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THE ROLE OF INNOVATION AND GLOBALIZATION STRATEGIES IN POST-CRISIS RECOVERY

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The aim of the research is to conduct an empirical investigation and reveal what types of globalization and innovation strategies in turbulent and unfavorable regional institutional environment are most likely to be associated with different trajectories of Russian manufacturing firms' performance in 2007-2012. We employ the results of empirical survey of 1000 medium and large enterprises in manufacturing (2009) linked to financial data from Amadeus database and the data on the regional institutional environment. We test that (1) introduction of innovations before the crisis ceteris paribus helped the firms to successfully pass the crisis and recover. We expect that (2) companies that became globalized before the crisis (via importing of intermediate and capital goods; exporting; FDI; establishment of partner linkages with foreign firms) ceteris paribus are more likely to successfully pass the crisis and grow. And (3) propose the positive effect of synergy of innovation efforts and globalization strategy of the firm. We expect that the abovementioned factors are complimentary and reinforce the ability of the firm to recover after crisis shock. We found strong support for the hypothesis that firms financing introduction of new products before the crisis and simultaneously managed to promote and sell them on the global market were rewarded by quick return to the growing path after global crisis. Other strategies, i.e. solely innovations without exporting play insignificant role while exporting without attempts to introduce new products contribute even negatively to post-crisis recover. Institutional environment also matters: in the regions with less level of corruption firms were more likely to grow after the crisis.

Keywords: firm performance; globalization; innovation; manufacturing firms; strategy

JEL Classification: Z.

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1 INTRODUCTION

The links between the globalization of the World economy and economic growth have been extensively researched in the last decades. Economists on both theoretical and empirical level were focusing on the positive and negative consequences of stronger involvement in international trade and cooperation for the national economies, for the specific sectors as well as on the performance and behavior patterns of individual firms. At the national level the impact is ambiguous and differ by countries (McMillan&Rodrik 2009), while for firms on the average internalization has a positive effects on the growth of productivity (Cavalcanti&2003, Fernandes 2007). This positive impact is usually attributed to several interlinked processes.

First, the globalization provides new opportunities for expanding sales to new markets. Second, the access to new suppliers provides the firms more diversified choice of inputs (materials, components, etc.) and to select better options in terms of price to quality ratio. Third, firms get access to new technologies and equipment with lower transaction costs (Dahlman 2014). Fourth, globalization drives innovations through both learning-by exporting and learning-by-importing mechanisms (Kasahara, Rodrigue 2008 Silva et al, 2012, 2013)). Fifth, globalization provides extended access to external financing, especially in the form of FDI which also may generate additional positive externalities for knowledge transfer (for literature review see Gerschewski 2013). And, sixth, internalization facilitates international networking, in particular the formation of long-term relations and partnerships between different firms and organizations which also low down transaction costs of knowledge transfer and intensify the learning processes (Mowery et al., 1996; Gomes-Casseres, Hagedoorn, and Jaffe, 2006).

Of cause, the internalization leads to increased competitive pressure which speed-up the "creative destruction" and creates additional challenges for less-productive firms. Besides, the internalization through participation in global value-chains (GVC) while facilitating productivity and growth may also lead to lesser diversification and create additional risks for a firm, especially if it is included in the lower-end of GVC (Altomonte et al, 2012, Baldwin (ed.), 2009; Brancati et al., 2015).

It should be noticed that most of the evidence for positive impacts of globalization for firms' performance have been evaluated for the periods when global economy and global trade demonstrated growth and crises were either local or not prolonged. Economic Crisis of 2008-2009 being a major shock to most of the countries has motivated studies aimed at revealing factors of firms' survival and sustainability of firms' performance, including the

assessment of relationships between firms globalization strategies and their performance (Kolasa et al, 2010; Medina, 2012; Burger et al, 2014; Arighetti et al, 2015).

For Russian economy assessment of sustainability is specifically interesting as for quite a long time Russia enjoyed almost a decade (1999-2008) of high and stable rates of growth. Favorable macroeconomic conditions on one hand provided opportunities for growth and modernization for Russian firms. In particular, during the period of growth a lot of Russian firms became more open to the World, increased participation in the foreign trade, acquired foreign co-owners, build up their international partnerships, etc. On one hand, higher competition with imported goods also facilitated innovations and modernization at the firms' level. On the other hand, high rates of economic growth, relatively easy access to external financing, etc. softened up budget constraints and slowed down the processes of "creative destruction", i.e. crowding out of less efficient firms by more efficient. Thus, the relatively high level of heterogeneity in terms of productivity and other performance indicators, in particular in Russian manufacturing persisted (Gonzalez et al, 2013).

Russian manufacturing has been strongly hit by the crisis of 2008-2009 and manufacturing has been hit harder than other industries. During the acute phase of the crisis (in Russia it continued since the last quarter of 2008 till the second quarter of 2009) the drop of production in manufacturing was about 16%, comparing, for example, to about 5% in agriculture and trade. The recovery measured at macroeconomic level was comparatively quick and the industrial production reached the pre-crisis level. Still, after 2010 the growth rates in manufacturing began to decline and by the end of 2013 fell to near zero level.

This paper mostly focuses on the consequences of the crisis for more globalized firms, which has been prior to the crisis more active in different international activities. We are interested in verifying the hypothesis that active globalization at a firm level facilitates the performance during the crisis and post-crisis recovery period using the integrated database of the survey data and objective statistics.

2 DATA

We use several data sources for our research (Fig 1.). The main source of empirical data comes from results of large-scale empirical survey about of 1000 medium and large enterprises in 8 two-digit manufacturing industries (by NACE code) conducted by face-to-face interviews with top-managers in more than 40 Russian regions in 2009 (for detailed description of the database see Kuznetsov *et al.* 2011). The questionnaire covers a variety of

issues on competitiveness and behavior patterns of firms, including their internationalization and innovation activities in pre-crisis period of 2006-2008, i.e. – export propensity and geographical structure of exports, importing of intermediaries and equipment, availability of foreign strategic partners, financing of new product development and introduction of new technologies in 2008. The initial survey data were linked to RUSLANA/Amadeus data on firms' sales. As only the firms with reported data for all years in 2007-2012 time period were included into the analysis the initial sample reduced to 670 observations.

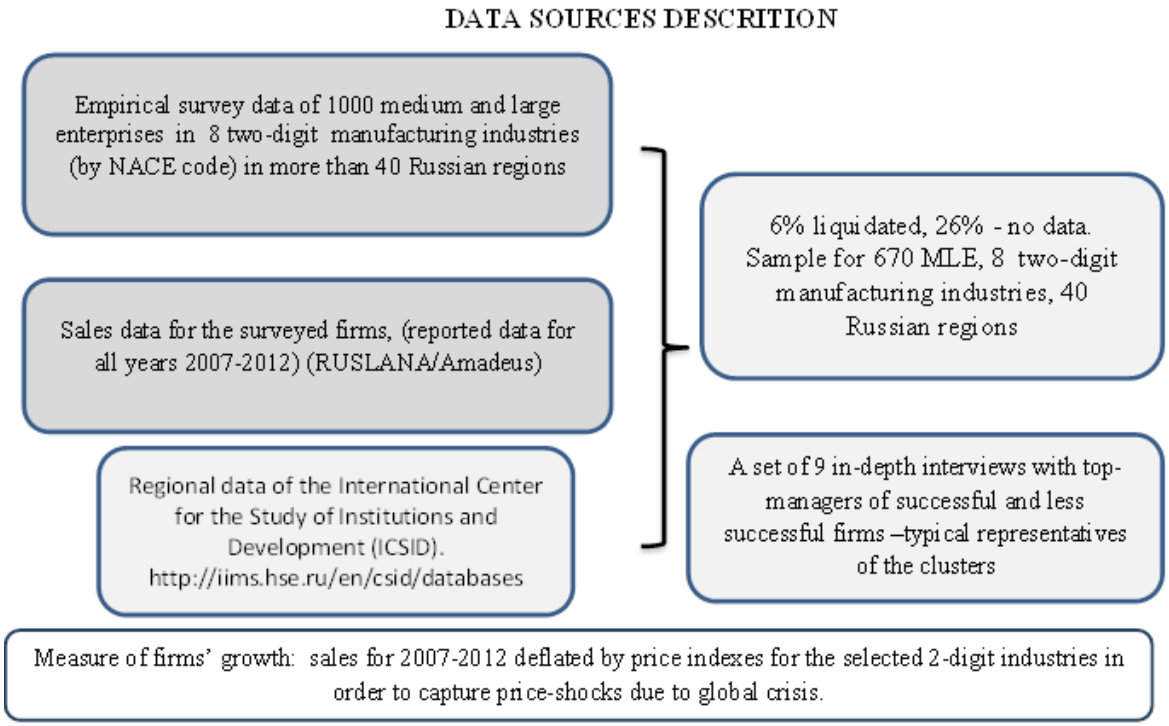

Fig.1. Data description

As a measure of firms' growth we use an indicator of sales in 2007-2012 deflated by price indexes for the selected 2-digit industries in order to capture price-shocks due to global crisis.

3 METHODOLOGICAL APPROACH AND EMPIRICAL STRATEGY

In our previous research using the procedure of hierarchical cluster analysis applied to the general population of Russian medium and large manufacturing firms as well as to our sample we revealed four stable clusters describing different trajectories of firms' growth in 2007-2012 (Ermilova et al, 2015).The sales for each firm are standardized using Z-scores (Z-values) in relation to the average sales amount for the specific companies for the total period of 2007-2012. As a result of the clustering procedure four stable clusters of crisis and post-crisis trajectories of the standardized output have been selected. Among them 92% of firms

got into two large clusters. First cluster consists of firms with a classical V-type growth trajectory - decline in the crisis year of 2009 and then quick recovery and return to the growth path. Second cluster consists of firms which after the fall of sales in crisis have not managed to recover to pre-crisis levels (L-type trajectory). In the sample these two clusters cover 32% and 60% of firms, correspondingly, and they are the objects of our quantitative research.

Additionally, qualitative data from in-depth interviews with top-managers of manufacturing companies was used to develop hypotheses for testing. The sample of firms for interviewing was constructed in a way to have typical representatives from two abovementioned largest clusters of firms (for detailed description of the sample see Annex 1). To define them we estimated the coordinates of clusters' centers based on median of sales. Median as a measure of clusters' center coordinates is a preferable metric as it smoothes out the fluctuations at the ends of distribution. After determining the coordinates of the cluster centers, we estimated the distance of the individual object to the center of its cluster using the same distance measure which we used in clustering procedure, i.e. the squared Euclidean distance. Finally, for the cluster core boundary we took the lower quartile of distance to the cluster center (Ermilova et al, 2015). The total number of in-depth interviews is nine: four interviews with representatives of "V-type" cluster and fives interviews with the respondents from "L-type" cluster. Interview guide included questions about the firm performance before, during and after the crisis of 2008-2009 and key internal and external factors that facilitated or constrained firms' growth. We were interested in modernization, innovation and internationalization strategies implemented by the firm. The respondents were also asked to evaluate ex ante the firms' strategic choice before the crisis in a sense of success or failure in providing firm's resistance to crisis shock and post-crisis recovery. The interviews with top-managers of companies were recorded in 2014-2015, then transcribed verbatim and classified by core topics of our research. In-depth interviews' sample represents firms in 5 manufacturing industries located in 6 subjects of Russian Federation.

In this paper we, first, test the impact of firms' internationalization strategies before the beginning of the global crisis of 2008-2009 on the probability of quick recovery and post-crisis sustainable growth. We explore a variety of internationalization strategies which the firm could follow: exporting, importing of intermediaries or equipment, establishment of strategic partnerships with foreign partners or FDI of foreign co-owner. We take in to consideration several important characteristics of exporting: the possibility of its non-linear effect of firms' growth during recession, the impact of geographical destination (CIS

countries vs non-CIS countries) and the product scope of exporting, i.e. weather the firm had financed introduction of new products to the market in pre-crisis period. We treat this fact as a proxy for possibility to export advanced products for more demanding customers. We also took into consideration the location of the enterprise in terms of socio-economic and institutional diversity of Russian regions and urban settlements. Both characteristics reflect different possibilities of recovery: inter-regional differences in structural diversity of Russian regional economy, the great inequality in per capita domestic product provide unequal opportunities for post-crisis growth of the economy. The location of firms is also taken into consideration: according to estimations of economic geographers (Nefedova et al, 2010) only cities with population of 250, 000 and above (majority of oblast-level regional centers) were well positioned to meet the challengers of crisis. An importance of heterogeneity in the regional institutional environment in Russia due to the variation of local regulation, different economic policies pursued by local authorities, the quality of institutions (e.g. the level of corruption), etc. also is taken into consideration in line with recent studies (Blagojevic, S. and Damijan, J. , 2013, Sharafutdinova and Kisunko, 2014, Ledyaeva et al, 2015). Among different indicators of institutional environment in the Russia's regions we choose corruption as a main one characterizing business-state relations and ease of doing business. The strong negative influence of corruption on both innovation capacity and performance of Russian firms was highlighted in the literature (Chadee and Roxas, 2013).

It should be stressed that in this paper we do not explore the survival of firms due to the crisis shock as we are focusing on types of the post-crisis dynamics. This definitely may be a source of selection bias which traditionally in the literature is tackled by using a two-stage sample selection à la Heckman (see, for example, Arrighetti et al, 2015). Though in our case the sample consists mostly of medium and large enterprises and relatively few of them (6% of the sample) were forced out of activity (through bankruptcy or mergers) due to the crisis.

HYPOTHESES

In this paper we test three main hypotheses. Our propositions are based on both literature review and empirical evidence we obtained from in-depth interviews with the respondents from two largest clusters with different paths of post-crisis recovery. Our first hypothesis links the dynamics of sales growth with innovation activity which the literature in line with Shumpeterian view suggest to be one of the main determinants of firm's growth (Aghion et al, 2015; Coad and Rao, 2008; Coad, 2009; Geroski and Machin, 1992; Geroski and Toker, 1996; Hall and Mairesse, 2006). Though the economic crisis had a significant

negative impact on innovation activity of Russian firms this impact was less pronounced for the firms pursuing the strategy of new product development in contrast to the firms involved in gradual improvement of products and processes (Kuznetsov & Simachev, 2010). We found an evidence of different innovative behavior of the successful and failed firms in our qualitative research (no matter of the fact weather new products were the results of in-house or outsourced R&D). For example, one of the firms in V-type cluster mentioned that: *"Our sales have been growing continuously since 2000 because our [multinational] mother-company transferred to us technologies for new pharmaceutical products. As soon as we get start producing a new product - our sales grow. It was like this before the crisis, during and after the crisis. [During the crisis] the product structure had changed but overall sales volume did not"* (V4)[4].

Another option to provide quick access to know-how was acquiring of knowledge and competencies by M&A: *"Our firm has been very successful: in 2005-2008 we grew by 40-45% annually, in 2009 sales fell by 17% but starting from 2000 we continued showing 2-digit growth rates [due to new know-how]. Know-how can be acquired in different way. One option was the establishment of joint venture … and we have created two such ventures. Then we bought out their share and, more than that, sometimes acquired those companies. We have bought in Italy exactly the firms which supplied us with new products. We start with importing then start localization. … Our strategy – introduction of new more technologically advanced products with higher value added"* (V2).

Contrary, a respondent from L-type cluster explained the problems in company's market position by the missed in-time opportunities to introduce new products to the market: *"As I have mentioned, we stopped developing. We continue to ride a horse we have saddled in the 90-es. If we were looking forward we would buy more flexible production lines which allow easily reconfigure and multiply high-precision operations [for new products]"* (L5). So, we make a proposition that:

H1: Financing of new product development before the crisis ceteris paribus helped the firms to successfully pass the crisis and recover.

Our second hypothesis propose that internationalization activities of the enterprises in pre-crisis period (exporting, importing of intermediaries and equipment, establishing of strategic partnerships with foreign partners and availability of foreign co-owner) matter for

[4] Here and further in this text V# – refers to the interview with the to-manager of the V-type firms, L – for interviews who top-managers of the L-type firms. For more detailed description of respondents see Annex 1.

the speed of recovery. We presume that according to self-selection of better performing firms to exporting and importing driven by the costs of internationalization (Melitz, 2003; Melitz and Redding, 2012), they could be more successful than locally oriented and, consequently, less productive firms in coping with crisis and exhibit faster recovery to the growth path.

Keeping in mind that foreigners initially bought more efficient firms (Sabirianova et al, 2012; Fons-Rosen *et al.* 2014) and that foreign-owned firms and local internationalized firms are, in general, more productive (Helpman et al, 2003), manufacturing firms with foreign ownership on the average were found to be more successful in overcoming the crisis (Alfaro and Chen 2012, Kolasa *et al.* 2010, Varum and Rocha 2011). However, these potential advantages could disappear due to global character of the crisis and in case the main firm's markets suffered more than others internationalization could become a disadvantage (Burger et al, 2014), especially if a large share of sales goes to the global market. Citing one of the top-managers from the V-type cluster: *"We have been growing by about 20% annually in 2005-2008. [The growth was based on trade within the Custom Union -- Kazakhstan, Belorussia].] Andeverything is going well on those markets with share of imported components of no more than 10-12%. … But entering other export market is a long process. Mainly it is a problem of finding a partner, learning on the specifics of each market. It's simple: …if we have less than 30% of European components we'll never enter European market"* (V3).

H2: companies that became globalized before the crisis (via importing of intermediate and capital goods; exporting; FDI; establishment of partner linkages with foreign firms) ceteris paribus are more likely to successfully pass the crisis and grow.

Our third hypothesis proposes the positive effect of synergy of innovation efforts and globalization strategy of the firm. High-productivity plants were found to be more likely to self-select into both R&D and exporting (Aw et al, 2011) while the direction of this link is not clear: there is an evidence that both exporting and importing induce innovations in developed and transition countries (Gorodnichenko et al, 2009; Altomonte et al, 2013; Golikova et al, 2012; Gonchar and Kuznetsov, 2015) and that product and process innovation might drive exports at firm level (Cassiman and Golovko 2011). The effect of synergy between exporting and innovation was found to be significant in terms of future productivity and survival of firms (Castellani and Zanfei, 2007; Aw et al, 2011; Ito and Lechevalier, 2010) and we expect it to be positively correlated with growth opportunities of firms as well. Our respondent in V-type cluster stated that strategy oriented on innovations provides success on

exporting and overall on financial sustainability and growth opportunities of company: *"In 2005-2008 our sales revenues increased also 3 times in euro. This is an indicator of good quality of our managerial decisions. The main focus was on the changes in product portfolio, i.e. on searching new products. Every year we introduce to the market a dozen of new products. We export our products to 16-18 countries. The pharmaceutical market didn't suffer from the global crisis"(*V1).

Contrary, if the company didn't invest in innovations and improving of the core products in time, it could lose, first, export markets with more demanding clients and later weaken market positions on the local market as well. Our respondent in L-type cluster provided us with the following story of failure: *"We used to export quite significantly. Mostly for some reasons to Greece, Italy, Syria, Spain France, Germany. Even Lebanon. But recently export has been squeezing…And there were a lot of obstacles - with documentation, transporting and the client's demands. Clients are far away and it's difficult to work with them…Sales volume, for example – it has been growing all the time in 2005-2008. … But I do not think this was development. To introduce new products, technologies – we have not had this for quite a long time. … And now we have kept only 30% of former sales, I should say, i.e. sales dropped down significantly"* (L4). So, we expect a significant role of synergy of innovation and exporting firm strategy and propose that:

H3: companies involved in product innovation and exporting before the crisis are ceteris paribus more likely to follow V-type trajectory of growth.

4 THE ECONOMETRIC MODEL AND ESTIMATION RESULTS

In all specifications the dependent variable that is the probability for a firm to find itself in V-type cluster, described in the previous section (i.e. the probability for a firm to successfully overcome the crisis and to return quickly to the growing path). This dummy variable takes value "1" for enterprises, that are classified as firms that recovered quickly (V-type cluster) and value "0" for companies with L-type dynamics of sales.

The regression equation takes the following form:

$$Pr\,(Crisis\_success) = \alpha * Xi + \beta * Individ\_controls + \gamma * Sectoral\_controls + \\ + \delta * Regional\_controls + \mu * Location\_controls + \eta * Institutional\_controls + \varepsilon \quad (1)$$

where *Xi* is a set of key explanatory variables (innovation and internalization indicators);

Individ_controls represents the set of firm-level control variables.

Sectoral_controls represents 2-digit industry dummies, Location_controls – is a dummy variable for regional capitals (including Moscow and St.Petersburg).

Regional_controls represents the set of regional control variables.

Institutional_controls are represented by the regional level of corruption.

Below we describe variables used in the estimations:

EXP_SHARE08 – the share of export revenues in the total sales of the firm in 2008, varying from 0 to 1;

SHARE_IMP_RAW08 – the share of imported intermediates in the total amount of intermediates input in 2008, varying from 0 to 1;

SHARE_IMP_EQ08 – the share of imported equipment in the total value of investments *into* equipment, %;

We presume that the requisites for export may be different for different destinations. In particular, export to CIS (i.e. former republics of the Soviet Union) may be determined by long-time economic and technological relationships between firms and other "non-market" factors. Thus we control for is as by including following variable:

EXP_DEST – categorical variable, firms being divided to four groups: 1- no export, 2 – more than 90% of export going to CIS countries, 3 – more than 90% of export going to non-CIS countries, 4 – with no certain preferences in the geography of export.

NEW_FOR_PART – is a dummy equals 1 if a firm acquired new foreign strategic partner in the three years period prior to the crisis (2006-2008) and zero otherwise. We use strategic partnership as a proxy for international network-building as a part of internalization strategy of the firm prior to the crisis.

NEW_PROD – is a dummy variable equals 1 if a firm introduced new product(s) prior to the crisis (2006-2008) and zero otherwise; we use this variable as a proxy for measuring product innovations as a part of firm's strategy prior to the crisis.

The following block of variables are used to catch the possible effects of ownership specific features:

HOLDING – a dummy variable equals 1 if a firm belongs to a group of companies and zero otherwise; we presume that belonging to a group may limit the companies choice of strategies, in particular if a firm is not the head company of a group.

FOREIN_OWN08 – a dummy variable equals 1 if there is a foreign co-owner among the owners of a firm in 2008 and zero otherwise; it is the only and rather crude indicator for FDI available to us: we do not know the share of stock belonging to foreign co-owner, there

may be a "quasi-foreign" owner, i.e. Russian investor investing through the off-shore schemes.

STATE_OWN08 - a dummy variable equals 1 if the state (either federal, regional or local) is a co-owner of the enterprise in 2008 and zero otherwise.

LP2007 - Labor productivity prior to the crisis (in 2007) is included to eliminate the path-dependence effect as it is natural for relatively more productive firm to have greater chances of success *in* overcoming the consequences of the crisis. As we do not have information on the value added for our sample of firms we use a proxy: the logarithm of a ratio of individual firm's output per employee indicator to the industry median level of this indicator. I.e. the indicator is negative for firms with output per employee level below the median value for the industry and positive for the firms above the median level.

GR_SIZE07 – the size of a firm prior to the crisis in terms of employment is included for the same reason – to eliminate path-dependence effect as larger firms are usually have much more resources to smooth the consequences of the crisis. This is a categorical variable: firms are divided into 5 groups by the number of employees in 2007 (below 100 employees, from 100 to 250 employees, 251-500 employees, 501-1000 employees and firms with more than 1000 employees).

AGE – is a categorical variable that divides firms in three groups: established in Soviet period (before 1992), established during the period of active transformation and mass privatization (1992-1998) and relatively new firms established after the crisis of 1998 during the period of fast economic growth in Russian economy (1999-2007).

BRIBES – this is a variable reflecting everyday corruption level by regions (index provided by Russian Public Opinion Foundation (POF) and based on INDEM survey data (Russian Federation for 2010. We use it as a proxy for institutional quality measure for the region firms are operating in.

Other regional/location controls include:

REG_GRP_PC - Gross Regional Product (GRP) per capita (in logs) in 2008;

REG_MAN_SHARE - share of manufacturing in GDP, % in 2008.

REG_CAPITAL - is a dummy equals 1 if a firm is located in the regional capital and zero otherwise.

The last block of variables reflects the modernization activity and pre-crisis performance. It includes:

INVEST_08 – this a categorical variable for three groups of firms divided pending on their investment activity: 1 - No investments in the three years prior to the crisis, 2 – minor investments and 3 – Significant investments. We use the self-assessment of firms made by top-managers during the 2009 survey.

RESTR_BUS_PROC – is a dummy variable equals 1 if a firm reports acivity in restructuring of business processes in three years prior to the crisis and zero otherwise. This is our proxy indicator for managerial innovations.

JOB_CREATOR – is also a dummy which equals 1 if a firm increased the number of Employees in the last three years prior to the crisis and zero otherwise.

This last indicator needs to be clarified. It should be noted that in general manufacturing firms in Russia during the economic growth period of the 2000-s were shedding jobs. The typical strategy was to increase productivity by both increasing output and cutting labor. Thus, the growth of jobs may be seen as an indirect indicator of general competitiveness of a firm in the pre-crisis period.

Descriptive statistics for main internationalization and innovation indicators and regional institutional environment by V-type and L-type clusters of firms is presented in Table 1.

Descriptive statistics does not reveal significant difference between firms in two clusters neither by most of globalization indicators (except for foreign co-ownership indicator), nor by productivity prior to the crisis. The firms in the V-type cluster are slightly larger (in terms of employment) and slightly more innovative. Also they more often have the state among owners.

The coefficients of the equations were estimated by binary probit regressions with robust standard errors clustered by regions. For robustness checks we incorporated the age of the firm grouped at categories before 1991; 1992-1998 and after 1999 as this characteristic is treated to be significant in the empirical analysis of firm's growth determinants (Burger et al, 2014; Geroski and Gugler, 2004; Coad et al, 2012; Navaretti et al, 2012).The results of estimations are presented in Table 2.

Table 1: Descriptive statistics for main variables

	"V"-cluster	"L"-cluster	Sig.*
Internationalization indicators			
Share of export in revenues in 2008, %	7.63	8.36	0.556
Share of imported raw materials/components in total materials/components purchase in 2008,%	17.26	16.17	0.636
Imported equipment in total purchased equipment in 2008	64.2	56.5	0.075
New foreign strategic partners	24.5	18.5	0.080
Geographical structure of firm exports			
No export	50.9	51.5	0.896
More than 90% of export to CIS	29.7	30.8	0.792
More than 90% to non CIS	5.7	4	0.350
Both CIS and non-CIS destinations	13.7	13.8	0.981
Innovation indicators			
Financed new product development in 2008	58.0	48.3	0.022
Productivity			
Sales per employee to industry's median value ratio	1.68	1.56	0.829
Ownership			
Foreign co-owned	0.15	0.083	0.041
State-co-owned enterprise	0.053	0.039	0.676
Holding	0.316	0.251	0.084
Regional economy			
Gross Regional Product per capita, 2008, thous. Rub.	25.3	24.9	0.291
Share of manufacturing in GRP, %	0.311	0.299	0.655
Capital of the region dummy	0.401	0.378	0.571
Regional institutional environment			
Bribery in the region (the component of everyday corruption index)	0.474	0.491	0.023
Size of firm, employees			
Number of employees in 2007	623.1	586.6	0.039
Age of firm	0.316	0.430	0.007
Established before 1992	0.792	0.768	0.481
Established in 1992-1998	0.142	0.160	0.546
Established after 1998	0.066	0.073	0.766
Observations	212	400	

Comment: *Students ttest for qualitative variables, Mann-Whitney two-sample test for binary variables
Source: Authors' calculations based on survey data, Rosstat regional statistics (Rosstat, 2009;, POF (2010).

In the Model 1 innovation and globalization indicators are included separately as independent variables controlled by initial (pre-crisis) firm's size, initial productivity, ownership, industry, and regional institutional environment. In Model 2 we include the

squared values for export revenues and import intermediates shares to check for possible non-linear relationships and cross-terms between export share and innovations to estimate the combined impact of innovation and globalization. Model 3 checks for the robustness of our results by including age of a firm, and Model 4 additionally checks for robustness by incorporating modernization strategies indicators we have had found to be significant in the previous research.

Table 2: Results of the Estimation of Firm Internationalization's Effect on the "V"-type growth trajectory (probit regression)

Dependant variable: "V"-type cluster	(1)	(2)	(3)	(4)
VARIABLES				
NEW_PROD08	0.331***(0.091)	0.129 (0.143)	0.125 (0.142)	0.069 (0.160)
EXP_SHARE08	-0.793 (0.523)	-7.894***(1.583)	-7.906***(1.576)	-6.496***(1.580)
NEW_PROD* EXP_SHARE		5.696***(2.012)	5.699***(1.987)	4.809**(2.018)
EXP_SHARE_SQ08		10.77***(2.545)	10.76***(2.488)	8.465***(2.333)
NEW_PROD* EXPORT_SQ		-8.410***(3.226)	-8.381***(3.152)	-6.761**(3.162)
SHARE_IMP_R08	0.100 (0.256)	-0.276 (0.582)	-0.185 (0.584)	0.018 (0.785)
SHARE_IMP_R_SQ		0.574 (0.786)	0.513 (0.778)	0.007 (0.988)
SHARE_IMP_EQ08	0.128 (0.150)	0.132 (0.161)	0.133 (0.160)	0.057 (0.228)
EXP_DEST_CIS	0.002 (0.167)	0.267 (0.199)	0.260 (0.198)	0.277 (0.224)
EXP_DEST_NOCIS	0.429 (0.354)	0.642* (0.345)	0.647* (0.348)	0.817**(0.387)
EXP_DEST_DIV	4.68e-05 (0.221)	0.331 (0.253)	0.330 (0.253)	0.272 (0.326)
NEW_FOR_PART	0.257* (0.145)	0.276* (0.150)	0.281* (0.155)	0.276*(0.162)
HOLDING	0.159 (0.174)	0.130 (0.178)	0.121 (0.182)	0.070 (0.188)
FOREIGN_OWN08	0.271 (0.228)	0.229 (0.241)	0.222 (0.236)	0.240 (0.247)
STATE_OWN08	-0.051 (0.281)	-0.031 (0.290)	-0.053 (0.293)	-0.023 (0.273)
LP_2007	0.102 (0.079)	0.081 (0.081)	0.090 (0.090)	0.024 (0.093)
GR_SIZE07_1	0.044 (0.274)	0.071 (0.282)	0.074 (0.280)	-0.274 (0.288)
GR_SIZE07_2	0.051 (0.281)	0.119 (0.293)	0.106 (0.287)	-0.199 (0.308)
GR_SIZE07_3	-0.040 (0.293)	0.003 (0.303)	-0.011 (0.293)	-0.383 (0.301)
GR_SIZE07_4	-0.199 (0.299)	-0.143 (0.292)	-0.172 (0.291)	-0.504 (0.329)
BRIBES	-0.0172** (0.007)	-0.0172** (0.007)	-0.0168**(0.007)	-0.0196**(0.008)
REG_GRP_PC	0.000687 (0.00493)	0.002 (0.005)	0.002 (0.005)	0.003(0.005)
REG_MAN_SHARE	0.001(0.007)	0.003 (0.007)	0.003 (0.007)	0.002 (0.007)
REG_CAPITAL	0.091 (0.143)	0.078 (0.144)	0.089 (0.147)	0.125 (0.141)
AGE_2			-0.185 (0.237)	-0.154 (0.229)
AGE_3			-0.006 (0.205)	0.082 (0.257)
INVEST_08_LOW				0.015 (0.178)
INVEST_08_HIGH				0.401*(0.211)
RESTR_BUS_PROC				0.306**(0.149)
JOB_CREATOR				0.368**(0.150)
2-digit Industries controlled				
Constant	0.0350 (0.521)	0.038 (0.529)	0.049 (0.531)	0.112 (0.612)

Pseudo Rsq	0.0643	0.082	0.084	0.127
Observations	507	507	507	454

*** - p<0.01; **- p<0.05; * p<0.1 Robust standard errors in parentheses
Source: Authors' calculations based on survey data

The results for different model specifications in Table 2 allows for several conclusions. First, in Model 1 we see the positive impact of product innovations prior the crisis on the probability of fast recovery. Second, a straightforward attempt (Model 1) ofof catching the effect of different globalization indicators on the probability for a firm to have a V-type trajectory (i.e. fast post-crisis recovery), in general,fails. The scale of participation in international trade (either by export or by importing raw materials/components) seems not to have any impact on the type of the trajectory. The existence of foreign investor (co-owner) also does not increase the chances for quick recovery. Only the acquirement of foreign strategic partner is important. Though, as further analysis shows, this "no globalization effect" result is due to non-linear relationship between the participation in foreign trade (in particular, export) and chances for quick recovery trajectory. In all other specifications (Models 2-4) we find strong evidence of that non-linearity (Fig.2).

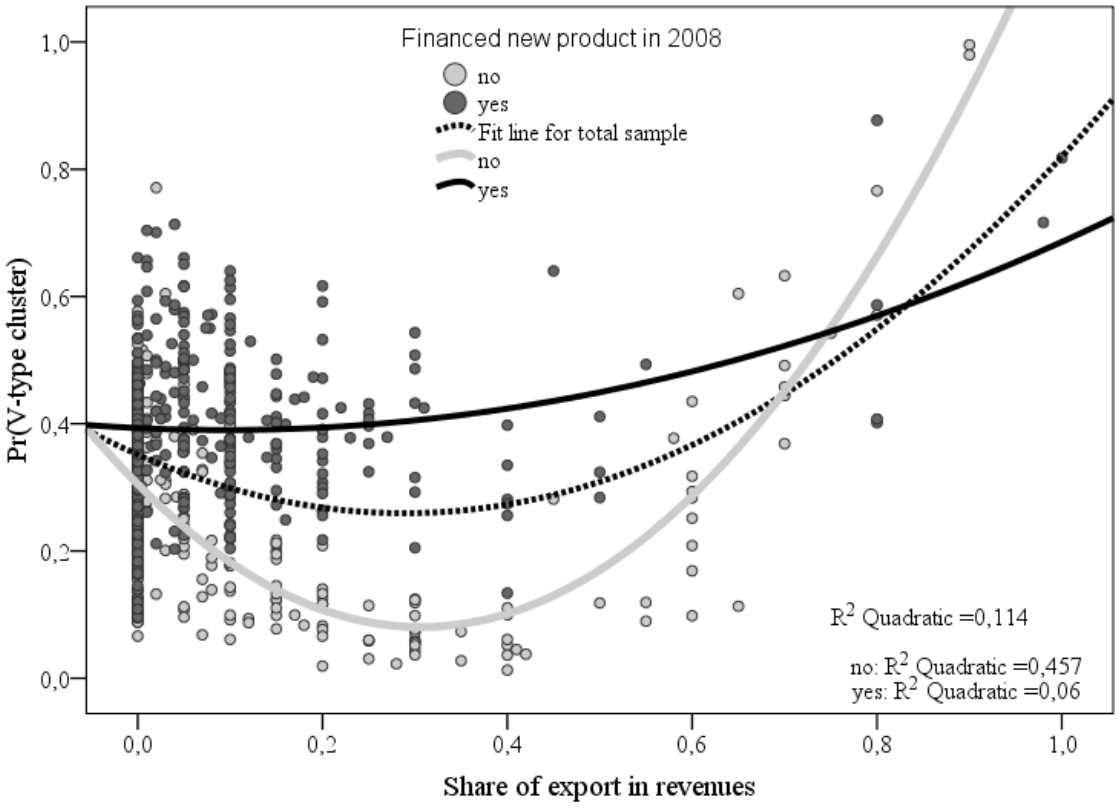

Fig. 2. The probability for a company to be in V-type cluster pending on export share in revenues and innovations.

If the share of export revenues is not high the larger share of export lower down chances for the recovery, while starting from certain value the increase of export revenues share lead to higher probability for a firm to belong to V-type cluster. This non-linear effect may be due to different type of products firm produces and/or to difference in geography of export: a firm producing more innovative products and selling to more developed (and, thus, more demanding) markets should have comparative advantage during the crisis. And the results of Model 2 supports this presumption: the coefficient at cross-term between innovation dummy and the share of export revenues is positive and highly significant statistically. As well as "far abroad" export destination: the coefficient at the dummy for group of companies selling predominantly to non-CIS countries is positive and significant though the significance is not very high.

Models 3 shows that the abovementioned results are robust to the inclusion of additional variable of firms age. In some cases there may be a distinct difference between old "Soviet" enterprises, forms created during the privatization of the 90-ies and young firms. Firms' age does not change the main findings. In Model 4 we control our results on possible "self-selection" effect for firms which were active in restructuring and modernization prior to the crisis (this effect has been found in our previous research (Golikova et al 2015). We see that while active modernization do increase the chances for a firm to get into V-type trajectory cluster this does not change other results: non-linear relation with share of export revenues, positive impact of being an innovator and positive impact of selling to more advanced markets (i.e. to non-CIS countries).

4 CONCLUSION

In this paper, we evaluated the impact of different aspects of globalization on the sustainability of firms' performance during the external global shocks. We extended the analysis of globalization effects including into consideration such components of globalization strategy as export activity to different destinations, import of raw materials, components and equipment, foreign ownership, establishment of international alliences and partnerships.

We did not find any evidence that the share of imported raw materials and components has any impact on the successful overcoming of economic crisis. One of the most probable explanations is that positive (better price to quality ratio, lower prices on the world markets due to the crisis, etc.) and negative (increased costs due to devaluation of national currency)

effects compensate each other. The share of imported equipment prior to the crisis while positive in all the specification is never statistically significant. Probably this is due to the fact the importing of equipment was uniform strategy for most of the firms in he period of 2004-2007. Anyway, our result does not support the concept that policy of import substitution may have a significant positive impact on the sustainability and growth of Russian medium and large manufacturing firms.

We do find strong impact of export activity on the post-crisis trajectories of firms growth trajectories, thought this relationship is not straightforward and linear: the significance and even the sign of this impact depend on how much a firm exports, what kind of product it exports and to what are the main destinations of export. First finding we get is that if a firm is not strongly export-oriented, i.e. the share of export revenues is below certain threshold (in our model thisis approximately 25%), the impact on the probability of quick post-crisis recovery will be negative. While having the share of export revenues above this limit improves firm's chances to successfully overcome the consequences of the crisis, and the higher this share the higher is the probability for a firm to show the V-type dynamics during the crisis and recovery period.

Second, we find that while this non-linear relationship stands for the total sample its parameters (i.e. the share at which the tendency and the slope of the curve changes) depends on innovation status of firms. In our case - on the fact of a firm financing introduction of new products prior to the crisis. Firms that we active both in terms of product innovations and export seem to be losing more during the crisis if they are not deeply involved in exporting (we have estimated this threshold at about 25%, though the probability of belonging to the successful cluster grew sharply if the share of export was above this threshold.

One of the explanations for non-linear relationship between share of export revenues and the probability of success may lay in changing ratios during the crisis of export fixed costs (sunk costs) and export premium. This ratio determine the threshold for efficient export volumes: export premium compensates costs at higher volumes. Thus, some of the exporters with low export revenue share have to leave export markets and, probably, to cut production if they couldn't increase sales on the local market to compensate losses. Such a concept may help also to explain the difference between firms with new products and without new products (if we presume that they are exporting the same type of products they are selling domestically). New products usually demand higher costs for marketing abroad and for them

the ratio between costs and premium may be higher. Of cause, alternative explanations are possible and the issue needs to be researched more thoroughly.

We find that the geography of export matters, though this impact is not very strong: firms specializing in export markets outside the CIS are more likely to find themselves in V-type cluster, while firms exporting to CIS or with diversified geography of export do not differ from non-exporters in terms probability of quick recovery.

Another interesting finding is related to the role of strategic international partnerships in the probability of successful overcoming of the crisis. In all the specification the fact of acquiring foreign strategic partner has a statistically significant and positive impact on the probability for a firm to belong to "successful" cluster. The fact of international partnership may be seen as an indicator of "serious", deep involvement of a firm in globalization, of exporting being a focus of firm's strategy. Though this result should be treated cautiously as the fact of foreign strategic partner may be strongly correlated with many other characteristics of a firm and in general is a proxy for the overall competitiveness of a firm. In other words, firms are self-selected for strategic alliances with foreign partners.

It should be stressed that opposite to other literature (Alfaro and Chen 2012, Kolasa *et al.* 2010, Varum and Rocha 2011) we do not find empirical evidence of significant impact of foreign ownership on the recovery dynamics. This is probably due to the fact other firms characteristics such as globalization activity, modernization activity, productivity, etc. (for which foreign-owned firms have been shown to be self-selected in many empirical research) just "eat up" the significance of this variable. Other possible explanation of this result on the sample of Russian manufacturing firms is a very crude indicator we had to use for FDI: we do not know nor the share of foreign co-owner(s) nor the type of this "foreigner", while in case of Russia it's often a "quasi-foreign" investor working through the firms registered in off-shore zones.

We find also that not everything depends on the firm's own characteristics. Institutional environment also is important: chances for quick recovery is significantly higher for firms located in the regions with lower level of corruption. There could be different explanations for the link between regional corruption and post-crisis recovery. First, the indexes of corruption may be looked at as the proxies for general quality of the regional business environment. Then, firms in a more favorable investment climate probably have less costly opportunities to adjust to the shocks and to recover. Another explanation may lay in the fact that in the corruptive environment prior to the crisis the economic laws of creative

destruction did not worked properly. I.e. not only the better and more efficient firms could have opportunities to grow but also those, which managed to get better conditions through bribes. But when the crisis hit and competition became sharper their low efficiency became visible and no bribes could help them sufficiently anymore.

Summarizing the results we can state that highly globalized firms in general have better chances to find itself in V-type (quick recovering) cluster. We found a strong support for the hypothesis that firms that introduced new products before the crisis and simultaneously managed to promote and sell them on the global market were rewarded by quick return to the growing path after global crisis. Other strategies, i.e. solely innovations without exporting play insignificant role while exporting without attempts to introduce new products contribute even negatively to post-crisis recover.

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Annex 1

Description of the in-depth interview sample by clusters, N=9

Case	Industry	Size	Holding	Region	Main markets	Internationalization				
						Foreign co-owner	Export	Import of intermediaries	Import of equipment	Foreign partners
V1	Chemical	220	yes	Nizhegorodskaya oblast	Russian and global	Yes, Russian subsidiary of TNC	Yes	Yes	Yes	No data
V2	Machinery	More than 1000	yes	Tverskaya oblast	Russian and global	Yes	Yes	Yes	Yes	Yes
V3	Machinery	800	No	Moscow	Russian and Customs' Union	No	No (active search of opportunities)	Yes	Yes	No (active search of partners)
V4	Chemical	400	Yes	Moscow oblast	Russian (main) and global	Yes, Russian subsidiary of TNC	Yes	Yes	Yes	No
L1	Textile	15	No	St.Petersburg	Local	No	No	Yes	Yes	No
L2	Metalworking	124	No	St.Petersburg	Local	No	No	Yes	Yes	No
L3	Machinery	550	Yes	Moscow oblast	Russian (regulated) and global	No	via intermediaries	Yes	No data	No
L4	Woodworking	40	Yes (informal)	Leningradskaya oblast	Regional	No	In the past	Yes	Yes	No
L5	Metalworking	98	No	St.Petersburg	Russian	No	No (not active search to enter Belorussian market)	Yes	Yes	No

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