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**Application of Heterogeneous Firm Theory Models to Identify
Competitiveness Factors of Russian Enterprises in Foreign Markets**

Specialty 5.2.3 – Regional and Sectoral Economics

Abstract of the Dissertation
for the degree of Candidate of Economic Sciences

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Relevance of the Study. Globalization has made a significant contribution to global economic growth. This growth has been made possible primarily through more efficient resource allocation, which in turn led to increased productivity, heightened competition, and reduced transaction costs. The processes of globalization have had a substantial positive impact on household incomes in many countries and have lifted hundreds of millions of people out of poverty worldwide, particularly in the largest Asian economies. However, while the overall economy benefits, increased economic interaction between countries can result in substantial losses for specific groups of economic agents. In «The Globalization Paradox», Dani Rodrik presents the following quantitative assessment: for every dollar of gain from full import liberalization in the United States, there is approximately \$50 of redistribution among different groups of agents. Thus, economic theory capable of adequately describing the complex processes of globalization becomes a crucial tool for identifying the groups that lose out from globalization. This is essential for enabling timely policy responses aimed at minimizing losses and securing support for the course of economic integration, which ultimately leads to accelerated economic growth.

Undoubtedly, a key component of globalization is international trade. The nature of international trade has constantly undergone and continues to undergo changes, which theory is compelled to keep up with. Before the Second World War, trade between countries was predominantly inter-industry in nature, which was quite successfully explained by classical models. However, by the second half of the 20th century, it had become evident that trade—especially between developed countries—was to a large extent intra-industry, and explaining and analyzing such trade required completely different types of models. The next shift occurred when researchers turned their attention to the behavior of individual firms. It was precisely the empirical evidence of significant firm heterogeneity that stimulated the development of the so-called "new new" trade theory. The deepening of trade theory and empirics to the level of individual firms should be considered fully justified, as it is companies—not countries or industries—that are the main actors in international trade. These companies act based on their own interests, which generally do not rely on the classical mechanisms of international trade theory. Therefore, a comprehensive understanding of the processes and consequences of international trade is impossible without studying firm behavior. Such studies are already being actively conducted using data from many countries, whereas for the Russian economy such works remain relatively scarce. At the same time, the extent to which the mechanisms emphasized in the models of the new new trade theory manifest themselves can point to ways of optimizing economic policy, thereby contributing to sustainable economic growth in Russia. However, due to the specific features of the Russian economy and a certain heterogeneity of the results presented in the

literature, the quantitative and qualitative conclusions accumulated in the literature should not be directly applied to the Russian case without appropriate empirical verification and quantification of these mechanisms using Russian data.

All these circumstances create a demand for studying the behavior of Russian firms in the context of their foreign trade activities. For many years, the Russian economy has faced the task of diversifying exports in favor of non-resource, non-energy goods, which is directly stated among the national development goals of Russia. Solving this task is impossible without understanding the mechanisms that determine the competitiveness of Russian products in foreign markets. This dissertation research is dedicated to the study of these mechanisms.

State of the Research Problem. The study is based on the systematization and application of theoretical and empirical approaches to analyzing firm behavior in the context of international trade within the framework of the new new trade theory (heterogeneous firm theory). This line of theoretical modeling is founded on the work of Melitz and has been developed in numerous studies focusing on various aspects of firm behavior in international trade. The most significant works from the perspective of theoretical analysis include studies by Bernard, Redding, Schott; Helpman, Melitz, Yeaple; Bastos; Costantini, Melitz, Melitz, Ottaviano; Bastos, Silva, Verhoogen, Mayer, Melitz and Ottaviano; Halpern, Koren, Siedl, Manova, Yu. From the perspective of empirical analysis, the most notable studies (in addition to those already mentioned) include works by Bernard, Jensen, Bradford, Pavcnik, De Loecker, Lileeva, Trefler, Manova, Zhang, Amiti, and Konings.

In the Russian economic literature, studies on this topic are significantly less numerous. Among the key works that examine the behavior of Russian firms in international trade while accounting for productivity heterogeneity, one can highlight the research conducted by Volchkova, Golovnya, Krasnopeeveva, Nazrullaeva, Peresetsky, Schetinin, Golikova, Gonchar, Kuznetsov, as well as publications involving the author of this dissertation.

In both the global and Russian economic literature, there are no studies that simultaneously examine, from both theoretical and empirical perspectives, the following interrelated aspects of firm behavior: imports, exports, product and input quality, product-country diversification, and productivity.

Research Objective and Tasks. The objective of the study is to theoretically and empirically identify the factors and mechanisms through which these factors influence the productivity and export competitiveness of Russian enterprises, and to develop policy recommendations based on the obtained results.

To achieve the stated objective, the study sets and addresses the following tasks:

- reviewing and systematizing modern theoretical and empirical approaches to analyzing firm behavior in international trade, taking into account heterogeneity in productivity;
- formulating substantive hypotheses about the factors of company competitiveness in foreign markets based on theoretical analysis using heterogeneous firm models;
- collecting, processing, and constructing the dataset, as well as calculating auxiliary variables for the empirical study of enterprise competitiveness factors in foreign markets;
- estimating the total factor productivity of enterprises in the Russian manufacturing sector;
- developing and implementing empirical methodologies based on Russian data for econometric testing of the formulated substantive hypotheses about the factors of firm competitiveness in foreign markets;
- developing policy recommendations based on the synthesis of the obtained theoretical and empirical results.

Object and Subject of the Study. The object of this dissertation research is Russian manufacturing enterprises during the period from 2004 to 2021. The subject of the study is the dynamics and spatial variation of measures of firms' production and export competitiveness depending on various factors predicted by heterogeneous firm theory.

Theoretical and Methodological Framework of the Study. The methodological framework of the dissertation research represents a comprehensive approach that combines complementary methods of theoretical and econometric modeling, as well as elements of comparative analysis. Theoretical modeling is conducted using modern models of heterogeneous firm theory and their modifications. Econometric modeling, aimed at identifying and quantitatively describing patterns and causal relationships in the behavior of Russian enterprises, is based on the application of panel data analysis methods (fixed and time effects models), semi-parametric estimation, the Difference-in-Differences method, logistic regression (logit model), L1-regularization via LASSO, and Propensity Score Matching.

The information base of the study consists of data from the Federal Customs Service of the Russian Federation (FCS), Rosstat, the SPARK-Interfax database, RUSLANA, UN Comtrade, BACI CEPII, the World Bank, the Federal Tax Service (FTS), and other sources.

The validity and reliability of the research results are based on

- the application of modern models of heterogeneous firm theory and their modifications, whose predictions are consistent with the behavior of firms in various countries, for theoretical analysis and the formulation of the substantive hypotheses of the dissertation research;
- the use of representative and reliable data sources;
- the application of modern methods for panel data analysis (fixed and time effects models), semi-parametric estimation, the Difference-in-Differences method, logistic regression (logit model), L1-regularization via LASSO, and Propensity Score Matching to identify and quantitatively describe patterns and causal relationships in the behavior of Russian industrial enterprises.

Statements submitted for defense and representing scientific novelty:

1. A methodology for the econometric estimation of total factor productivity (TFP) of enterprises in the Russian manufacturing sector has been proposed and implemented. Distinctive features of the estimates obtained and used in this dissertation research include the simultaneous accounting for intermediate input costs; inclusion of observations with negative value added; consideration of firm exit from the dataset and correction for potential endogeneity of productivity and the use of mobile production factors (using the semi-parametric Levinsohn-Petrin approach); and a long observation period. The resulting estimates indicate a 21% increase in average TFP (30% in weighted TFP) in the manufacturing sector over the period 2006–2021, corresponding to an average annual constant TFP growth rate of 1.3% (1.8%). (Section 2.5. "Competitiveness of Industrial Product Manufacturers" of the Passport for Scientific Specialty 5.2.3 Regional and Sectoral Economics).

2. A methodology has been proposed and applied for the econometric estimation of the trade premium (in terms of TFP) and the effect of foreign trade on the TFP of Russian industrial enterprises across different trade directions, with a distinction between unfriendly and neutral partner countries. It is shown that the selection effect contributes more to the trade premium across all trade directions than the positive impact of foreign trade on productivity. In exports, the manifestations of the selection effect are comparable between groups of unfriendly and neutral countries, whereas in imports, the import premium is higher for unfriendly countries precisely due to selection. This reflects the difficulties Russian companies faced in accessing the markets of unfriendly countries even before the introduction of sanctions: only the most productive firms found it feasible to source goods there. In contrast, export barriers to neutral markets were lower, and the positive effect on TFP was higher. The result indicates that, provided successful reorientation, Russia can continue to reap the benefits of foreign trade in terms of productivity

growth among participating firms. (Sections 2.7. "Foreign Economic Activity of Industrial Companies and Enterprises", 2.5. "Competitiveness of Industrial Product Manufacturers" of the Passport for Scientific Specialty 5.2.3 Regional and Sectoral Economics).

3. A methodology has been proposed and applied to evaluate the impact of support measures for non-resource exporters on the export activity of Russian companies in 2016–2018. The results show that, on average, already in the year following a company's application for export support, its foreign market deliveries increase by an additional 12 percentage points. This growth is driven primarily by the expansion of the geographic reach and product range of exports, rather than by an increase in export intensity. A conservative estimate of the volume of additional exports resulting from non-resource export support measures amounts to USD 1.4 billion in 2019. (Sections 2.7. "Foreign Economic Activity of Industrial Companies and Enterprises", 2.5. "Competitiveness of Industrial Product Manufacturers", 2.8. "Industrial Policy" of the Passport for Scientific Specialty 5.2.3 Regional and Sectoral Economics).

4. A methodology has been proposed and applied to analyze the spatial variation in Russian export prices by separating the effects of price discrimination and selection. The application of this methodology empirically reveals the key role of quality-based selection mechanisms in shaping the spatial variation of Russian export prices. It is additionally shown that the supply of relatively higher-quality imported inputs plays an important role in shaping product quality and success in foreign markets. This suggests that, when choosing between investments in cost reduction and investments in quality improvement, other things being equal, preference should be given to enhancing consumer characteristics of products—especially when targeting hard-to-access export markets. Access for Russian producers to foreign markets for intermediate goods will promote improvements in product quality and the development of complex export directions. (Sections 2.7. "Foreign Economic Activity of Industrial Companies and Enterprises", 2.5. "Competitiveness of Industrial Product Manufacturers", 2.6. "Pricing in Industry" of the Passport for Scientific Specialty 5.2.3 Regional and Sectoral Economics).

5. A methodology has been proposed and used to assess the contribution of the import supply shock of intermediate goods from China to the dynamics of Russian industrial production and exports. It has been shown that industrial exports are more sensitive to disruptions in the supply of intermediate goods, indicating a higher intensity of imported input usage by exporting firms. (Section 2.7. "Foreign Economic Activity of Industrial Companies and Enterprises" of the Passport for Scientific Specialty 5.2.3 Regional and Sectoral Economics).

6. The predominant role of specific (product-level) competencies of Russian firms in shaping competitiveness in foreign markets has been empirically identified. This result implies

that, despite the perceived growing importance of firm-wide technologies and business process management practices, as well as the effects of firm-level economies of scale and the trend toward enterprise consolidation, the production technologies of individual goods remain a crucial factor in determining external competitiveness in the operations of modern industrial enterprises. (Sections 2.7. "Foreign Economic Activity of Industrial Companies and Enterprises", 2.5. "Competitiveness of Industrial Product Manufacturers" of the Passport for Scientific Specialty 5.2.3 Regional and Sectoral Economics).

7. Based on the frequency of co-occurrence of types of economic activity in the production and export portfolios of firms, a composite measure has been constructed that captures various aspects of revealed technological proximity between types of economic activity. Using this measure, the influence of technological proximity of production to the structure of comparative advantages of Russian regions on the export competitiveness of regional enterprises has been empirically identified. The obtained result implies that when setting priorities for the sectoral transformation of a country's or region's economy, it is necessary to take into account existing technological linkages between industries. A higher likelihood of having the necessary set of production "ingredients" in a given location can be revealed through an analysis of the region's comparative advantage structure and the technological proximity of potential industries to the already established sectoral specialization. This approach not only enhances the effectiveness of public policy but also provides firms themselves with guidance for choosing directions of diversification based on their current competencies and production capabilities. As a result, support measures can be targeted where both growth potential and organizational and technological readiness for expanding export activities are present. (Sections 2.7. "Foreign Economic Activity of Industrial Companies and Enterprises", 2.5. "Competitiveness of Industrial Product Manufacturers" of the Passport for Scientific Specialty 5.2.3 Regional and Sectoral Economics).

Thus, the **scientific novelty** of the research lies in

- the application of theoretical models from the new new trade theory to identify the factors of competitiveness of Russian industrial enterprises in foreign markets;
- the development and application, taking into account the specifics of Russian data, of methodologies for econometric estimation of total factor productivity of industrial enterprises, the effects of foreign trade activity on productivity, the effects of export support measures on firms' export activity, the direction and magnitude of quality-based selection effects into foreign markets, the impact of exogenous supply shocks of intermediate goods on production and exports (considering the magnitude of the shock and the role of goods in output formation); and the

methodology for calculating a measure of revealed technological proximity between types of economic activity and assessing the influence of technological proximity to the structure of regional comparative advantages on export dynamics and product assortment evolution.

Theoretical and Practical Significance of the Study. The conducted research has resulted in significant theoretical and applied findings. The elements of scientific novelty presented above can be regarded as a contribution to the expansion of knowledge about the factors influencing the competitiveness of Russian enterprises in foreign markets. The practical significance lies in obtaining concrete empirical results that illustrate the mechanisms behind the formation of firms' competitiveness in foreign markets. These results provide a basis for formulating economic policy recommendations. Moreover, the findings can be applied by:

- government authorities (such as the Ministry of Economic Development of the Russian Federation, the Ministry of Industry and Trade of the Russian Federation), and development institutions (e.g., the Russian Export Center JSC, VEB.RF) to define priority sets of measures aimed at developing Russian foreign trade, enhancing the competitiveness of Russian enterprises, and advancing Russian industrial exports;
- manufacturing enterprises in developing export-oriented strategies for improving competitiveness, expanding product lines, and diversifying export portfolios and geography;
- educational institutions for teaching purposes, to illustrate the mechanisms through which various factors affect export competitiveness, and to demonstrate methods for evaluating the effects of a potentially wide range of economic measures on enterprises and industries.

Approbation of the Research Results. The main provisions and findings of the dissertation research were presented by the author at the following conferences:

1. Section report titled “Geographic Heterogeneity of the Trade Premium and the Effect of Trade on the Productivity of Russian Enterprises” // April 15, 2025 // Moscow // XXV Yasin (April) International Academic Conference on Economic and Social Development;
2. Section report titled “The Role of National Development Institutions in Diversifying Russian Exports” // September 12, 2023 // Yekaterinburg // Fifth Russian Economic Congress (REC-2023);
3. Presentation titled “Factors of Competitiveness in Foreign Markets” // June 6, 2023 // Moscow // Conference “Russian Industrial Enterprises under Non-Economic Shocks” at HSE University;

4. Section report titled “The Impact of External Shocks on Enterprises in Russian Manufacturing” // April 12, 2023 // Moscow // XXIV Yasin (April) International Academic Conference on Economic and Social Development;

5. Section report titled “Import Liberalization as a Means of Expanding Russia’s Non-Resource Exports” // April 5, 2022 // Moscow // XXIII Yasin (April) International Academic Conference on Economic and Social Development;

6. Section report titled “The Export Assortment of Russian Enterprises and Proximity to Local Comparative Advantages” // December 23, 2020 // Moscow // Fourth Russian Economic Congress (REC-2020);

7. Section report titled “Patterns in the Formation of Export Assortments by Russian Firms” // May 28, 2020 // Moscow // XXI April International Academic Conference on Economic and Social Development.

The results of the dissertation research at various stages were also presented at academic seminars held by the Gaidar Institute for Economic Policy, the Russian Foreign Trade Academy under the Ministry of Economic Development of the Russian Federation, the Institute for Applied Economic Research of RANEPA, and the Center for Macroeconomic Analysis and Short-Term Forecasting (CMASF).

List of the Author’s Publications Related to the Research Topic. The main provisions of the dissertation research are presented in four publications in journals included in the list of leading peer-reviewed scientific journals and publications approved by the Higher Attestation Commission (VAK) (Category K1):

1. Kuznetsov D. E. Pricing Patterns of Russian Firms in Export Markets / Co-author: Knobel A. Yu. // Journal of the New Economic Association, No. 41(1), 2019.

2. Kuznetsov D. E. Analysis of the Contribution of Productivity Components to the Competitiveness of Russian Exporters // Russian Economic Development, No. 27(1), 2020.

3. Kuznetsov D. E. Export Assortment of Russian Enterprises and Proximity to Local Comparative Advantages // Economic Policy, No. 16(1), 2021.

4. Kuznetsov D. E. The Effect of the Reduction in Intermediate Imports from China on Russian Industry // Journal of the New Economic Association, No. 65(4), 2024.

Chapter One of the dissertation, «Existing Approaches to the Theoretical and Empirical Analysis of Firm Behavior in International Trade», addresses the diversity of models within the new new trade theory. To provide a comprehensive understanding of the development stages of international trade theory, the chapter briefly reviews the main preceding theoretical concepts and

their underlying mechanisms. This allows the heterogeneous firm theory to be placed within the broader context of the evolution of approaches to trade analysis, while also highlighting mechanisms that, in one form or another, are present in the new new trade theory as well. The discussion then turns to a detailed examination of the foundational model of this theory — the Melitz model. The second part of the review outlines the main theoretical and empirical directions in the study of firm behavior in international trade. The main objective of this section is to demonstrate the wide range of research questions that can be addressed using the models of the new new trade theory. The focus is placed on studies that examine aspects of firm behavior that are most relevant to the goals and tasks of this dissertation. Nevertheless, the final section of the chapter mentions other important strands of modeling and empirical research that are in some way connected to the heterogeneous firm theory.

Chapter Two, «Theoretical Analysis of the Factors Shaping Company Competitiveness in International Trade», presents an analysis whose main outcome is a set of substantive hypotheses to be tested using Russian data. The analysis focuses on the following closely interrelated aspects of firm behavior: imports, exports, product and input quality, product-country diversification, and productivity. As part of the theoretical analysis, a number of simplifying assumptions are made to abstract from second-order effects, which are expected to only slightly adjust quantitative conclusions without affecting them qualitatively. Moreover, examining different aspects of firm activity separately through distinct models allows the analysis to remain manageable and interpretable. This approach provides a clear demonstration of the mechanisms of interest and results in the formulation of ten substantive hypotheses to be tested on Russian data.

The main part of Chapter Three, «Empirical Analysis of the Behavior of Russian Enterprises in International Trade» consists of the econometric testing of the hypotheses put forward in Chapter Two using Russian firm-level and industry-level data. The results obtained support the existence of a trade premium and a positive effect of international trade on productivity; a positive effect of export support measures on the product-country diversification of Russian firms' exports; evidence of quality-based selection into export markets; the positive role of the quality of imported intermediate goods in shaping export competitiveness; the heightened sensitivity of industrial export dynamics to import supply shocks of intermediate goods; the determining role of the product-specific component of productivity in export competitiveness; and the influence of local comparative advantages on the evolution of export assortments among firms in Russian regions. The chapter concludes with a synthesis of the results and the development of policy recommendations.

The conclusion summarizes the findings of the research and outlines, from the author's perspective, promising directions for further studies on the behavior of heterogeneous firms in Russia.