders (top 10%)	56.0	44.0	78.4	21.6
Baseline group (middle 20-90%)	64.0	36.0	82.7	17.3
Laggards (bottom 20%)	73.1	26.9	89.1	10.9

Government procurement contracts

Entire period setup (exit by 2016)



Yearly setup (exits in 2011-2016)



Government procurement contracts

Dependent variable: firm age at exit	Entire period setup (exit by 2016) All contracts		Yearly setup (exits in 2011-2016) All contracts		Yearly setup (exits in 2011-2016) Contracts in home region	
	Coef.	*Hazard ratios*	*Coef.*	*Hazard ratios*	*Coef.*	*Hazard ratios*
	(7)	(8)	(9)	(10)	(11)	(12)
Efficiency level[i], Leaders - top 10%	0.091***	1.096***	0.193***	1.213***	0.242***	1.274***
	(0.029)	(0.032)	(0.031)	(0.038)	(0.038)	(0.048)
Efficiency level, Laggards - bottom 20%	-0.019	0.981	0.109***	1.115***	0.090***	1.095***
	(0.023)	(0.022)	(0.026)	(0.029)	(0.028)	(0.031)
Government contract dummy	-0.956***	0.384***	-0.903***	0.405***	-0.954***	0.385***
	(0.027)	(0.011)	(0.043)	(0.018)	(0.053)	(0.020)
Leaders X Government contract	-0.236***	0.790***	-0.118	0.889	-0.286**	0.751**
	(0.058)	(0.046)	(0.096)	(0.085)	(0.130)	(0.098)
Laggards X Government contract	-0.100*	0.905*	-0.239**	0.787**	-0.220*	0.803*
	(0.056)	(0.051)	(0.115)	(0.091)	(0.132)	(0.106)
Firm size[ii], Small	0.630***	1.877***	0.326***	1.385***	0.169***	1.184***
	(0.020)	(0.038)	(0.023)	(0.032)	(0.026)	(0.031)
Firm size, Medium	0.927***	2.527***	0.442***	1.556***	0.298***	1.347***
	(0.040)	(0.100)	(0.046)	(0.071)	(0.054)	(0.073)
Firm size, Large	0.432***	1.541***	-0.099	0.906	-0.349***	0.706***
	(0.058)	(0.090)	(0.068)	(0.061)	(0.083)	(0.059)
Sector dummies	yes	yes	yes	yes	yes	yes
Observations	381,389	381,389	1,069,862	1,069,862	785,820	785,820

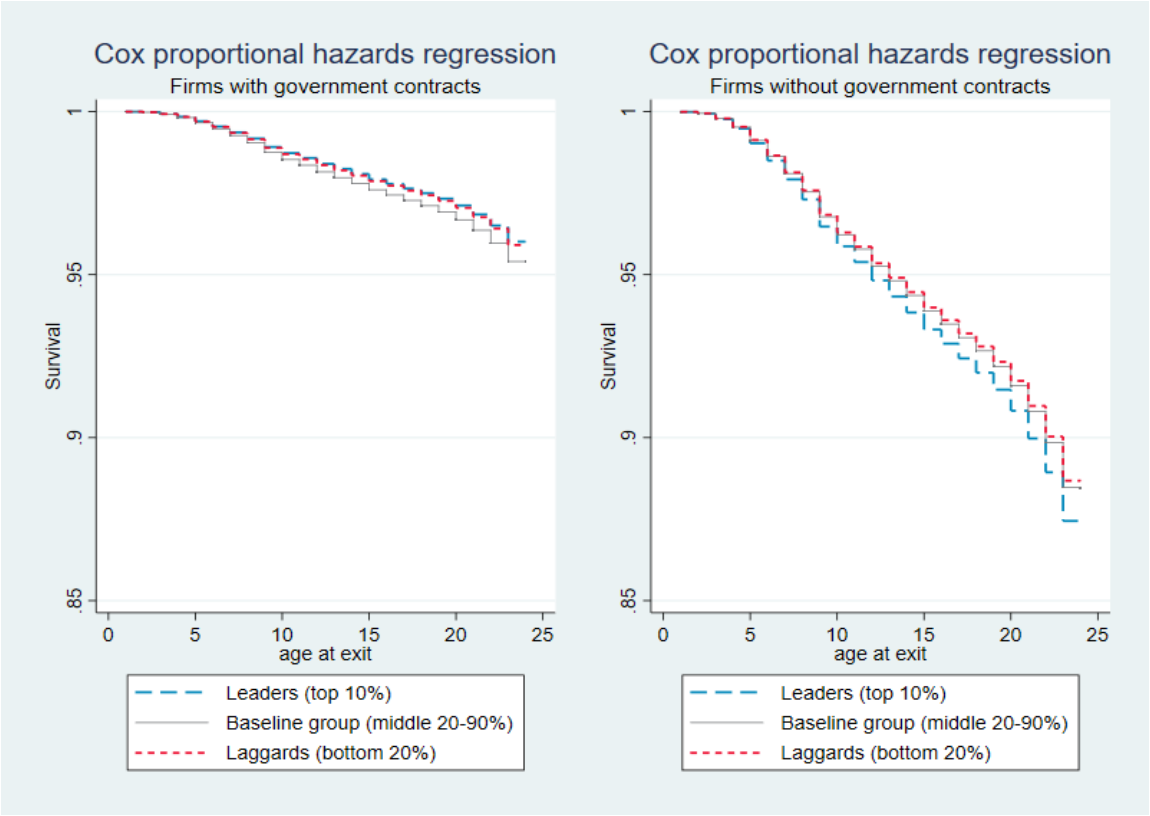
Cox proportional hazards model. Standard errors are in parentheses

[i]Omitted category: Baseline group (efficiency level between 20-90%). [ii]Omitted category: Micro firms

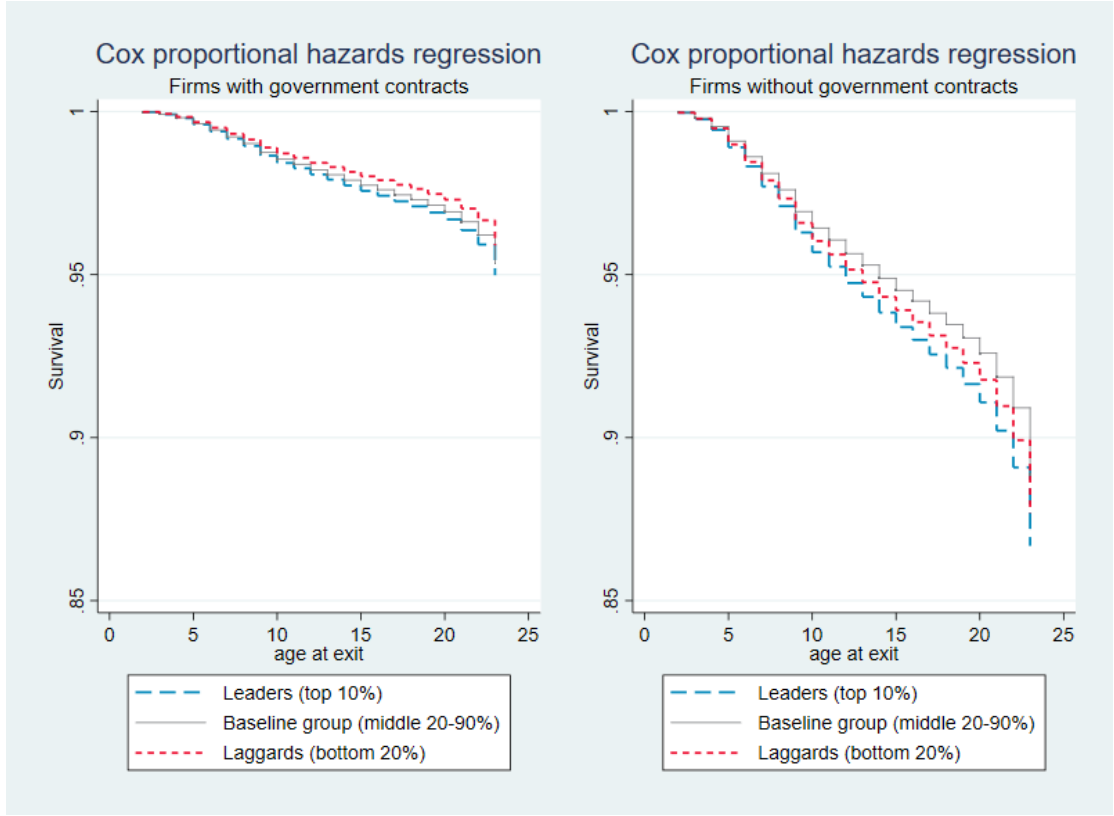
*** p<0.01, ** p<0.05, * p<0.1

Government procurement contracts

Entire period setup (exit by 2016)

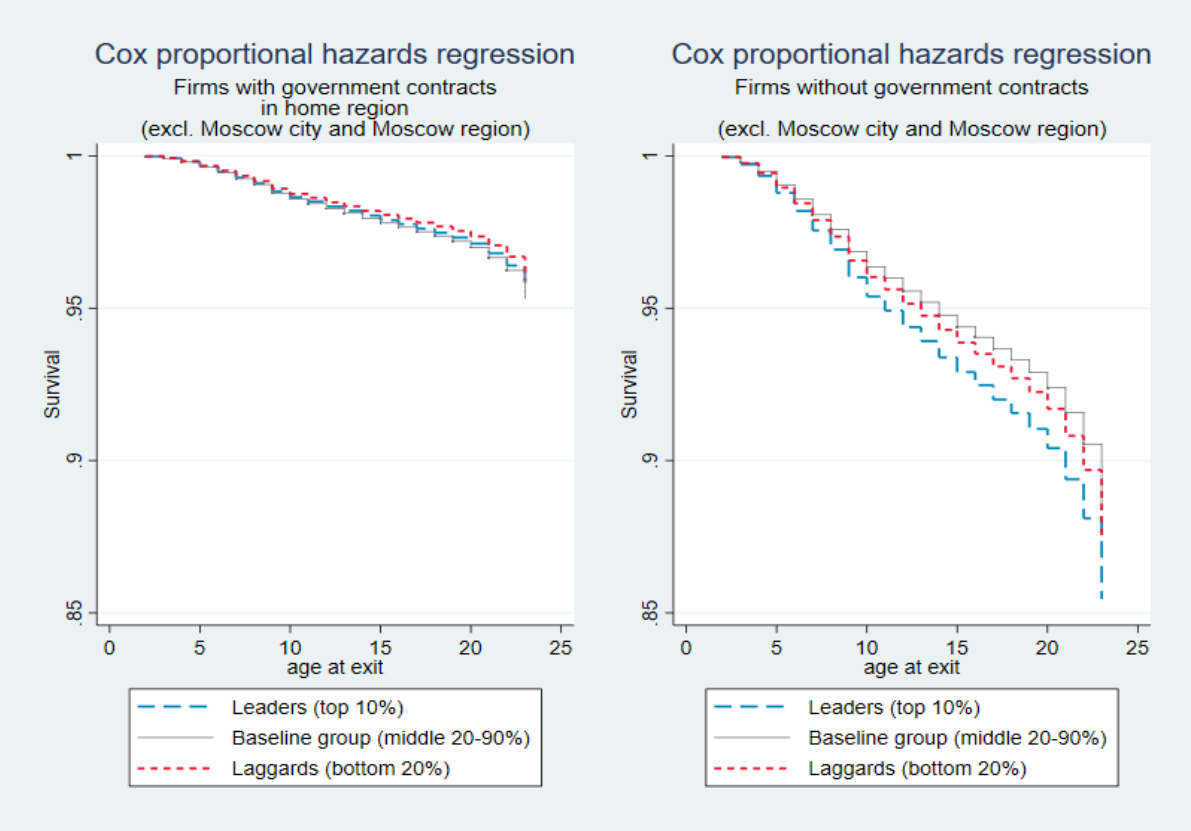


Yearly setup (exits in 2011-2016)



Government procurement contracts in home region

Yearly setup (exits in 2011-2016)



Conclusion

- The results obtained suggest significant positive rates of technological progress. However, the widening gap in the distance to the technological frontier for less efficient firms was seen over the entire period of observation. The catching-up behavior was not observed for laggard firms and the **gap in productivity levels kept increasing** after the 2008 crisis
- The most efficient enterprises increase their share in the domestic market. At the same time, there is a **significant share of inefficient enterprises which do not exit the market**, continuing to use production factors inefficiently
- Survival analysis shows **that leaders exit the market more promptly** than less efficient firms
- Additional **financing from government contracts helps inefficient firms to survive** and shelters them from competition with more efficient enterprises
- The positive effect of winning government procurement contract for leaders in the short run is observed only for home region which seems to suggest that the public procurement system does not support all types of firms with growth potential but only those that are affiliated with local authorities

Policy implications

In order to address the goal of accelerating TFP productivity growth, it is necessary to concentrate on creating conditions for inefficient companies' prompter exit from the market.

Measures to achieve this may include

- simplification of the bankruptcy procedure
- shifting the accent of government support from troubled to growing enterprises, instead of supporting inefficient firms through the government procurement system
- developing programs for retraining or reemployment of personnel leaving inefficient companies

After the sanctions were imposed on Russia, the role of public procurement as an instrument of economic policy to support enterprises affected by the sanctions became more evident. The effectiveness of this economic policy may be questionable if it affects firm dynamics through changing market mechanism of selection of more productive firms.

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