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**FORMAL AND INFORMAL FORMS OF SUPPORT AS SUCCESS DRIVERS
OF TECHNOLOGY STARTUPS IN RUSSIA**

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Entrepreneurship and the entrepreneurial ecosystem are often considered drivers of national economic growth [Acs, Estrin, Mickiewicz, Szerb, 2018; Van Stel, Carree, Thurik, 2005; Thurik, Wennekers, 2004]. At the same time, the following are most often identified as specific effects of entrepreneurship on the economy [Barringer, Ireland, 2019]:

- Innovation development: According to a study by Breitzman and Thomas [Breitzman, Thomas, 2011], small innovative enterprises in green technologies industries are 16 times more productive than large innovative enterprises in terms of patents per employee in the company.
- Job creation: according to Ayygari, Demirguc-Kunt, and Maksimovic, in developing countries, it is small enterprises (less than 20 people) that create the most significant number of jobs [Ayygari, Demirguc-Kunt, Maksimovic, 2014]. At the same time, there is a similar trend in developed countries: in the United States, firms with fewer than 500 employees were involved in creating 2/3 of private-sector jobs in 2014 [Barringer, Ireland, 2019].
- Impact on big business: the business model of many startups is built around existing product and service production, thereby providing competition and helping large firms become more efficient.
- Impact on society: usually, new products and services are developed to improve quality of life, health, productivity, or simply for fun.

Meanwhile, among all types of SMEs, technology companies can create products and innovations with significant economic value that impact everyone's lives [Portincaso, de la Tour, Soussan, 2019].

Russian startups in advanced tech industries represent only 0,4% of the total number of startups globally, which is less than the share of startups in developed countries and BRICS (excl. South Africa) [Салтанова, 2021]. According to the recent survey of 620 tech entrepreneurs in Russia, 49% of startup founders identified the need for investments, and 26% named other types of support as a primary need for business development [Startup Barometer, 2020].

The specificity and opacity of startups complicate the attraction of investments to such companies, especially in the emerging markets where asymmetric information leads to credit rationing [De Wet, 2004]. This explains the motivation of government participation in a startup's support: indeed, many developing markets recognize the need to foster young tech companies by introducing liberalization of tax and customs regimes for such companies, funding of government venture funds and other venture initiatives, and building technoparks with significant infrastructure equipment. The Russian government also allocated significant budget money to create a favorable environment for startups by establishing various government institutions for innovation development.

However, does government support positively contribute to startups' performance and effectively substitute other sources of new venture support in Russia? This research is aimed to analyze the different sources of support for a tech startup in an emerging market with significant government participation in the economy and identify the impact of such support on a firm's performance.

The lack of information and the difficulty of obtaining the data complicates such analysis and can explain the insufficient evidence from academic research on startup corporate governance and performance in Russia. At the same time, a significant period since the establishment of the government institutions provides an opportunity to identify and compare the efficiency of different forms of support available to Russian startups.

Therefore, **the aim of the research** is to determine the relationship between the performance of tech startups and existing formal and informal forms of support of such companies in Russia.

In this research, we define support from government and private organizations (such as venture funds, financial institutions, and companies) as formal (as it is usually organized in the form of the legal contract, in which the types, terms, and amount of support are strictly defined). In contrast, informal support refers to the family, friends, management, and the entrepreneur, as such a form of support is more relationship-based and less formalized.

The objectives of the research are as follows:

- To systemize the results of empirical studies of the influence of existing types of support provided by formal sources (venture capital funds, business angels, government institutions, financial institutions) and informal sources (family, friends, management, and entrepreneurs) on SMEs performance;
- To construct a database of Russian tech small and medium companies which includes data about the performance of such companies as well as their support;
- To describe a governance landscape of Russian startups and compare ownership and management characteristics of startups in developed and developing markets;
- To determine the relationship between equity support provided by formal and informal sources and startup's performance;
- To investigate the impact of government institutions' grant financing on tech companies' performance in Russia as in the country with significant government participation in the economy;

The database for the research was collected in two steps. First, the list of startups for nuclear, space, and biomed industries was manually collected from the Skolkovo website, as well as the data about private and government support of Skolkovo biomed startups. At the later stage of research, the list of companies was significantly enlarged by an automated collection of the names of startups from *Startuplist.ru* (digital platform of interaction between government institutes for development) and by the list of SMEs downloaded from the Register of Small and Medium Enterprises (*rmsp.nalog.ru*). Second, information about startups' characteristics (e.g., age, location, size), ownership structure (number, gender of owners, management ownership), and financial statements of the companies were downloaded from Spark-Interfax and/or Ruslana (Bureau van Dijk). Therefore, our database includes 25,144 companies in 2019, with detailed information about the ownership and management characteristics of 629 startups. For 416 companies, such information was traced during 2010-2017.

To estimate the impact of grant financing, we collected another database, which includes detailed information about the financial and operational performance of 28,651 companies during 2015-2020.

In contrast to traditional definitions of startups as companies with a short history of operations [Coleman, Cotei, Farhat, 2016; Huyghebaert, Van De Gucht, 2007; Cassar, 2004] or as young high-tech firms [Wasserman, 2017; Davila, Foster, Gupta, 2003], in this research, we do not limit the age of small and medium technology companies included in our sample. Due to the peculiarities of emerging markets, the time for success for Russian startups can be longer.

Our **research methodology** included steps as follows:

- Application of automated data collection methods as well as manual data collection for the construction of the database.
- Statistic and correlation analysis of variables which characterize ownership structure, management, the operational and financial performance of startups in Russia;
- Cluster analysis of the sample of biomed startups for the description of differences between startups supported from different sources;
- Econometric analysis of the relationship between startups' support, characteristics, and performance (random regression analysis, matching, two-way fixed effect regressions for panel data).

Current academic research. The academic literature on the support of startups can be divided into two tracks: papers that focus on the relationship between an entrepreneur/startup and its support and research which discusses the influence of different types and sources of support on firm performance.

The relationship between an entrepreneur/startup and its sources of support is bilateral. First, the individual characteristics of an entrepreneur were confirmed to have a significant influence on a choice of support [Drover, Wood, Fassin, 2014; Schwienbacher, 2007]. Second, the new venture investors (both private and government) were also found to select their investments according to their preferences and goals [Malmström et al., 2020; Uzuegbunam et al., 2017; Afful-Dadzie, Afful-Dadzie, 2016; Knockaert M., Clarysse B., Wright M., 2010] or according to their ability to identify startups which are in line with their strategy [Baum and Silverman, 2004].

The second track, which is of interest to this research, considers the influence of a firm's support on its performance is much more prevalent among corporate finance researchers. The papers in this track can be classified based on the sources of support:

1. Formal support

- *Government institutions.* These institutions use various instruments to support young companies, although most of the research is focused on the influence of grant financing, government equity funding, and infrastructure support (government technoparks). Grants are widely used in the early stages of the company's life-cycle, and such instrument was confirmed to positively influence the survival of the company [Dvouletý, Srhoj, Pantea, 2020; Pellegrini, Muccigrosso, 2017; Butler, Galassi, Ruffo, 2015]. However, some studies did not find the impact of the grant on the revenue growth [Demirel, Danisman, 2019; Hewitt-Dundas, Roper, 2011; Mole et al., 2009], employment [Srhoj, Škrinjaric, Radas, 2019; Capelleras, Contín-Pilart, Larraza-Kintana, 2011], productivity [Lang, Nagy, Stancsics, 2017; Cerqua, Pellegrini, 2014] and profitability [Roper, Hewitt-Dundas, 2001]. The research on the impact of government venture funds on firm performance was not able to confirm the significant positive contributions of such funds [Bertoni, Tykvova, 2015; Grilli, Murtinu, 2014] or proved their underperformance compared to private venture funds [Cumming, Grilli, Murtinu, 2017; Luukkonen, Deschryvere, Bertoni, 2013].
- *Venture capital funds and business angels.* These types of investors were confirmed to be able to positively contribute to startup performance in several ways besides direct financing: by providing network opportunities [Davila, Foster, Gupta, 2003], management expertise [Fitza, Matusik, Mosakowski 2009] and by signaling to other investors [Bertoni, Colombo, Grilli 2011; Baum, Silverman, 2004]. Their contribution leads not only to higher profitability and revenue growth of a company but also to a higher level of employment [Samila, Sorenson, 2011], higher valuation [Gerasymenko, Clercq, Sapienza, 2015; Maula, Autio, Murray, 2005], higher IPO performance [Hegde,

Tumlinson, 2014; Chemmanur, Krishnan, Nandy, 2011; Pollock et al., 2010; Dolvin, 2005], more patents [Pahnke, Katila, Eisenhardt, 2015], lower failure rates [Puri, Zarutskie, 2012].

- *Private companies and financial institutions.* Most academic studies about corporate investors from industry focus on the benefits of corporate entrepreneurship to corporate investors themselves rather than on their investment [Benson, Ziedonis, 2009]. However, corporate venture capital was confirmed to positively contribute to improving innovation output [Park, Steensma, 2012] as well as R&D activities [Paik, Woo, 2017]. Another stream of academic research on the support from private companies is focused on the influence of networking and membership opportunities, which arise from firms' engagement with each other [Schøtt, Jensen, 2016; Zhao, Frese, Giardini, 2010]. The studies on the impact of financial institutions are mainly focused on the debt financing for such companies, while the effect of this support is ambiguous [Aiello, Bonanno, Rossi, 2020; Demirel, Danisman, 2019; Lee, Lee, Pennings, 2001].

2. Informal support

- *Friends and family.* Family and friends provide a startup with financial and social capital, which influences the company's progress [De Carolis, Litzky, Eddleston, 2009], as well as moral support, mentoring, expertise, and contacts [Edelman et al., 2016]. Moreover, according to Conti, Thursby, and Rothaermel [Conti, Thursby, Rothaermel, 2013], money invested in a new company by friends and family can be a valuable signal for venture capital and business angels. However, some researchers confirmed the negative influence of family ownership on R&D intensity [Block, 2012] and the conservatism of family owners in choosing firm strategy [Miller, Le Breton-Miller, Lester, 2011].
- *Entrepreneurs and managers.* Although the management was confirmed to significantly impact the performance of young firms with limited prior expertise and experience [Nuscheler, Engelen, Zahra, 2019], the academic literature primarily focuses on the founders rather than CEOs of startups [Guseva and

Stepanova, 2019] as often in a startup the same person takes these positions. The studies of the entrepreneur's influence confirm the positive effect of her personality on various measures of startup performance: from firm survival to internalization processes [Stucki, 2016; Baptista, Karaöz, Mendonça, 2014; Filatotchev et al., 2009; Kauermann, Tutz, Brüderl, 2005; Belso-Martínez, 2006]. The firm's management's personality, expertise, and networking were also found to contribute to firm performance positively [Siepel, Cowling, Coad, 2017; Danis, Chiaburu, Lyles, 2010; Foreman-Peck, Makepeace, Morgan, 2006; Lynskey, 2004; Zhao, Aram, 1995]. At the same time, the management support in the form of equity financing can be a barrier for firm performance and internalization [Serrasqueiro, Nunes, 2008; George, Wiklund, Zahra, 2005].

Most studies about peculiarities of startup characteristics and their performance have focused on firms in a developed market. However, studies of developing markets show that innovation firms face particular difficulties: for example, administrative barriers are higher for such firms [Баранов, Долгопятова, 2014]

The research on small and medium or technology companies in Russia mainly analyzed the influence of macroeconomic factors [Баринова, Еремкин, Земцов, 2015; Chadee, Roxas, 2013; Molz, Tabbaa, Totskaya, 2009; Aidis, Adachi, 2007; Hartarska, Gonzalez-Vega, 2006; Долгопятова, 1999] or firms on later stages of life-cycle [Земцов, Чернов, 2019; Iwasaki, Muzabata, Muravyev, 2018; Yusupova, Khalimova, 2017].

Additionally, the stream of academic research of Russian SMEs focuses on the specificity of managerial and entrepreneurial characteristics and styles of such firms in Russia, as well as their significance for firms' performance [Shirokova et al., 2020; Salienko, Baev, Klyueva, 2020; Pletnev, Barkhatov, 2016; Pletnev, Nikolaeva, 2016; Mikhailitchenko, Lundstrom, 2006; Batjargal, 2003].

However, this research contributes to the understanding of various financial, operational, and entrepreneurial success drivers of young tech startups in countries with limited private investments by examining the characteristics of such companies and other sources of support in the market.

Overall, the **main conclusions** of our research about formal and informal forms of support of Russian startups can be summarized as follows:

1. There exists a significant relationship between startups' sources of support and specific characteristics of a Russian startup, such as industry, age, and personalities of stakeholders.

1.1 Industry aspects. Sources of support can be dependent on the industry of a startup: in particular, corporate and private investors are more often observed among owners of startups from IT and biomed cluster, while government institutions are more often observed in owners of firms from the nuclear industry and their participation in the ownership structure of biomed startups is insignificant.

For nuclear and space industries positive relationship between the support of corporate and government investors was observed, which can indicate the connection between government and corporate activities and/or be a signal of risk-sharing behaviors of such institutions. This is also partially confirmed in the studies of developed markets: in contrast to private venture funds, corporate and government venture funds do not have purely financial objectives but rather strategic ones [Standaert, Manigart, 2018]. However, the recent research of Simachev et al. showed that nuclear technologies is the only sector in which the share of Russian startups is the highest with 16,7% of global export [Салтанова, 2021].

1.2 Age/life-cycle aspects. In biotechnology industry, support from private investors was observed for younger and smaller tech companies. In contrast, support from government institutions in the form of equity financing and infrastructure support was observed for more mature firms (for example, 59% of the companies in the sample supported by the government had revenue; compared to 41% of companies supported by private institutions). While venture capital firms can invest in the development and startup stages of the company to help a startup achieve initial revenue growth, government institutes can help overcome market barriers to expansion or give access to government contracts and networks, which are essential in the later stages. This confirms the conclusions of Puri and Zaratuskie [Puri, Zaratuskie, 2015] based on the evidence of the

US Longitudinal Business Database that VC firms make significant investments in firms with no commercial revenues.

1.3 Stakeholders' personalities. Although recent academic research of Russian firms confirms the positive and significant effect of gender diversity on firm performance [Garanina, Muravyev, 2020; Tleubayev et al., 2020; Berezinets, Ilina, Cherkasskaya, 2017], sample of all Russian tech startups shows that woman management is more often observed among younger and smaller firms. The data on biotech companies indicates that startups with women founders, owners, or managers are less likely to have any type of support, which can be explained by the fact that women are less likely to ask funding [Kwapisz, Hechavarría, 2018]. The comparison of private and government sources for such companies confirmed that private institutes less often invest in startups with women in ownership or management structure.

However, corporate and government investors are more likely to attract outside managers: a negative relationship between CEO-share and share of corporate or government ownership was confirmed. This can be explained by the higher percentage of equity financing of such investors, but this observation could also be a characteristic of emerging markets where connections between CEO turnover and political relations were observed [Cao et al., 2017; Yuan, 2011].

Additionally, it was confirmed that government institutions prefer to invest in startups with more experienced CEOs, which aligns with academic research of developed markets [Uzuegbunam et al., 2017].

2. Government institutions primarily use grant and equity financing, while private organizations use debt as a channel of firm support more extensively.

In the research, we considered several types of support which can be traced using available information about startups: grant financing, equity, and debt financing, and infrastructure support.

According to the financial statements of startups, government institutes are more likely to support the startups with equity and grant financing, while startups supported by private institutions such as venture funds, on average, have higher leverage. However, while in the US and European markets, one of the most popular types of venture capital

financing is convertible securities [Bascha, Walz, 2007; Cumming, 2006], this type of financing is not available in Russia due to regulatory limitations. At the same time, according to IIDF research [based on Ефремов, Лурье, Чумаков, 2020], 35% of venture deals in Russia are structured in line with convertible debt model.

This research also indicates that for startups in the biomedical cluster, the primary form of government support is infrastructure support, which was traced by the presence of a startup in technopark.

We should also point out that various government institutions specialize in the provision of different types of support. For example, for FASIE, the main instrument of support is grant financing, while Skolkovo Foundation is engaged with more companies with infrastructure support in the form of technopark residence.

3. Types of government institutions' support impact startup performance. Government grant financing positively influences a startup's survival and access to external funding, while we did not find a positive relationship between government equity support and firm performance.

In the research performance of a startup was estimated based on several metrics: financial (revenue, presence of revenue, ROA, profitability, revenue growth, productivity, and labor productivity) and operational (number of patents and number of employees).

“We found no evidence of the positive relationship between the share of government-related organizations in ownership and firm performance proxied by ROA, profitability, and revenue growth” [Guseva, Stepanova, 2021]. Such results can be explained by the fact that such organizations could be more interested in investments in strategically important startups rather than in companies that provide high returns. Additionally, we should take into consideration the specific features inherent in government institutions and identified by Alperovych, Groh, and Quas [Alperovych, Groh, Quas, 2020]: focus on underdeveloped regions, exposure to political interference, and lack of managerial competence. Such features can prevent government development institutions from competing with private venture capital.

At the same time startups with government support in the form of infrastructure are more successful in terms of operational performance measured both by the number of patents and employees. Additionally, a positive relationship between the presence of revenue of a company and both types of government support was observed. This, however, can be explained by the fact that government institutes more often invest in mature firms.

We found no evidence that grants significantly improve the financial and operational performance of the firm, although the companies with grant financing were observed to survive longer. We also confirmed the findings of Rodionov, Semenov, and Oskin that grant financing can be a determinant of future venture capital investment in Russia [Rodionov, Semenov, Oskin, 2021].

4. Private institutions positively and significantly contribute to startup performance in Russia, and can be enhanced by government support.

In line with previous studies, we found evidence of a significant contribution of venture capital considered as a private source of financing to firm performance in Russia; however, the effect is industry-specific.

While family equity contributions were not found to have a significant impact on startup performance, we identified a positive relationship between the owner or CEO change and future startup performance.” [Guseva, Stepanova, 2021]. Although CEO share is negatively correlated with the age and size of the company, the relationship between the share of CEO in ownership structure and performance was not confirmed.

The performance of Russian biomed startups indicate that joint support from private and government institutions is the most beneficial. Indeed, startups with backing from both private and government sources are more successful. Moreover, the findings of this research indicate that in the setting of emerging markets, government support cannot fully substitute the expertise and capital of private investors but can complement it and help eliminate the institutional voids by using different channels.

Contribution. Based on the analysis of the existing literature on formal and informal sources of startup support, we contribute to scientific research as follows:

- The new database containing information about main corporate governance, performance, and other characteristics of Russian startups was constructed;
- The corporate governance landscape of startups in Russia from different industries was revealed and described in details;
- The peculiarities and connections between different kinds of support for tech startups in Russia were identified;
- The specific impact of equity and grant financing provided by the government and private sources on Russian tech companies was demonstrated.

Theoretical implications. Our research contributes to the stream of academic literature about entrepreneurship and entrepreneurial finance. In particular, this study provides an overview of existing research about possible sources of entrepreneurship support and their influence on specific measures of firm performance; and discusses the peculiarities of the pecking order and signaling theories for young tech companies. We contribute to the research on the impact of private and government financing in the form of a grant, equity, and infrastructure with the evidence from Russia as the country with significant government participation in the economy

Practical implications. The findings of this research provide strategic management insights for startup entrepreneurs looking for support for their business to enhance the firm's performance. This research also provides insights for public authorities to design an effective system of entrepreneurship support using appropriate instruments concerning policy goals.

The results of the research are published in the papers:

1. Guseva, O., & Stepanova, A. (2019). Owners and CEOs of startups: Evidence from Russia. *Journal of Corporate Finance Research*, 13(1), 107-119
2. Guseva, O., Stepanova, A (2021). Startups in Russia: Ownership vs. Performance. *Journal of the New Economic Association*. 52(4) - the paper is accepted for publication.
3. Guseva, O. (2021) Government and private institutions' support: evidence from biomedical startups in Russia. *Journal of Corporate Finance Research*, 15(2) – the paper is accepted for publication.

The results of the research were presented and discussed at Russian and international conferences and workshops:

1. Report on XXI April International Academic Conference on Economic and Social, section L-25, 23 Apr 2020
2. Report on REMI 1-st Annual Workshop, 30 Sep 2019, NRU HSE, St Petersburg, Russia
3. Report on XX April International Academic Conference on Economic and Social, section L-04, 9 Apr 2019
4. Report on 6th annual Ph.D. workshop "Financial Markets and Corporate Strategies: Comparative Studies", 13 Apr 2019
5. Report on RENT XXXII – Research in Entrepreneurship and Small Business, Toledo, Spain, 15 Nov 2018
6. Report on Analytics for Management and Economics Conference 2018, 21 Sep 2018
7. Report on the Ph.D. workshop, Analytics for Management and Economics Conference, 19 Sep 2018

The results of this dissertation were presented and discussed in seminars organized by the Doctoral School of Economics in the Higher School of Economics.

Research findings are also used in the teaching process of course “Entrepreneurial Finance” for master students in the NRU HSE master program “Strategic Corporate Finance” and for academic supervisory of term papers and theses of master and bachelor students NRU HSE.

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