World Academy of Science, Engineering and Technology
International Journal of Economics and Management Engineering
Vol:10, No:12, 2016

Determining the Direction of Causality between Creating Innovation and Technology Market

Liubov Evstigneeva

Abstract**—**In this paper an attempt is made to establish causal nexuses between innovation and international trade in Russia. The topicality of this issue is determined by the necessity of choosing policy instruments for economic modernization and transition to innovative development. The vector auto regression (VAR) model and Granger test are applied for the Russian monthly data from 2005 until the second quartile of 2015. Both lagged import and export at the national level cause innovation, the latter starts to stimulate foreign trade since it is a remote lag. In comparison to aggregate data, the results by patent's categories are more diverse. Importing technologies from foreign countries stimulates patent activity, while innovations created in Russia are only Granger causality for import to Commonwealth of Independent States.

Keywords**—**Export, import, innovation, patents.

I. Introduction

IN today's globalization, a successful economic development is considered to be the main aim of all governments and Russia is no exception. The long-term strategic plan of the Russian Federation determines the transition from raw materials export to the innovation model to 2030 [1]. It is possible only if policy can generate conditions for knowledge based economy and innovation, since the latter is a key driver of economic growth and performance [2].

Many developing countries tend to quickly make up for the lack of innovative capacity through implementation of effective scientific policy, often on the basis of derived practical experience from abroad [3]. In this regard, the importance of international technology transfer (TT), which is the managed process of conveying a technology from one party to its adoption by another party [4], is difficult to overestimate. However, it is worth highlighting that over the past decades there has been the shift from "adoption" to "adaptation", that emphasizes the necessity of effective diffusion into recipient economies. An approach based on the National Innovation System (NIS) provides the theoretical rationale for government intervention in this respect [5]. The articles by Liu, and by MacGarvie, demonstrate that the interaction between countries contributes to the development of innovation and technological progress [6], [7].

In spite of the fact that the importance of TT on the world market is constantly increasing, a database allowing to conduct quantitative analysis of international technological flows is absent, with the exception of OECD statistics (which is rather limited). Nevertheless there are some studies, which reflect the problem of international TT in one way or another. Doroti, Rodgers, Garreta, Dussoga are among the well-known authors who take a broad outlook in this field. Acharya, Keller, Hoekman and Javorcik particularly focus on international trade and FDI as a means of spreading technologies [8], [9]. Other researchers of imports as a channel of transfer such as Eaton and Kortum, pay more attention to producer goods and intangible assets [10]. Labour mobility between subsidiaries and domestic enterprises, as one of the ways of TT, is considered in studies of Fosfuri, Motta and Ronde [11]. One more aspect of TT, namely, intellectual property rights is covered relatively better in academic literature [12]; however, the evidence is far from complete. At the national level, trade with other nations has been shown to correlate with innovation and learning [13], [14]. It has been argued that open-minded nations have a greater ability to absorb innovations generated from leading nations [15].

The role of the state in the creation of an effective network information service (NIS) comprises development of scientific-technical and industrial policy, optimization of the ratio of exports and imports, improvement of the investment climate, and increasing the innovative competitiveness of a country [16]. To determine development priorities, it is necessary to understand the causes and linkages between trade, respectively, export and import, and innovation. Obviously, a variety of directions is possible, as each sector of the economy is influenced by foreign ideas (whether through import or export, through market penetration and competition at the local level) and may become more innovative, while innovative industry can find new export markets or require new imports to meet changing needs.

Despite the fact that one cannot but agree on the association between trade and innovation, there has been virtually no study of the direction of that causality. Thus, the main goal of the research proposed is to suggest a statistical model and some empirical evidence in this respect based on the analysis of actual Russian data.

II. Hypotheses and Methodology

The method proposed by Wagoner and Johnson [17] has been applied in this research and adapted to the Russian reality. The model is based on the most common and reliable way to test the causal relationship between two time series, namely Granger causality test. The model to identify the direction of impact of trade and innovation has the following econometric specification:

L. Evstigneeva, 3d Year PhD Student is with the National Research University Higher School of Economics, Moscow, 101000, Russia (phone: +7 926-751-42-34; e-mail: levstigneeva@hse.ru).

$$Innov_t = \alpha_{innov} + \beta_k Innov_{t-k} + \gamma_j Export_{t-j} + \\ + \delta_{innov} exch_t + \theta_{innov} GDP_t + \tau_{innov} Import_t + \xi_{innov,t} \quad (1)$$

$$Export_t = \alpha_{trade} + \rho_k Innov_{t-k} + \omega_j Export_{t-j} + \\ + \delta_{innov} exch_t + \theta_{innov} GDP_t + \tau_{trade} Import_t + \xi_{trade,t} \quad (2)$$

$$Innov_t = \alpha_{innov} + \beta_k Innov_{t-k} + \gamma_j Import_{t-j} + \\ + \delta_{innov} exch_t + \theta_{innov} GDP_t + \tau_{innov} Export_t + \xi_{innov,t} \quad (3)$$

$$Import_t = \alpha_{trade} + \rho_k Innov_{t-k} + \omega_j Import_{t-j} + \\ + \delta_{innov} exch_t + \theta_{innov} GDP_t + \tau_{trade} Export_t + \xi_{trade,t} \quad (4)$$

where *Innov* is the number of patents granted, *Export* is export value, *Import* is import value, *exch* is real exchange rate, *GDP* is the real gross domestic product, and *e* is an unexplained error, and *t, k, j* are the indices of the current period and prior ones.

Monthly data (except for patents granted) from 2005 until the second quartile of 2015 has been gathered from Russian Federal Statistics Service and State Corporation "Bank for Development and Foreign Economic Affairs (Vnesheconombank)" [18], [19]. Overall, there are one 127 observations, the descriptive statistics are shown in Table I. Information about the number of patents granted by every category, in accordance with International Patent Classification (IPC), was retrieved manually from the PatSearch database. Due to the practical impossibility to automatically analyse patent data, the concordance assignment to economic sectors is not conducted in this paper.

TABLE I
DESCRIPTIVE STATISTICS

Variable	Obs	Mean	Std. Dev.	Min	Max
Export_total	127	33,970.31	9,311.43	13,675	50,248
Export to far-abroad countries	127	28,956.43	7,854.95	11,950	42,202
Export to CIS countries	127	5,013.89	1,526.01	1,725	8,046
Import_total	127	20,811.17	6,810.57	6,934	32,486
Import from far-abroad countries	127	18,080.70	5,944.04	5,752	28,467
Import from CIS countries	127	2,730.47	917.82	1,152	4,799
Patents_A	127	928.44	241.90	373	2,281
Patents_B	127	690.40	129.59	377	1,310
Patents_C	127	527.48	107.94	289	1,151
Patents_D	127	32.65	9.82	12	61
Patents_E	127	287.00	53.85	101	427
Patents_F	127	444.28	82.21	274	717
Patents_G	127	514.13	97.89	318	780
Patents_H	127	345.02	80.88	184	585
Innovations	127	3,769.40	637.75	2,387	5,775

It is necessary to note here that a patent, by itself, does not guarantee commercial success of innovations, but rather represents an intermediate measure of innovation [12]. However, according to the OECD definition, innovation is defined as all scientific, technological, organizational, financial and commercial activities that lead or aim at the implementation of technologically new or improved products or services [20]. Given that technology is the main driving force of growth and the fact that 80% of patent documents consists of technological information, patents are invaluable sources, reflecting scientific-technical activity.

The test for Granger-causality assumes that the time series must be stationary, so Dickey-fuller (ADF) test was conducted to ensure the appropriate conditions (Table II). Bold highlighter represents the significant level in which the null hypothesis of a unit root is rejected.

TABLE II
DICKEY-FULLER TEST FOR UNIT ROOT

Variable	Test Statistic	Critical Value 1%	5%	10%
Export_total	-2.860	-3.501	-2.888	-2.578
Export to far-abroad countries	-2.903	-3.501	-2.888	-2.578
Export to CIS countries	-3.084	-3.501	-2.888	-2.578
Import_total	-3.384	-3.501	-2.888	-2.578
Import from far-abroad countries	-3.529	-3.501	-2.888	-2.578
Import from CIS countries	-2.565	-2.357	-1.657	-1.288
Patents_A	-8.075	-3.501	-2.888	-2.578
Patents_B	-6.502	-3.501	-2.888	-2.578
Patents_C	-8.689	-3.501	-2.888	-2.578
Patents_D	-10.226	-3.501	-2.888	-2.578
Patents_E	-7.880	-3.501	-2.888	-2.578
Patents_F	-6.975	-3.501	-2.888	-2.578
Patents_G	-6.994	-3.501	-2.888	-2.578
Patents_H	-5.623	-3.501	-2.888	-2.578
Innovations	-6.737	-3.501	-2.888	-2.578

The hypotheses for (1) are the following:

H_0: Export does not cause innovation; H_{alt}: Export causes innovation,

and for (2):

H_0: Innovations do not cause export, H_{alt}: Innovations cause export.

For (3) and (4), import substitutes export in the hypothesis. The calculations were carried out using the statistical software package STATA. To assess the validity of the models, the test for stability and for autocorrelation of the residuals were also conducted (Table III).

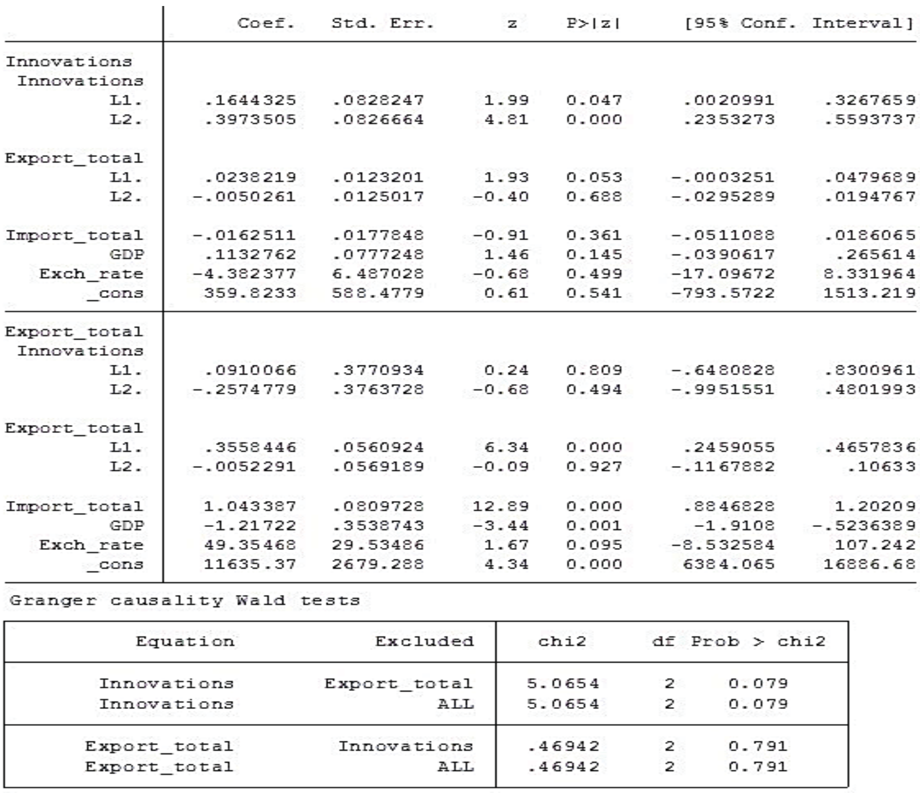
III. RESULTS

Generally, the positive effect of international economic integration is strongly dependent on the qualitative trade characteristics of a particular country [21]. However, it is worth testing for Russian data using the initial hypotheses, as described in the previous section.

Both lagged import and export at the national level cause innovation (both H_0 hypotheses for (1) and (3) are rejected, though the former seems to have a stronger effect since the p-value is 0.026 in contrast to 0.079 (with lag=2) (Fig. 1, Table IV). As the number of lags rise to five, the impact of export on innovation is not observed; however, with further increase in lag, export remains Granger-causality of innovation at any reasonable level of significance. In turn innovation, measured by a number of patents granted, begins to stimulate foreign trade only starting with the remote lag. It is also worth noting that the impact of innovation on exports is limited (after 16 lag, this influence is not observed), but there is no such constraints for import. With a lag from 10 to 14, hypothesis H_0 for (2) is rejected (α = 5%), thus innovations cause export (Table V). This could be due to the fact that innovation in the model is measured by patents that have limited validity.

TABLE III
CORRELATION COEFFICIENTS

		Export			Import			Patent's categories								
		total	to far-abroad	to CIS	total	from far-abroad	from CIS	A	B	C	D	E	F	G	H	Total
Export	total	1.00														
	to far-abroad	1.00	1.00													
	to CIS	0.96	0.95	1.00												
Import	total	0.95	0.95	0.94	1.00											
	from far-abroad	0.95	0.94	0.93	1.00	1.00										
	from CIS	0.93	0.92	0.94	0.95	0.94	1.00									
Patent's categories	A	0.32	0.31	0.33	0.29	0.30	0.24	1.00								
	B	0.40	0.39	0.41	0.45	0.46	0.38	0.52	1.00							
	C	0.16	0.16	0.16	0.15	0.15	0.17	0.45	0.42	1.00						
	D	0.09	0.08	0.17	0.14	0.15	0.11	0.27	0.39	0.20	1.00					
	E	0.20	0.20	0.21	0.26	0.26	0.19	0.53	0.65	0.30	0.26	1.00				
	F	0.40	0.40	0.37	0.42	0.43	0.35	0.54	0.83	0.34	0.25	0.60	1.00			
	G	0.51	0.51	0.50	0.50	0.51	0.44	0.59	0.80	0.36	0.32	0.55	0.79	1.00		
	H	0.57	0.58	0.54	0.56	0.57	0.47	0.52	0.74	0.31	0.26	0.51	0.75	0.87	1.00	
	Total	0.45	0.45	0.45	0.46	0.46	0.39	0.84	0.86	0.60	0.37	0.70	0.83	0.87	0.81	1.00



```
             |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
Innovations  |
 Innovations |
         L1. |   .1644325   .0828247     1.99   0.047     .0020991    .3267659
         L2. |   .3973505   .0826664     4.81   0.000     .2353273    .5593737
             |
Export_total |
         L1. |   .0238219   .0123201     1.93   0.053    -.0003251    .0479689
         L2. |  -.0050261   .0125017    -0.40   0.688    -.0295289    .0194767
             |
Import_total |  -.0162511   .0177848    -0.91   0.361    -.0511088    .0186065
         GDP |   .1132762   .0777248     1.46   0.145    -.0390617     .265614
   Exch_rate |  -4.382377   6.487028    -0.68   0.499    -17.09672    8.331964
       _cons |   359.8233   588.4779     0.61   0.541    -793.5722    1513.219
-------------+----------------------------------------------------------------
Export_total |
 Innovations |
         L1. |   .0910066   .3770934     0.24   0.809    -.6480828    .8300961
         L2. |  -.2574779   .3763728    -0.68   0.494    -.9951551    .4801993
             |
Export_total |
         L1. |   .3558446   .0560924     6.34   0.000     .2459055    .4657836
         L2. |  -.0052291   .0569189    -0.09   0.927    -.1167882      .10633
             |
Import_total |   1.043387   .0809728    12.89   0.000     .8846828     1.20209
         GDP |   -1.21722   .3538743    -3.44   0.001      -1.9108   -.5236389
   Exch_rate |   49.35468   29.53486     1.67   0.095    -8.532584     107.242
       _cons |   11635.37   2679.288     4.34   0.000     6384.065    16886.68
------------------------------------------------------------------------------
Granger causality Wald tests
+------------------------------------------------------------------+
|          Equation           Excluded |   chi2     df Prob > chi2 |
|--------------------------------------+---------------------------|
|       Innovations       Export_total |  5.0654     2    0.079     |
|       Innovations                ALL |  5.0654     2    0.079     |
|--------------------------------------+---------------------------|
|      Export_total        Innovations |  .46942     2    0.791     |
|      Export_total                ALL |  .46942     2    0.791     |
+------------------------------------------------------------------+
```

Fig. 1 Outcome example of Granger causality test in Stata

Further on, this research focuses on the relationship of foreign trade with a certain industries. Patent data is available only by the categories of the IPC, thus, the following three out of eight categories, which largely corresponds to the industries and have more technological aspects, have been selected for analysis:

- B – Performing operations; transporting:
- C – Chemistry; metallurgy;
- F – Mechanical engineering; lighting; heating; weapons; blasting.

To test these variations of the model in (1)-(4), the Innovation variable is replaced by a variable corresponding to the analyzed category of patents.

TABLE IV
GRANGER TEST FOR IMPORT AND INNOVATION

Equation	Excluded	Chi2	df	Prob>Chi2
Lag=2				
Innovations	Import	7.3179	2	0.026
Innovations	All	7.3179	2	0.026
Import	Innovations	2.6579	2	0.265
Import	All	2.6579	2	0.265
Lag=8				
Innovations	Import	31.694	8	0.000
Innovations	All	31.694	8	0.000
Import	Innovations	20.665	8	0.008
Import	All	20.665	8	0.008

TABLE V
GRANGER TEST FOR EXPORT AND INNOVATION

Equation	Excluded	Chi2	df	Prob>Chi2
Lag=6				
Innovations	Export	18.682	6	0.005
Innovations	All	18.682	6	0.005
Export	Innovations	9.806	6	0.133
Export	All	9.806	6	0.133
Lag=10				
Innovations	Export	26.811	10	0.003
Innovations	All	26.811	10	0.003
Export	Innovations	18.680	10	0.045
Export	All	18.680	10	0.045

According to a preliminary analysis of exports and patents, category B interference with the lag equal to 2 is not observed. If the lag increases up to 5, the export process stimulation of the invention activity (with $\alpha = 5\%$). Patents issued in the B category are Granger causality for export only from the remote lag, which in this case equals to 21 (Table VI).

A similar analysis for import and patent category B shows that imports had a direct immediate impact, but it is interesting to note that then when the lag equals to 3, 4 and 5 this dependence is not observed, then again the effect is it is reinstated. This fact can be explained by the time needed to adapt acquired technologies to Russian conditions. The development of the national innovation system will reduce, this time lag, which in turn will serve to improve the technological level of the country. Issued patents category B also stimulate imports starting with the 9^{th} lag. It should be noted that a large proportion of the considered patents can be attributed to the high-tech sector forming, which is an especially urgent task for Russia.

Patents of category C "Chemistry; metallurgy" could be classified as medium-high-tech. Per export, there is a simultaneous interaction in both directions. As expected, Import is Granger-cause of the patents in this category. Unlike the previous case, for any reasonable increases in the lag number effect of the inventions in the field of chemistry and metallurgy on import has not been found.

Similar situation is observed in the patents in the category F "Mechanical engineering; lighting; heating; weapons; blasting", namely the unilateral import influence at any reasonable level of confidence. Also, this category does not influence export, and the impact of the latter is observed only after the lag 6.

In comparison to aggregate data, the results for patent's categories appear to be more diverse. It is not surprising that import stimulates patents activity in all considered spheres. As far as export is concerned, it clearly influences only patents B and C categories. Only patents granted in category C have an impact on export.

In the current political situation, the analysis of causality between innovation activity and trade patterns by groups of countries is of particular interest. In (1)-(4), the total export and import values are substituted for the corresponding values of the trade with far abroad and Commonwealth of Independent States (CIS) countries.

TABLE VI
GRANGER TEST FOR EXPORT AND PATENTS B

Equation	Excluded	Chi2	df	Prob>Chi2
Lag=2				
Patents B	Export	1.9535	2	0.377
Patents B	All	1.9535	2	0.377
Export	Patents B	0.71394	2	0.700
Export	All	0.71394	2	0.700
Lag=5				
Patents B	Export	13.0200	5	0.023
Patents B	All	13.0200	5	0.023
Export	Patents B	2.1291	5	0.831
Export	All	2.1291	5	0.831
Lag=21				
Patents B	Export	66.676	21	0.000
Patents B	All	66.676	21	0.000
Export	Patents B	39.373	21	0.009
Export	All	39.373	21	0.009

Preliminary results of the analysis are shown in Tables VII and VIII. Importing technologies from far abroad countries is uniquely affecting the patent activity, that leads to high-tech sector stimulation. However, innovations created in Russia are only a unilateral Granger cause for import to the CIS countries. The results are quite expected, as for Russia the choice of channels of technology transfer is closely linked to the potential transfer of tacit knowledge. This is confirmed also by the fact that post-Soviet countries buy technology in Russia, and Russia does from countries such as Germany, France, etc. [22]. Analysis of the balance of technology payments by categories of agreements in Russia shows that all categories, except for scientific research and development are negative [23]. This can be explained by intensive adaptation of the foreign scientific and technical achievements. Analyzing the structure of export revenues, one can conclude that, the re-orientation of Russia to the markets of developing countries is the main direction (Fig. 2).

TABLE VII
ANALYSIS OF THE SITUATION WITH FAR ABROAD COUNTRIES

Equation	Excluded	Chi2	df	Prob>Chi2
Import from far abroad countries				
Import	Innovations	2.4599	2	0.292
Import	All	2.4599	2	0.292
Innovations	Import	8.7133	2	0.013
Innovations	All	8.7133	2	0.013
Export to far abroad countries				
Export	Innovations	3.2045	3	0.361
Export	All	3.2045	3	0.361
Innovations	Export	7.9234	3	0.048
Innovations	All	7.9234	3	0.048

TABLE VIII
ANALYSIS OF THE SITUATION WITH CIS COUNTRIES

Equation	Excluded	Chi2	df	Prob>Chi2
Import from CIS countries				
Import	Innovations	4.7826	2	0.092
Import	All	4.7826	2	0.092
Innovations	Import	2.3028	2	0.316
Innovations	All	2.3028	2	0.316
Export to CIS countries				
Export	Innovations	1.7421	4	0.783
Export	All	1.7421	4	0.783
Innovations	Export	18.284	4	0.001
Innovations	All	18.284	4	0.001

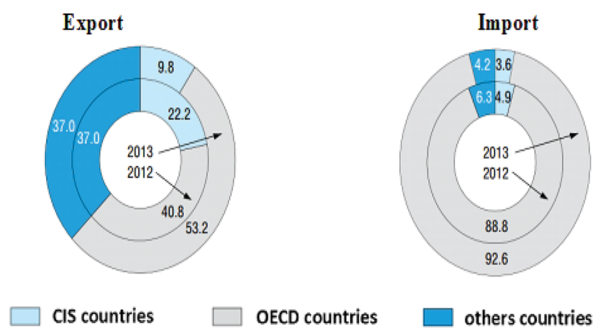


Fig. 2 Structure of technology export and import in Russia

IV. CONCLUSION

Both lagged import and export at the national level cause innovation; however, the former seems to have a stronger effect. In turn innovation, measured by a number of patents granted, begins to stimulate foreign trade only starting with the remote lag. It is also worth noting that the impact of innovation on exports is limited (after 16 lag, this influence is not observed), but there is no such constraints for import.

In comparison to aggregate data, the results for patent's categories appear to be more diverse. It is not surprising that import stimulates patents activity in all considered spheres. As far as export is concerned, it clearly influences only patents B and C categories. Only patents granted in category C have impact on export.

Further application of that model, i.e. considering trade in the context of the CIS and far abroad countries, serves more for policy making. Though export in both direction cause innovation. On the contrary, only import from far abroad countries causes innovations. Thus, there is a strong influence of import on patent activity; this is due to opportunity to complement their development by third-party technology, as well as information on the current trends of the world market innovation. Despite the apparent dependence on Russian imports and an unstable position in the high-tech market, two of the three categories of patents considered observed the impact of innovations created for export.

Consequently, the findings support the theoretical observation that the majority of Russian developments are commercialized abroad, thus bypassing the internal market. Moreover, these developments are returned as finished products with higher added value, given a negative balance of payments for technology.

Technology transfer has a positive effect on economic performance provided that national innovation system has been integrated into the international cooperation and creates good conditions for the diffusion and adaptation of acquired technologies. The creation of a single innovation chain (especially the introduction of innovations into mass production) should be the main aim of the state activity. Further diversification analysis and prediction built on this VAR model could serve to identify the areas of targeted public policies where technology transfer intensification could promote innovative economy in Russia.

REFERENCES

[1] The Forecast of long-term socio-economic development of the Russian Federation for the period until 2030 (Прогноз долгосрочного социально-экономического развития Российской Федерации на период до 2030 года) URL: http://economy.gov.ru/minec/activity/sections/macro/prognoz/doc20130325_06

[2] J. Fagerberg, *Competitiveness, scale and R&D. In Technology and International Trade*. Cheltenham, UK: Edward Elgar, 1997, pp. 38-55

[3] M. Hoppe "Technology Transfer Through Trade", *Nota di Lavoro, Fondazione Eni Enrico Mattei*, No. 19, 2005

[4] W.E. Soeder, A.S. Nashar, and V. Padmanabhan, "A Guide to the Best Technology Transfer Practices", *Journal of Technology Transfer*, vol. 15, 1990

[5] N. Sharif, "Emergence and development of the National Innovation Systems concept", *Research Policy*, vol. 35, no. 5, June 2006, pp. 745–766. http://dx.doi.org/10.1016/j.respol.2006.04.001

[6] X. Liu, C. Wang, "Does foreign direct investment facilitate technological progress? Evidence from Chinese industries.", *Research Policy*. 32(6), pp. 945-953, 2003.

[7] M. MacGarvie, "Do firms learn from international trade?", *Review of Economics and Statistics*, vol. 88(1), pp. 46-60, 2006

[8] R. Acharya, W. Keller, *Technology Transfer Through Imports. National Bureau of Economic Research* Working Paper N. 13086, Cambridge, 2007

[9] B. Hoekman, B. Javorcik, Global Integration and Technology Transfer. *World Bank*, Washington, D.C., 2006

[10] J. Eaton, S. Kortum, "Technology, Geography, and Trade." *Econometrica*. Vol. 70(5), pp. 1741-1779, 2002

[11] A. Fosfuri, M. Motta, and T. Ronde, "Foreign direct investment and spillovers through workers' mobility.", *Journal of International Economics*. Vol. 53(1), pp. 205-222, 2001

[12] W. Fleur, N. Johnstone, and I. Haščič "Using patent data as an indicator of international technology transfer", *Empirical Policy Analysis Unit OECD Environment Directorate*, October 2009

[13] S. Edwards, "Trade policy, growth, and income distribution", *The American Economic Review*, 87(2), Papers and Proceedings of the Hundred and Fourth Annual Meeting of the American Economic Association), pp. 205-210, 1997
[14] S. Chand, K. Sen, "Trade liberalization and productivity growth: Evidence from indian manufacturing." *Review of Development Economics*, vol. 6(1), pp. 120-132, 2002
[15] G. M. Grossman, E. Helpman, "Trade, knowledge spillovers, and growth", *European Economic Review*, vol. 35(2), pp. 517-526.
[16] D. Leonard, N.V. Long, "Technology transfers and industry closure.", *The Journal of International Trade & Economic Development*. Vol. 24(4), pp. 542-569, 2015
[17] D.K. Johnson, V. Wagoner, "The Chicken or the Egg: Granger-Causality between Trade and Innovation." Colorado College Working Paper. 2014. № 04.
[18] Russian Federal Statistics Service URL: http://www.gks.ru/
[19] State Corporation "Bank for Development and Foreign Economic Affairs (Vnesheconombank)" URL: http://www.veb.ru/analytics/iVEB/
[20] OECD/Eurostat, Proposed Guidelines for Collecting and Interpreting Technological Innovation Data – Oslo Manual, The Measurement of Scientific and Technical Activities Series, Paris, 1997
[21] S. Lall "Transnational corporations and technology flows" (in D. Nayyar (ed.)) *Governing Globalization: Issues and Institutions*, Oxford: Oxford University Press, 2002, for the World Institute for Development Economics Research (WIDER).
[22] L.M. Evstigneeva, V.V. Kiseleva "Technology and knowledge transfer: international perspective", *International Journal of Business and Management Study – IJBMS*, Vol. 2: Issue 2 (ISSN : 2372-3955), pp. 364 – 369, 2015.
[23] Science Indicators 2016: stat. Sat. – M.: National Research University "Higher School of Economics", 2016

Liubov Evstigneeva received double master degree in Public Administration at London Metropolitan University (The UK) and National Research University Higher School of Economics (Moscow, Russia) in 2014.

She published 27 papers, including 4 articles in pee-reviewed international journals. The scope of publications is innovation policy, international technology transfer, and scientific research capacity.

Ms. Evstigneeva is the member of Universal Association of Arts And Management Professionals.