High-growth firms' sustainability and efficiency in the Russian energy sector during pandemic

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Abstract. High-growth firms (gazelles) are important drivers of economic growth, being one of the key employment creators. COVID-19 pandemic hit the global and national economy. Dozens of industries suffer from epidemic restrictions. Gazelles did not stand aside and also suffered losses. Current research reveals the difference in performance of normal and high-growth firms in Russian energetic industry based on the financial reports data. The sample of energetic firms includes 3,066 normal and 162 high-growth firms. The performance is evaluated through the system of 6 indicators. The authors test 6 hypotheses (using one-way ANOVA) of better gazelles' ability to grow, efficiency, solvency, and employability than normal firms in 2019-2021. The pandemic hit firm's revenue growth in 2020, but gazelles had better ability to grow in 2019-2020. However, normal firms increased revenue greater than HGFs in 2021. Gazelles have higher profitability, solvency and employment creation abilities in comparison with normal firms. Firm efficiency doesn't significantly differ between normal firms and HGFs.

1 Introduction

The coronavirus pandemic has become a serious challenge for society and national economies. Epidemiological restrictions paralyzed dozens of industries and forced entrepreneurs to transfer most of the production processes. The economic shock led to the threat of mass unemployment, reduction in purchasing power and bankruptcy of economic entities. In such conditions of risk, firms have been forced to freeze or abandon investment and socially oriented projects, R&D, etc., which will affect the slower rates of social and economic development in the future. High-growth firms (gazelles) are the source of growth on national economy [1,2]. Gazelles are associated with employment generation [2-4], innovation [5] and R&D activities [6]. The population of gazelles in the economy occupies 2-6% in average. This small sample is able to form from 40 up to 60-70% of all new jobs created [2]. According to the most common definition, high-growth companies are "all enterprises with an average annual growth of more than twenty percent per year for three years and with ten or more employees at the beginning of the observation period. Growth is measured by the number of employees and turnover" [7]. Gazelles provoke the growth of

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their occupied and related industries [8,9]. These statements prove the importance of this category of entrepreneurship for the economy. There are no clear evidences of gazelles' greater resilience during crises [10-12], including pandemic of COVID-19 [13-16].

The authors formed empirical background of researching the financial performance of Russian gazelles during pandemic. HGFs have higher growth rates of revenue and employment in 2020-2021 in comparison with normal firms. There is no stable tendency of greater profitability of HGF. The greater solvency and efficiency tendencies of gazelles vary across studies [17-19].

The particular scientific interest is the analysis of sectoral features of the impact of the pandemic on the economic activity of firms. Energetic sector is one of the most promising and significant sectors in the structure of the Russian economy [20, 21].

The purpose of this study is to analyze the financial condition of high-growth and normal energetic firms during the coronavirus pandemic. To achieve this goal, it is necessary to solve a number of tasks:

1. Formation of a sample of high-growth and normal energetic firms in the period 2016-2021.
2. Analysis of the financial results of high-growth and normal energetic firms in the pre-pandemic (2019) and pandemic period (2020-2021).
3. Hypotheses testing using one-way ANOVA.
4. Generalization of research results and answering the research question.

The sample of energetic firms was formed on the basis of OKVED 2 and financial reporting data. The assessment of the financial results of firms is based on a system of 6 indicators that reflect the ability to grow, profitability, business activity, solvency and job creation. The sample consists of 3,228 Russian firms, including 162 high-growth firms. The research presents 6 hypotheses, which are tested in 2019, 2020 and 2021 years. The authors demonstrate the hypotheses testing, highlight the accepted on 1% confidence level hypotheses, and compare results with reviewed studies.

2 Materials and methods

The sample is collected on the official data from the Rosstat and Russian Tax Service, provided by FIRA PRO. Energetic firms were identified by All-Russian classifier of types of economic activity 2, code 'Provision of electricity, gas and steam; air conditioning'. The financial reports of firms were obtained from 2016 to 2021. Calculation of revenue growth indicator in 2017-2019 allows authors to create a sample of high-growth firms. The gazelle is defined as enterprise with average annualized turnover growth greater than twenty percent per annum, over three years. A number of restrictions were applied to the sample r to exclude the influence of extreme values.

The theoretical base of firm performance analyze is built on the literature review [22-25]. The authors suggest to analyze the financial performance of energetic firms during pandemic through the system of 6 indicators, which represent different spheres of firm growth:

- Ability to grow. The first indicator is revenue growth rate. It is a basic indicator showing how dynamically a company is developing.
- Profitability. Profitability is one of the main indicators of the firm performance. Return on sales (ROS). ROS is calculated as net income divided by sales.
- Efficiency. Total-assets-turnover ratio (TATR). TATR is calculated as sales divided by total assets. Current-assets-turnover ratio (CATR). CATR is calculated as sales divided by current assets.
- Solvency. Equity-to-assets ratio (EAR). EAR is calculated as equity divided by total assets.

- Employment generation. Employment growth is essential indicator in HGF assessment.

The research question turns to an assumption of higher resilience of gazelles during the crisis [10,26]. We test the differences between HGFs and the normal firms in their reaction to the COVID-19 pandemic using one-way ANOVA instruments [27]. We focus the differences in the prepandenic period (2019), the first (2020) and the second (2021) years of the COVID-19 pandemic. According to performance assessment system, the authors formulate 6 hypotheses to answer the research question for three years (2019.2020,2021):

1. The gazelles' revenue growth rate is not significantly different from normal firms' rates.
2. The gazelles' ROS rate is not significantly different from normal firms' rates.
3. The gazelles' TATR is not significantly different from normal firms' rates.
4. The gazelles' CATR is not significantly different from normal firms' rates.
5. The gazelles' EAR is not significantly different from normal firms' rates.
6. The gazelles' employment growth rate is not significantly different from normal firms' rates.

3 Results and discussion

The entire sample of energetic firms includes 5471 observations. After homogeneity checking we excluded observations with extraordinary values of revenue growth, profitability and equity and have got the final sample. The final sample consists of 3066 normal and 162 high-growth firms. The gazelle concentration in energetic industry is 5.02%. The value is higher than other analyzed industries in Russia and rest of world wide researches. Concentration among small gazelles is close to the sample value (5.18%). This concentration value is consistent with global trends [2], however, higher than previously studied industries in Russia [17-19]. Medium and large sized HGFs have concentration less than 4%. These values are closer to earlier calculated average concentration of gazelles in across middle-sized firms (3,09%) in Russia [18]. The pandemic hit the survival abilities of all enterprises. Only 62 firms (38%) were able to hold 'gazelle' status in 2020. In 2021 only 24 firms (15%) kept revenue growth over 20%. Survival ability if gazelles is one of the tricky features of this type of enterprises. Most of gazelles are not able to prolong extremely high rates of growth more than 3 year and lost this status on the next year after holding it [27-9]. These results are consistent with the trends previously identified by the authors [17-19]. The performance results of gazelles and normal firms with hypothesis testing in 2019 are presented in Table 1.

Table 1. High-growth and normal energetic firms' performance and ANOVA-tested hypotheses results, 2019

	Average value			One-way ANOVA	
	Sample	NormlF	HGF	F-value	Pr(>F)
Revenue growth rate	**0.127**	**0.094**	**0.759**	**174.903**	**0**
Return on sales (ROS)	**0.074**	**0.07**	**0.163**	**33.133**	**0**
Total-assets-turnover ratio (TATR)	2.694	2.664	3.265	1.673	0.196
Current-assets-turnover ratio (CATR)	3.816	3.803	4.086	0.666	0.414
Equity-to-assets ratio (EAR)	0.518	0.519	0.495	0.273	0.601
Employment growth rate	**0.056**	**0.042**	**0.325**	**54.639**	**0**

* *Bold-highlighted null hypotheses are not accepted at confidence level 1%, the differences*

between normal and high-growth firms are significant
Source: authors' calculations

High-growth firms demonstrate better performance than normal firms in 2019. The average revenue growth greater in 8 times than normal firms' rate. Both normal and high-growth firms have downtrend in revenue growth in 2017-2019. HGFs expanded employment by a third more, when normal firms grown by 4%. Solvency of gazelles is also better. Gazelles are more efficient in use of both in total and current assets. Gazelles tend more than normal firms to loan capital. The hypotheses testing shows the significant difference in revenue and employment growth as well as return on sales in 2019 between gazelles and normal firms in energetic industry. The performance results of gazelles and normal firms with hypothesis testing in 2020 are presented in Table 2.

Table 2. High-growth and normal energetic firms' performance and ANOVA-tested hypotheses results, 2020

	Average value			One-way ANOVA	
	Sample	NormlF	HGF	F-value	Pr(>F)
Revenue growth rate	0.076	0.071	0.164	4.419	0.036
Return on sales (ROS)	**0.071**	**0.067**	**0.138**	**21.266**	**0**
Total-assets-turnover ratio (TATR)	**2.555**	**2.485**	**3.885**	**8.913**	**0.003**
Current-assets-turnover ratio (CATR)	**3.684**	**3.615**	**4.988**	**7.009**	**0.008**
Equity-to-assets ratio (EAR)	0.531	0.532	0.504	1.221	0.269
Employment growth rate	**0.025**	**0.016**	**0.192**	**23.335**	**0**

***** *Bold-highlighted null hypotheses are not accepted at confidence level 1%, the differences between normal and high-growth firms are significant*
Source: authors' calculations

Pandemic provided significant challenges for firms and hit rest of firms. HGFs reduced the average revenue growth up to 16%, but hold the rate higher than normal firms. The pandemic caused reduction in the growth rate of gazelles [2,14,16]. Gazelles saved the leading positions also in employment creation [14]. The profitability of gazelles reduced by 2,5% and stated greater of normal firms. Normal firms' solvency decreased against the increasing of HGFs' rates in 2020. The efficiency didn't significantly differ in each type of firms. In 2020, the hypotheses about revenue growth differences is confirmed. However, we can confirm differences in HGF and normal firms' solvency (provided by Total and current-assets-turnover ratios). Profitability and employment growth differences are still significant. The performance results of gazelles and normal firms with hypothesis testing in 2021 are presented in Table 3.

Table 3. High-growth and normal energetic firms' performance and ANOVA-tested hypotheses results, 2021

	Average value			One-way ANOVA	
	Sample	NormlF	HGF	F-value	Pr(>F)
Revenue growth rate	0.17	0.171	0.156	0.098	0.754
Return on sales (ROS)	**0.07**	**0.06**	**0.137**	**25.991**	**0**
Total-assets-turnover ratio (TATR)	2.684	2.634	3.645	3.791	0.052
Current-assets-turnover ratio (CATR)	3.835	3.806	4.377	1.025	0.311

	Average value			One-way ANOVA	
	Sample	NormlF	HGF	F-value	Pr(>F)
Equity-to-assets ratio (EAR)	0.539	0.541	0.5	2.643	0.104
Employment growth rate	0.015	0.012	0.051	1.27	0.26

* *Bold-highlighted null hypotheses are not accepted at confidence level 1%, the differences between normal and high-growth firms are significant*
Source: authors' calculations

Normal firms in 2021 show atypically high revenue growth, which higher than HGFs' rate. Gazelles have reduced their ability to generate new jobs from 19% to 5%. The profitability and efficiency of gazelles and normal firms didn't significantly change in 2021. Solvency of normal firms approached the indicators the value of 2019. HGFs' solvency reduced both in total and current assets turnover. The hypotheses testing provides the significant differences only in profitability between HGFs and normal firms.

4 Conclusion

Energetic complex in Russia is an industry with high development potential. This industry accumulates high technologies, qualified personnel and complex technological processes. In Russia, there is a trend towards renewable energy sources. Enterprises tend to become 'green' and reduce harm to the environment. High-growth firms are source for economy growth. The coronavirus pandemic provided challenges for enterprises. The current studies, aimed to verify the consumption of better HGF ability to sustain in crisis, find not typical tendency across energetic industry gazelles. Firstly, the concentration of HGFs among Russian energetic firms is 5%. This value is higher than average values in other industries as well as whole economy value. Gazelles show higher performance rates across all assessed indexes (instead of equity-to-assets ratio) in 2019 in comparison with normal firms. Moreover, they confirm the leading positions in generating new jobs. The first year of pandemic (2020) hit the revenue growth of both types of firms. Despite this, HGFs have higher growth rates than normal firms. The average revenue growth rate of gazelles is 16% (in 8 times reduction), the normal firms' rate is 7% (2% reduction) in 2020. HGFs and normal firms' profitability decreased, but firm solvency and efficiency have grown. In 2020, gazelles also reduced the volume of newly hired employees in 2 times up to 19%. The second year of pandemic (2021) presented an atypical HGF behavior. Normal firms grew higher than HGFs in revenue. Profitability did not significantly change. Solvency and efficiency of normal firms grew. At the same time, solvency, efficiency and employment creation of gazelles decreased. The regression analyses find differences in profitability between high-growth and normal firms during 2019-2021 years at confidence level 1%.

The authors find the prospects for the future research in analysis of gazelles' performance in energetic industry in subsequent years. The other direction is detailed research of sample outlier and identifying common features of life cycle as well as reasons for decline or increase in performance trends. The authors aim to organize cross-country comparison of gazelle performance during pandemic.

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