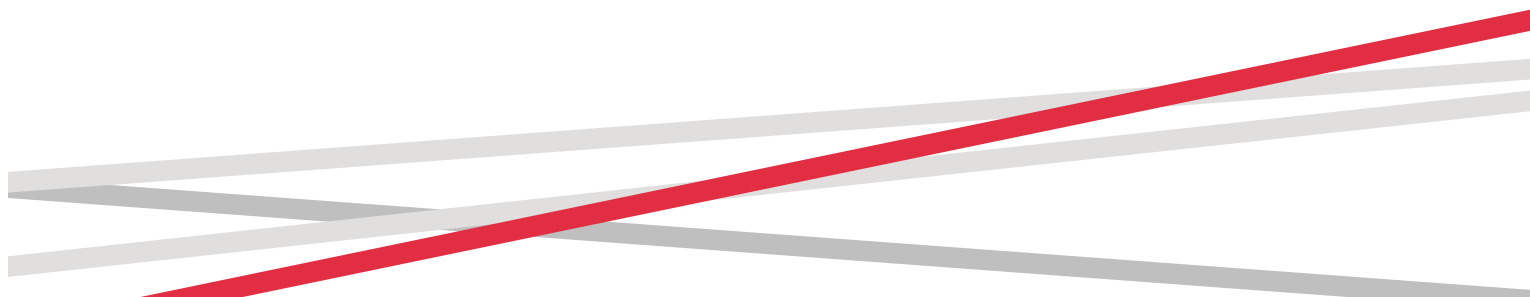




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# On Economics of Innovation Subsidies in Russia

Following the general agreement that innovation is a source of economic growth, the Russian government has provided various stimuli to foster domestic innovation. One of the mechanisms of innovation policy is research subsidies. This policy brief starts off with a discussion of the theoretical predictions and empirical evidence, which relates the economic incentives of research subsidies to innovation and growth. We then address the potential adverse effects of focusing innovation subsidies mainly on large public companies in Russia. Finally, we attempt to establish a link between the innovation rate and market competition within Russian industries.



## Overview

According to data from the Russian Statistical Agency, the R&D intensity – measured by R&D expenditure as percent of sales – increases with company size. Companies with 50 to 500 employees spend 1% of their sales on R&D, while the R&D intensity varies from 2 to 5% of sales for larger businesses (see Figure 1). The size non-neutrality of R&D in Russia contradicts the findings in the theoretical and empirical literature, which hold for companies in the developed countries (Cohen, 2010). An explanation may be the excessive government support to public companies in Russia, and in particular, to larger public corporations. A positive consequence of such policies is that public corporations come ahead of private companies, not only in R&D intensity, but also in innovation rates (see Figures 2–3).

However, government support towards innovation does not necessarily have a positive impact on overall economic activity. The purpose of this brief is to discuss the unwanted effects of the government policy in the form of research subsidies, both in theory and in an application to public companies and corporations in Russia. We base our analysis on the outcomes of the 2014–2017 micro surveys by the Analytical Center under the Government of the Russian Federation.

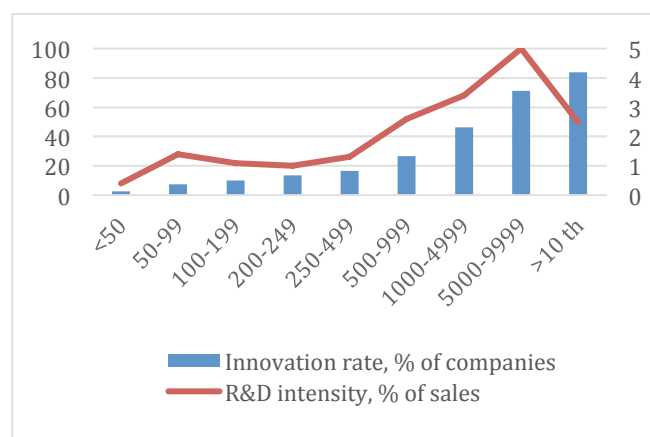
## The role of government

### Fighting under-provision of innovation

According to the seminal paradigm of the endogenous growth models with technological change, companies are engaged in quality

competition, and their innovations are explained by a rational decision to raise profits through expanding the markets for existing products or entering markets for new products (Schumpeter, 1942; Romer, 1990; Grossman and Helpman, 1991; Kletter and Kortum, 2004). The innovation becomes one of the causes of economic growth, which is proved in empirical applications for developed countries, such as the U.S., Japan and the Netherlands (Akcigit and Kerr, 2010; Lentz and Mortensen, 2008; Grossman, 1990).

*Figure 1. Innovation rate and R&D intensity by company size (number of employees)*



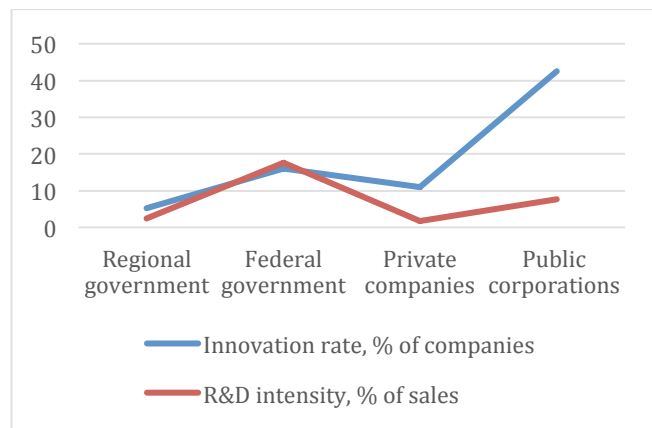
Source: Indicators of Innovation in the Russian Federation: 2017. Tables 2.4, 2.16, Data for 2015. Innovative rate is % of companies involved in innovative activity.

However, the technological change is closely linked to knowledge disclosure, which means that new products become vulnerable to imitation, and that the non-rival character of knowledge causes an under-provision of innovation on the market (Arrow, 1962). The argument supports the cause for government policies through the system of intellectual property rights on the legal side, and research subsidies as an economic mechanism (Rockett, 2010; Hall and Lerner, 2010). Research subsidies are expected to have a positive effect on



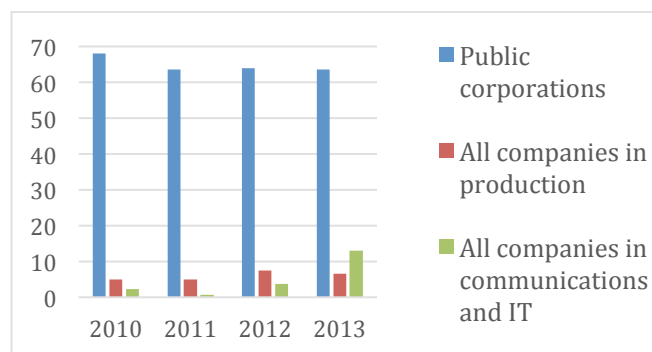
innovation rate, as is empirically shown for the U.S. in Acemoglu et al. (2016) and Wilson (2009). However, the impact on economic growth is ambiguous (Acemoglu et al., 2013; Grossman, 1990).

**Figure 2. Innovation rate and R&D intensity by ownership**



Source: Indicators of Innovation in the Russian Federation: 2017. Tables 2.6, 2.17, Data for 2015, public corporations are different from organizations by regional/federal government.

**Figure 3. Share of public funds in R&D financing, % of company budget**



Based on: Indicators of Innovation in the Russian Federation: 2017. Table 1.13; Innovation Development Programmes of Russian State-Owned Companies, Fig.4.

## Unwanted effects of subsidies

Two concerns are associated with subsidization of innovation. First, while research subsidies may stimulate innovation among the targeted companies, the growth effect is likely to be

heterogeneous across companies in the industry or economy, leading to a neutral or even negative overall effect. For instance, the increased innovation rate in subsidized large incumbents may curb entry of new (and more productive) firms, so the net outcome is deceleration of growth in the economy (Acemoglu et al., 2013). Research subsidies may even cause a shrinking of the high-tech sectors: if skilled labor moves from manufacturing to research labs, manufacturing may experience a shortage of labor, resulting in the net effect being a decrease in production (Grossman, 1990).

Another extreme of subsidizing entrants, in view of antitrust policies, occurs when former entrants change their market status to incumbents: now they face lower profits relative to newer entrants and hence, become less incentivized in their economic activity (Segal and Whinston, 2007).

Second, innovation policy (for instance, in the form of subsidies) may sometimes not even increase the innovation rate. Indeed, incumbents have no incentives to innovate in order to keep their market power or to prevent entry of higher quality firms in industries with non-perfect competition (Rockett, 2010; Qian, 2007).

Both mechanisms are likely to hold for Russian industries, where the protection of large public corporations has led to low competition, various forms of distortions on the market and hence, weak incentives to innovate.

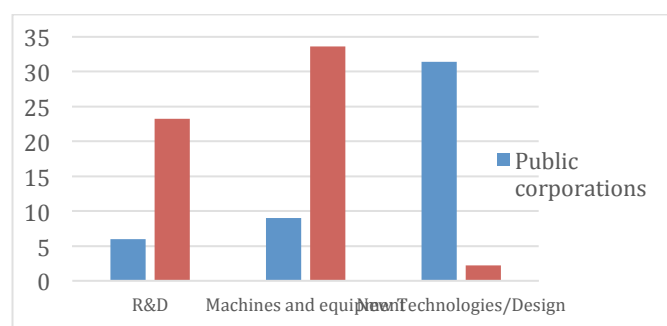
## Potential adverse effects in Russia

Large companies are likely to attract public attention owing to their obvious advantages in spreading fixed costs of innovations (Cohen,



2010). Russia is no exception to the phenomenon, so public corporations, which are commonly of a large size, received government subsidies. However, the subsidy is primarily used for acquiring new technologies and perfecting design, rather than conducting R&D (See Figure 4 with comparison available for communications and IT industry). The fact points to a possibility of a small effect of innovations on growth of public companies. Only if the research subsidy is spent on delegating the R&D research to specialized firms, with a subsequent acquiring of the resulting technology, the existing policy of supporting public corporations may induce their growth and/or growth of the corresponding industry.

*Figure 4. Structure of spending the research subsidy in communications and IT in 2013, %*



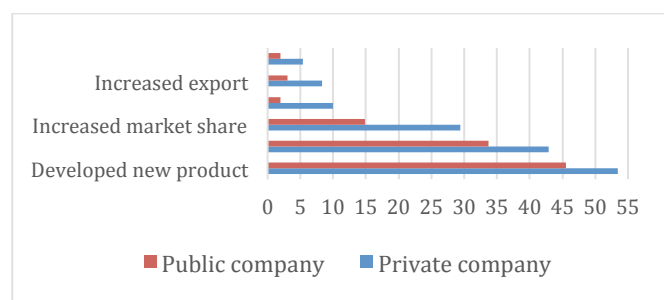
Notes: Indicators of Innovation in the Russian Federation: 2017. Table 1.134 Innovation Development Programmes of Russian State-Owned Companies, Fig.3.

In an attempt to formally assess the effect of innovation subsidies on company growth, we focus on the time profiles of the common proxies for company size: sales, profits and employment (Akcigit et al., 2017; Akcigit and Kerr, 2010; Acemoglu et al., 2013). The macroeconomic literature predicts that innovation becomes one of the channels for an increase of each of the three variables through a rise in quality. Motivated by

this literature, the micro-data analysis “On the Interaction of the Elements of the Innovation Infrastructure”, conducted by the Analytical Center under the Government of the Russian Federation (2014), asked companies to assess their changes in sales, profits and employment in response to the innovation subsidy. As a result, the outcomes of the above analysis allow for a comparative assessment of the impact of the government’s innovation subsidy for public and private companies.

In particular, the results point to higher growth across private companies owing to research subsidies: the percent of private companies with new employees is higher than that of public companies. Similarly, the percentage of private companies that increased market share or raised profits/export due to subsidies exceed those of the public companies (see Figure 5). Here, we interpret new hires as employment growth and increase of market share as a potential indicator of sales growth.

*Figure 5. Economic activity owing to research subsidies, % of companies*



Source: Analytical Center under the Government of the Russian Federation, 2014. Fig.22

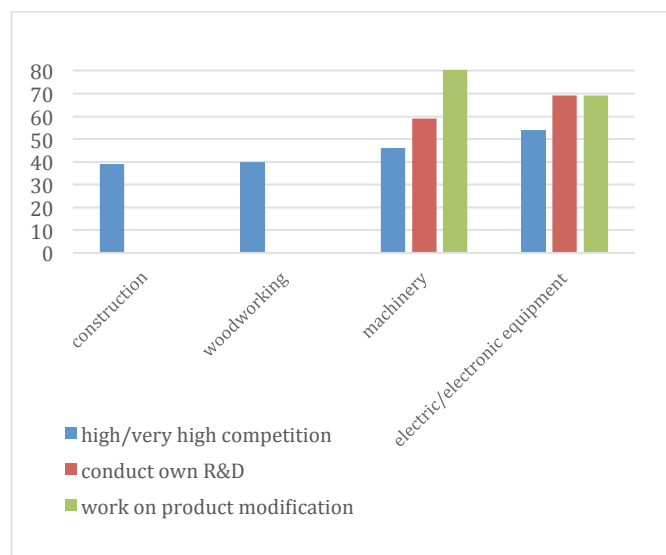
The innovation activity in private Russian companies lead to a higher prevalence of new products in comparison with public companies. The fact goes in line with a more important role



of research and development in the innovative activity of private Russian companies (see Figure 4).

Finally, we attempt to establish a link between the innovation rate and market competition at the level of Russian industries. For this purpose, we use the results of the annual surveys “An assessment of the competitiveness in Russia”, conducted in 2015–2017 by the Analytical Center across 650–1500 companies from 84 Russian regions. The respondents were asked if they implemented R&D as a strategy for raising their competitiveness. We use the percentage of firms doing R&D as a proxy for the innovation rate. Competition in the industry was evaluated by respondents on a five-point scale (no competition, weak, median, high and very high), and we combine the prevalence of the two top categories as a proxy for competition in the industry.

*Figure 6. Competition and R&D in Russian industries, % of firms*



Source: Analytical Center under the Government of the Russian Federation, 2017, pp.8, 18.

The results show that innovative activity in the form of R&D or product modification is observed in industries with relatively high competition in

Russia – for instance, in machinery and electric/electronic equipment (Figure 6). At the same time, industries where competition is not as high (e.g. woodworking, construction) show absence of either type of innovation. The findings go in line with the economic theory about market competition being a prerequisite for the rational choice of companies about innovation. Moreover, if the purpose of government subsidies is to foster innovation, the effective allocation of subsidies would imply the focus on Russian industries with high competition – here various forms of innovation do play a role in the company strategy on the market.

## Conclusion

Our analysis outlines the theoretical foundations for the potential adverse effects of innovation policies in the form of research subsidies. The unwanted outcomes may relate to heterogeneity of companies and absence of the association between innovation activity and growth on non-competitive markets.

We offer the empirical evidence, which points to the undesired effects of subsidizing public companies in Russia. For instance, compared to the overall Russian sector of communications and IT, the innovative activity in public corporations has a weaker association with research and development. Additionally, compared to private companies, the innovations may result in smaller prevalence of increased exports, profits or new hires, as well as in a less frequent development of new products by public companies in Russia.



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