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Foreign Economic Relations and Regional Growth in North East Asia: Russia's WTO Accession and Its Effects

Edited by Kazuhiro Kumo and Irina Korgun

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Preface

Since the late 20th century, trade has been recognized as a major factor of economic growth. It is increasingly so in the East Asia where most of the economies pursued export-oriented industrialization. This volume deals with issues of trade and development in the North East Asia. As a result of these policies, the region saw a rise of very dense and strong connections defined as global value chains. Based on sharing of production and logistic linkages, global value chains reinforce economic exchanges and are believed to contribute to further technological upgrading and economic growth on the whole.

However, there is a certain grain of criticism about trade. The major line of critique discusses destruction of manufacturing jobs, hollowing out of industrial sectors in national economies, dependence on cheap imports from developing countries that lead to accumulating trade deficits in the developed countries. While there is some connection of trade with negative tendencies in mature economies, the relation between them is not straightforward. Moreover, the dynamics of trade-related structural changes in economies differs depending on their domestic conditions. Responses of trade-dependent East Asian countries with regard to trade differ too. Such discrepancies become even more obvious in international strategies of businesses.

This volume deals with the outlined questions. To be more specific, it discusses various aspects of impact of trade on national economies with regard to regional development, industrial structure, trade policy and firms strategies. Research articles focus more on North-East Asia, which during several decades has saw a steady increase in its economic significance due to expanding trade. Today, Japan, China, South Korea are in the center of world economy and represent integrating pieces of the global value chains. Russia, too, is an important part of North-East Asia trying to establish its presence in regional trade networks more firmly. We hope that this volume will contribute to discussion on trade-related aspects of economic development and be interesting to a wide audience. Also, through theoretical and practical discussion at seminars that took place in September 2014 in St. Petersburg, Russia and November

2014 in Tokyo, Japan, authors tried and contribute to scholarly exchanges between Russian and Japanese academic communities.

Authors would like to thank many people who made this project possible and contributed to its practical realization. Seminars would not be possible without support from the Grant-in-Aid for Scientific Research (A) by the Ministry of Education, Technology, Science and Culture of Japan (#26245034), the Heiwa Nakajima Foundation and the Visiting Fellowship of the Institute of Economic Research, Hitotsubashi University. Administration of the Institute of Economic research of the Hitotsubashi University managed practical issues in an almost unnoticeable manner so that all of us could give our full energy to research.

Korgun Irina and Kumo Kazuhiro

March 2015

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Impact of Accession to the WTO on Russian Economy: Analysis of International Background+

Sergei F. Sutyrin* and Dmitriy N. Kolesov**

Abstract

Currently, more than two and a half years passed since Russian Federation had become a fully-fledged member of the World Trade Organization. Neither alarmist fears, no rainbow hopes regarding the accession came true. At the same time, leaving these clearly extreme forecasts aside and assuming that the period since August 2012 provided certain amount of relevant empirical evidences, one might be really surprised by remarkable diversity of existing opinions with respect to the impact of the WTO accession and membership on Russian economy. More than that, similar serious disagreements due to various objective reasons will most probably continue for at least several years ahead. Under the circumstances one of the main challenges for the researchers would be to separate specific impact of Russia's the WTO accession/membership on national economy in general, its foreign trade component in particular, from the influence of the other factors. As one possible way to meet above-mentioned challenge the authors of a present paper suggested to take a broader look at the problem and to investigate international experience. A number of presumably accession-dependent macroeconomic indicators are analyzed for all 29 non-GATT member-countries (including Russia) that acceded to the WTO between 1995 and 2012. The results of this constitute a basis for certain conclusions.

+ The study was supported by the Grant-in-Aid for Scientific Research (A) by the Ministry of ducation,Technology, Science and Culture of Japan (#26245034) and The Heiwa Nakajima Foundation.

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1. Introduction

During a very lengthy process of negotiations[1] on accession to the World Trade Organization (WTO), Russian academic journals as well as mass media frequently presented directly opposite predictions regarding possible repercussions of the future WTO membership (Mikhailenko & Gruzdov). In contrast to that, overwhelming majority of foreign experts mostly shared relatively optimistic views arguing that even assuming certain potential losses Russian economy should gain from the accession to the WTO. (World Bank; Tarr, David) Currently, more than two and a half years have passed since Russian Federation had become a fully-fledged member of the organization. Neither alarmist fears, no rainbow hopes came true. At the same time, leaving these clearly extreme forecasts aside and assuming that the period since August 2012 provided substantial relevant empirical evidences, one might be really surprised by remarkable diversity of existing opinions. More than that, serious disagreements with respect to the impact of the WTO accession and membership on Russian economy will most probably continue for at least several years ahead.

It is not that difficult to understand the reasons behind above-mentioned disagreement. There are at least several of them. Firstly, Russian Federation similarly to many other newly acceded members of the WTO has relatively lengthy implementation period in order to put all commitments stipulated in accession documents into practice. That is the case for tariff liberalization with implementation period of 8 years for pork, followed by 7 years for motor cars, helicopters and civil aircraft. This is also true regarding liberalization of trade in services where Russian Federation has to authorize operations for direct affiliates of foreign insurance companies 9 years after accession.

Secondly, proposition that accession to the WTO would most probably have different repercussions for various Russian economic actors (companies, industries, or regions) hardly requires any serious justification. Some of these actors would ultimately gain, while others – loose. Respectively, experts assessing results of

[1] Russian Federation officially became a fully-fledged member of the World Trade Organization on August 22, 2012. Russia's 18 years-long accession history is at the moment the longest one among all GATT/WTO members. At the same time, some other countries currently involved in negotiations on their accession (in particular, Algeria and Republic of Belarus') have all chances to beat "Russian record".

accession from the point of view of specific company, industry, or region should make different conclusions[2].

Thirdly, even if we assume the possibility of an isolated study of the accession effect, it would be still very difficult to predict exactly how domestic producers would operate under new economic condition. Meanwhile, many things depend precisely upon that (Sutyrin S. and Trofimenko O.).

Fourthly, accession/membership is far from being the only "international factor" that really matters in influencing the performance of RF national economy. In particular, one could sensibly argue that due to its relatively high level of economic openness the latter is in general very sensitive (if not quite vulnerable) with respect to various negative as well as positive external shocks. At this very moment uncertainty regarding prospects of global economic growth, contraction of oil prices, fluctuations of exchange rate, and Western sanctions are among the most significant external factors influencing the way Russian economy operates in a short run and will probably develop in a much longer time-frame.

Available Russian foreign trade statistical data[3] (http://www.gks.ru/) for a period just after accession do not reveal any radical changes of trade flows in comparison with the pre-accession period. Indeed, foreign trade turnover for January-August 2012 equaled to 103.3% of the same 2011 period. January-November 2012 demonstrated 2.7% growth against 2011; January-December witnessed 2.2% growth. Monthly fluctuations of merchandise import being relatively substantial by themselves still do not provide enough ground for any straightforward conclusions regarding impact of the accession. In September 2012 import equaled to just 91.8% of August level. October against September was 114.5%; November against October – 95.4%; December against November – 102.0%.

With respect to certain specific goods import just after the accession changed substantially. At the same time these changes did not result from the WTO commitments *per se*. In particular, in September 2012 import of tobacco experienced ≈ 30% growth, which resulted from the anticipations of excise tax increase and reorganization of distribution and sales' channels. Similar ≈ 30% growth in import of floating devices and vessels took place under no change in import tariff. Import of cars

[2] Quite frequently opinions based upon some specific observations tend to predefine general appraisals of certain processes and developments.

[3] Focus on foreign trade data is perfectly understandable assuming the nature of the WTO accession commitments. GDP, industrial or agricultural production, employment and other similar indicators are influenced by the accession in more or less indirect way.

in spite of tariff reduction witnessed ≈ 40% contraction. The latter could be attributed to introduction of recycling/utilization fee for foreign cars[4] and rush ≈ 20% growth of import in August in anticipation of above-mentioned fee.

Official RF foreign trade statistics for a longer period of time (see Tabl. 1) does not clarify the situation under review. Especially regarding the results for 2014 one might sensibly argue that the WTO membership with all respective Russian commitments is far from being "the only that matters". In particular, Western sanctions (with ≈$40 bln. estimated costs for Russia), contraction of oil prices (resulting in ≈$90 - $100 bln. losses), almost two-fold devaluation of RF national currency (making substantial part of foreign products too expensive for Russian consumers) are widely perceived as much more significant factors currently generating developments of foreign trade flows.

Table 1. RF merchandise trade in 2013 and 2014 (%% in comparison with respective period of the previous years, according to BOP methodology)

	I half 2013	Jan.-Dec. 2013	I half 2014	Jan.-Dec. 2014
X + M	99.4	100.2	98.7	93.1
X	96.2	99.2	101.2	94.9
M	104.4	101.7	94.8	90.2

Source: http://www.gks.ru

Under the circumstances one of the main challenges for the researchers would be to reveal specific impact of Russia's the WTO accession/membership on national economy in general, its foreign trade component in particular, in contrast to the influence of the other factors. In order to meet above-mentioned challenge the paper presents an attempt to investigate the patterns of economic performance experienced by all the countries that acceded to the World Trade Organization after it had been established. In the second section we describe initial theoretical hypotheses, methodology of the analysis, and statistical data the analysis is based upon. Section 3 deals with the results being achieved at this stage of research. Final section concludes major findings.

[4] That tax basically infringed the WTO rules. It was not by chance that first two complains against Russia within the framework of the WTO Dispute Settlement Mechanism presented under the same titles separately by EU and Japan challenged this very practice of Russian authorities. (See: DS462 Recycling Fee on Motor Vehicles and DS463 Recycling Fee on Motor Vehicles - https://www.wto.org/english/tratop_e/dispu_e/dispu_by_country_e.htm).

2. Underlying hypotheses, methodology, and statistical data

As one possible way to evaluate possible repercussions of accession to the WTO the authors of a present paper suggested to take a broader look at the problem and to investigate experience of the other countries that also negotiated their commitments required to gain a status of fully-fledged membership (in contrast to those economies that GATT at various stages of its functioning). From the point of view Russian Federation performance analysis two initial hypotheses seems to be appropriate. Firstly, with due respect to all its specificities and unique features Russia ultimately could be not that different from other countries of the globe, being the subject of the same general economic trends. Secondly, sufficiently large number of observations demonstrating similar results might turn "post-hoc" type of relations (something that took place after accession to the WTO, did not necessarily resulted from the accession) into causal ("due to the accession") link.

According to the official site of the organization (wto.org) 29 non-GATT contracting parties[5] (including Russia) acceded to the WTO between 1995 and 2012[6]. Namely, they are: Albania, Armenia, Bulgaria, Cabo Verde, Cambodia, China, Croatia, Democratic Republic of the Congo, Estonia, Georgia, Jordan, Kyrgyzstan, Latvia, Lithuania, The Former Yugoslav Republic of Macedonia (FYROM), Moldova, Mongolia, Montenegro, Nepal, Oman, Panama, Russian Federation, Samoa, Saudi Arabia, Chinese Taipei, Tonga, Ukraine, Vanuatu, and Vietnam.

In what sense their experience would be relevant for the others? In general, one might sensibly argue that all of them either to larger or to less extent felt certain impact of accession, which had to influence developments of a whole variety of their macroeconomic indicators. Of course, these countries are very diverse in terms of their

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[5] In line with the basic principles of establishing of the World Trade Organization all fully-fledged negotiating countries (GATT contracting parties) that participated in Uruguay Round more or less automatically gained the status of the WTO members. Hence, they neither negotiated their accession *per se*, nor made accession-related binding commitments. It goes without saying that the WTO "founding fathers" had their own commitments stipulated within the framework of Uruguay Round. Being technically in many ways similar to the commitments of newly acceding members, "Uruguay Round commitments" due to their origin still have to be excluded from this paper analysis.

[6] At this stage of research the authors decided to exclude from analysis three countries who acceded to the WTO later than 2012 (namely, Lao People's Democratic Republic in February 2013, Tajikistan in March 2013, and Yemen in June 2014). An obvious reason behind this decision – too short post-accession period with a lack of relevant data.

size, geographical location, and level of economic development. Nevertheless, this diversity could be even perceived as some kind of advantage in comparison with more homogeneous samples. Indeed, in case of overwhelming (or just substantial) majority of the economies under review experienced after their accession to the WTO roughly the same pattern of development in terms of a certain specific indicator, this should be taken as twice as convincing argument in favor of causality. At the same time, existence of different patterns clearly reveals that no general trend is applicable to the whole variety of countries. Under the circumstances more profound cluster type of analysis would be needed to make any meaningful generalizations valid for a certain group of countries (say, transitional and post-transitional or land-locked ones, etc.).

For the purpose of suggested investigation a large number of indicators is of obvious interest. They could be separated into the following several groups:

First of all, these are basic absolute indicators measuring in terms of value and volume foreign trade flows – merchandise export and import, visible trade balance, export and import of services, invisible trade balance, and overall trade balance.

Secondly, there are relative indicators assessing acceleration or slowing-down of foreign trade flows – merchandise export and merchandise import annual rates of growth as well as annual growth rates of export and import of services.

Third group include indicators of relative significance of specific country trade flows in respective global ones – share of national merchandise export in world merchandise export, share of national merchandise import in world merchandise import, share of national export of services in world export of services, and share of national import of services in world import of services.

Fourthly, both absolute and relative data on GDPs seems to be relevant. Nominal and real GDP, GDP calculated on the basis of purchasing power parity (PPP) as well as nominal, real, and PPP GDP rates of growth; GDP real annual rate of growth; GDP PPP annual rate of growth are on the list.

Fifth group of indicators allows to assess relative significance of foreign trade for the overall economic performance of individual countries. Here we have shares of merchandise import and export as well as their sum, i.e. merchandise turnover in nominal, real, and PPP GDP; shares of import and export of services as well as their sum, i.e. service trade turnover in nominal, real, and PPP GDP.

Sixthly, one has to take under consideration data on inward foreign direct investments (FDI)[7]. In this case both absolute and relative indicators make sense – FDI

[7] From purely formal point of view FDI are largely (except an Agreement on Trade-Related Investment Measures / TRIMs and partly General Agreement on Trade in Services / GATS)

inflows, inward FDI stock, FDI inflows annual rate of growth and inward FDI stock annual rate of growth.

Finally, seventh group includes various international ratings presumably being able to reflect an impact of the WTO accession/membership (together with other factors) on respective fields of activity. Among many o these ratings annual KOF globalization index (http://globalization.kof.ethz.ch/), World Bank (WB) annual "Doing business" index, Logistics Performance Index (LPI) calculated by WB each second year (http://lpi.worldbank.org/), Enabling Trade Index (ETI) calculated be World Economic Forum (http://www.weforum.org/), and some others might deserve a special attention.

While analyzing fluctuations of whatever indicator one significant point cannot obviously be ignored. Indeed, dates of the WTO accession for all 29 above-mentioned countries differ. The earliest "newcomer" was Bulgaria gaining status of a member in December 1996; Russian Federation and Vanuatu acceding in August 2012 were the last. Under the circumstances the only possible way to make data for individual economies comparable with each other would be to introduce something that might be called a "floating time-frame". The idea is to observe for each and every country two years period before the accession and compare it with next two years after the accession for the same economies.

It goes without saying that this approach has its own shortcomings. Mainly they relate to the fact that for almost two decades duration period, individual countries as well as global economy in general went through several recessions and recoveries. Hence, national economies that happened to accede to the WTO in times of the former

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beyond the scope of World Trade Organization regulatory framework. At the same time, real impact of international trading system on international investments appears to be more comprehensive one. The authors of one of the first analytical reports published by the WTO claimed: "Because the benefits which the WTO brings to the world economy come primarily via the impact of the WTO on investment decisions, it is no exaggeration to say that investment is at the heart of the WTO." (WTO, 1996). Accession to the WTO is widely perceived as a factor stimulating inward FDI. In addition to above-mentioned TRIMs-GATS considerations, expansion of investments inflows might result from more transparent and predictable business environment in newly acceding countries as well as better protection of intellectual property rights associated with the provisions of an Agreement on Trade-Related Intellectual Property Rights (TRIPS). In particular, in Russian case many potential investors during 1990s-2000s had named serious concerns regarding security of their intellectual property as a barrier to FDI.

just could not perform in line with the upward trend of the latter. More than that, within the framework of economic disturbances (including the last global crisis of 2008-2009) national regulators in many instances tend to stop trade policy liberalization and even to introduce protectionist measures as much as possible (Baldwin, Richard and Evenett, Simon). Nevertheless, the authors of a present paper would argue that it is a "floating time-frame", which provides an opportunity to get, at least at the initial stage of research, appropriate results. As for above-mentioned possible discrepancies, if necessary they could be taken under consideration later as a part of cluster analysis.

There is yet another worth mentioning technical detail. Different countries officially became the members of the WTO in different months of respective years. Macroeconomic indicators for the analysis are statistically presented on the annual basis. Under the circumstances the authors decided to take a half of the year as a "border line" to distinguish between pre- and post-accession periods. In other words, for the countries acceded to the WTO during January – June these months together with the rest are taken for the first post-accession year. In contrast to that, for the countries with accession dated in July – September the whole this year is taken for the last pre-accession one.

Final remark of this section of a paper relates to the source of statistical data. In order to ensure as much consistency and comparability as possible the data are mostly borrowed from the same source, namely UNCTAD statistical data base (www.unctad.org).

3. Results of the analysis

In a present paper the authors present preliminary results of their work in progress with a limited number of above-mentioned indicators being analyzed. Namely, they are:

Merchandise export [X (m)] annual growth rate. It is frequently argued that one of the most substantial possible advantages resulting from gaining the status of the WTO member is a better access to foreign market for the variety of products manufactured in a newly acceding country;

Merchandise export plus export of services [X (m+s)] annual growth rate. Available statistics does not support a widely shared belief that trade in services tends to grow faster than merchandise trade. According to the WTO during the period of 2000-2006 average annual global growth rate was 10% for the former, and 11% for the latter (WTO, 2007, p.6). During the period of 2005-2013 both components of world export demonstrated the same dynamics – average annual growth of 8% (WTO,

2014, p.25). Nevertheless, assuming the fact that at the moment both scope and scale of services traded internationally is much less than those traded at the domestic market, existing untapped reserves for export of services expansion look really impressive;

Merchandise import plus import of services [M (m+s)] annual growth rate. Among possible threats of the WTO accession for the "newcomers" fast growth of import resulting in redistribution of market share in favor of foreign manufacturers as well as service providers arguably has the highest rank;

Nominal GDP annual growth rate. From the very beginning of its existence and till present days official documents of GATT/WTO system have constantly emphasized that international trade is not an ultimate goal, but rather an important instrument. Liberalization of trade policies and respective expansion of trade flows among the countries should contribute to more balanced global economic growth and development, to narrowing the gap between wealthy and less prosperous members of international community;

Real GDP (in constant 2005 prices) annual growth rate. Due to various reasons level of inflation in the group under review tends to differ substantially between the countries. Being influenced by some global trends this level also fluctuated within the framework of almost two decades time span we investigate. In particular, for 29 countries under review consumer price indexes (CPI) in 2013 comparing with 2000 (taken as 100) increased up to between 114.4 (the lowest case of Chinese Taipei) and 1891.4 (the highest case of Democratic Republic of the Congo) (www.unctad.org). Just in 2013 world average growth of consumer prices equaled to 3.9%; for developing countries it was 5.6% (CIA). From that perspective last two of above-mentioned indicators clearly complement each other.

In other words, the focus is made on relative indicators in order to assess either as "positive" or as "negative" developments of individual national economies after their accession to the WTO. More specifically, the question is: how did rate of growth (calculated in terms of simple average) change during two years after accession in comparison with two years prior to gaining the status of the WTO member? Under the circumstances "positive" dynamics in annual growth rates stands for one of three following options:

higher rate of growth;

slow-down of contraction;

shift from contraction to growth.

In its turn, "negative" dynamics in annual growth rates stands for one of three following options:

lower rate of growth;

higher rate of contraction,

shift from growth to contraction.

X (m) annual growth rate[8] after the accession for individual countries fluctuated between -40.6% (in case of Ukraine, post-accession period under review 2008-2009) and +34.6% (in case of China, post-accession period under review 2002-2003). All in all "positive" dynamics of various magnitudes for this indicator in three above-mentioned forms (namely, higher rate of growth, slow-down of contraction, and shift from contraction to growth) took place in 13 economies out of 29. These were Albania, China, Croatia, Democratic Republic of the Congo, Estonia, Jordan, Kyrgyzstan, The Former Yugoslav Republic of Macedonia (FYROM), Moldova, Chinese Taipei, Tonga, Vanuatu, and Vietnam.

In contrast to that, "negative" dynamics of equally different magnitudes (presented by lower rate of growth, higher rate of contraction, shift from growth to contraction) was experienced by the rest of 16 countries. These were Armenia, Bulgaria, Cabo Verde, Cambodia, Georgia, Latvia, Lithuania, Mongolia, Montenegro, Nepal, Oman, Panama, Russian Federation, Samoa, Saudi Arabia, and Ukraine.

X (m+s) annual growth rate[9] after the accession for individual countries fluctuated within the range of -37.2% (in case of Ukraine, post-accession period under review 2008-2009) and +32.7% (in case of China, post-accession period under review 2002-2003). It is quite understandable that both in case of merchandise export and in case of merchandise export plus export of services it was the same country, which demonstrated the largest growth and the deepest contraction. All in all "positive" dynamics of various magnitudes in X (m+s) annual growth rate took place in 14 economies out of 29. These were Bulgaria, China, Croatia, Democratic Republic of the Congo, Estonia, Jordan, Kyrgyzstan, Latvia, Lithuania, The Former Yugoslav Republic of Macedonia (FYROM), Moldova, Samoa, Chinese Taipei, and Vietnam.

In contrast to that, "negative" dynamics of equally different magnitudes was experienced by the rest of 15 countries. These were Albania, Armenia, Cabo Verde, Cambodia, Georgia, Mongolia, Montenegro, Nepal, Oman, Panama, Russian Federation, Saudi Arabia, Tonga, Ukraine, and Vanuatu.

M (m+s) annual growth rate[10] after the accession for individual countries fluctuated within the range of -44.0% (in case of Ukraine, post-accession period under review 2008-2009) and +51.4% (in case of Democratic Republic of the Congo, post-

[8] See Appendix 1 for detailed information.

[9] See Appendix 2 for detailed information.

[10] See Appendix 3 for detailed information.

accession period under review 1997-1998). It is interesting to note that this is the largest gap among those observed for all indicators under review. All in all "positive"e dynamics of various magnitudes in M (m+s) annual growth rate took place in 15 economies out of 29. These were Armenia, Bulgaria, China, Croatia, Democratic Republic of the Congo, Estonia, Jordan, Lithuania, The Former Yugoslav Republic of Macedonia (FYROM), Moldova, Mongolia, Saudi Arabia, Chinese Taipei, Vanuatu, and Vietnam.

In contrast to that, "negative" dynamics of equally different magnitudes was experienced by the rest of 14 countries. These were Albania, Cabo Verde, Cambodia, Georgia, Kyrgyzstan, Latvia, Montenegro, Nepal, Oman, Panama, Russian Federation, Samoa, Tonga, and Ukraine.

Nominal GDP annual growth rate[11] after the accession for individual countries fluctuated between -34.9% ((in case of Ukraine, post-accession period under review 2008-2009) and +29.9% (in case of Bulgaria, post-accession period under review 1997-1998). All in all "positive" dynamics of various magnitudes in annual growth rate for this indicator took place in 17 economies out of 29. These were Albania, Armenia, Bulgaria, Cambodia, China, Croatia, Democratic Republic of the Congo, Estonia, Jordan, Kyrgyzstan, Lithuania, The Former Yugoslav Republic of Macedonia (FYROM), Moldova, Nepal, Chinese Taipei, Vanuatu, and Vietnam.

In contrast to that, "negative" dynamics of equally different magnitudes was experienced by the rest 12 countries. These were Cabo Verde, Georgia, Latvia, Mongolia, Montenegro, Oman, Panama, Russian Federation, Samoa, Saudi Arabia, Tonga, and Ukraine.

Real GDP annual growth rate[12] after the accession for individual countries fluctuated within the range of -14.8% (in case of Chinese Taipei, post-accession period under review 2002-2003) and +10.8% (in case of Cambodia, post-accession period under review 2005-2006). Regarding this specific indicator the gap in performance of different countries quite expectably was the smallest among those observed for all indicators under review. All in all "positive" dynamics of various magnitudes in annual growth rate for this indicator took place in 13 cases out of 26[13]. These were Bulgaria, Cambodia, China, Croatia, Estonia, Georgia, Jordan, Kyrgyzstan, Latvia,

[11] See Appendix 4 for detailed information.

[12] See Appendix 5 for detailed information.

[13] At the moment with respect to this specific indicator data for tree countries, namely Democratic Republic of the Congo, Vanuatu, and Vietnam are not available to the authors.

Lithuania, The Former Yugoslav Republic of Macedonia (FYROM), Moldova, and Saudi Arabia.

In contrast to that, "negative" dynamics of equally different magnitudes was experienced by the rest 13 countries. These were Albania, Armenia, Cabo Verde, Mongolia, Montenegro, Nepal, Oman, Panama, Russian Federation, Samoa, Chinese Taipei, Tonga, and Ukraine.

Tab. 2 depicts integrated information on all five indicators being analyzed.

Table 2. "Positive" and "negative" changes in dynamics of selected indicators for individual national economies after their accession to the WTO.

"Positive" dynamics	"Negative" dynamics
X (m)	
Bulgaria, China, Croatia, Democratic Republic of the Congo, Estonia, Jordan, Kyrgyzstan, Latvia, Lithuania, The Former Yugoslav Republic of Macedonia (FYROM), Moldova, Samoa, Chinese Taipei, and Vietnam.	Armenia, Bulgaria, Cabo Verde, Cambodia, Georgia, Latvia, Lithuania, Mongolia, Montenegro, Nepal, Oman, Panama, Russian Federation, Samoa, Saudi Arabia, and Ukraine.
M (m+s)	
Bulgaria, China, Croatia, Democratic Republic of the Congo, Estonia, Jordan, Kyrgyzstan, Latvia, Lithuania, The Former Yugoslav Republic of Macedonia (FYROM), Moldova, Samoa, Chinese Taipei, and Vietnam.	Albania, Armenia, Cabo Verde, Cambodia, Georgia, Mongolia, Montenegro, Nepal, Oman, Panama, Russian Federation, Saudi Arabia, Tonga, Ukraine, and Vanuatu.
M (m+s)	
Armenia, Bulgaria, China, Croatia, Democratic Republic of the Congo, Estonia, Jordan, Lithuania, The Former Yugoslav Republic of Macedonia (FYROM), Moldova, Mongolia, Saudi Arabia, Chinese Taipei, Vanuatu, and Vietnam.	Albania, Cabo Verde, Cambodia, Georgia, Kyrgyzstan, Latvia, Montenegro, Nepal, Oman, Panama, Russian Federation, Samoa, Tonga, and Ukraine.
Nominal GPD	
Albania, Armenia, Bulgaria, Cambodia, China, Croatia, Democratic Republic of the Congo, Estonia, Jordan, Kyrgyzstan, Lithuania, The Former Yugoslav Republic of Macedonia (FYROM), Moldova, Nepal, Chinese Taipei, Vanuatu, and Vietnam.	Cabo Verde, Georgia, Latvia, Mongolia, Montenegro, Oman, Panama, Russian Federation, Samoa, Saudi Arabia, Tonga, and Ukraine.
Real GDP	
Bulgaria, Cambodia, China, Croatia, Estonia, Georgia, Jordan, Kyrgyzstan, Latvia, Lithuania, The Former Yugoslav Republic of Macedonia (FYROM), Moldova, and Saudi Arabia.	Albania, Armenia, Cabo Verde, Mongolia, Montenegro, Nepal, Oman, Panama, Russian Federation, Samoa, Chinese Taipei, Tonga, and Ukraine.

* Real GDP annual growth rate data are not available

4. Conclusion

According to commonly shared idea, accession to the World Trade Organization has to generate not only in a long-run but also in a medium-run as well as in a short-

run certain economic effects for each and every newly acceding country. Majority of internationally recognized experts (assuming variety of both extra costs and extra benefits associated with accession) tends to argue in favor of net gains. This perception is supported by the fact that so far no single WTO-member has ever left the institution[14]. More than that, currently 23 countries negotiate (although with different speed and progress) their accession.

At the same time, the analysis of available data for all 29 non-GATT contracting parties successfully acceded to the WTO between 1995 and 2012 demonstrates very diverse patterns in development of trade and trade-related (presumably accession-dependent) economic indicators after accession in comparison with the pre-accession period. In general, the countries under review experienced amazingly large difference of growth rates. Even in case of expectedly the lowest gap in case of real GDP, it fluctuated within the range of -14.8% (Chinese Taipei, post-accession period under review 2002-2003) and +10.8% (Cambodia, post-accession period under review 2005-2006).

Table 3 Summary on "positive" and "negative" changes in dynamics of selected indicators for individual national economies after their accession to the WTO.

"Positive" dynamics	"Negative" dynamics
In all 5 indicators	
China, Croatia, Democratic Republic of the Congo*, Estonia, Jordan, The Former Yugoslav Republic of Macedonia (FYROM), Moldova, and Vietnam*.	Cabo Verde, Montenegro, Oman, Panama, Russian Federation, and Ukraine.
X (m+s) + Nominal GPD + Real GDP	
China, Croatia, Democratic Republic of the Congo*, Estonia, Jordan, The Former Yugoslav Republic of Macedonia (FYROM), Moldova, and Vietnam*. + Bulgaria, Kyrgyzstan, and Lithuania.	Cabo Verde, Montenegro, Oman, Panama, Russian Federation, and Ukraine. + Tonga.
M (m+s) + Nominal GPD + Real GDP	
China, Croatia, Democratic Republic of the Congo*, Estonia, Jordan, The Former Yugoslav Republic of Macedonia (FYROM), Moldova, and Vietnam*. + Bulgaria, Lithuania, and Saudi Arabia,	Cabo Verde, Montenegro, Oman, Panama, Russian Federation, and Ukraine. + Samoa, and Tonga

* Real GDP annual growth rate data are not available

[14] Technically withdrawal (in contrast to accession) neither requires any negotiations, nor assumes any direct financial obligations.

Largely in contrast to initial expectations, analysis revealed very small difference between the amount of countries that experienced “positive” and “negative” dynamics. The widest gap was in case of nominal GDP with 17 economies on a “positive” side against 12 economies on a “negative” one. On top of that, only less than a half of the countries under review demonstrated uniformity in the dynamics of all selected indicators (see Tab.3).

Russian Federation together with five other (including Ukraine) newly acceded members of the WTO experienced in two post-accession years “negative” dynamics of all indicators we observed. At the same time, especially with respect to 2014 accession/membership was far from being the only “international factor” that really mattered in influencing the performance of RF national economy in general, foreign trade in particular.

At this stage of their research the authors clearly failed to reveal any dominating trend in post-accession development of the countries under review. Taking under consideration extremely high level of diversity typical for these countries further, more profound cluster type of analysis would be needed to make any meaningful generalizations valid for a certain groups of economies.

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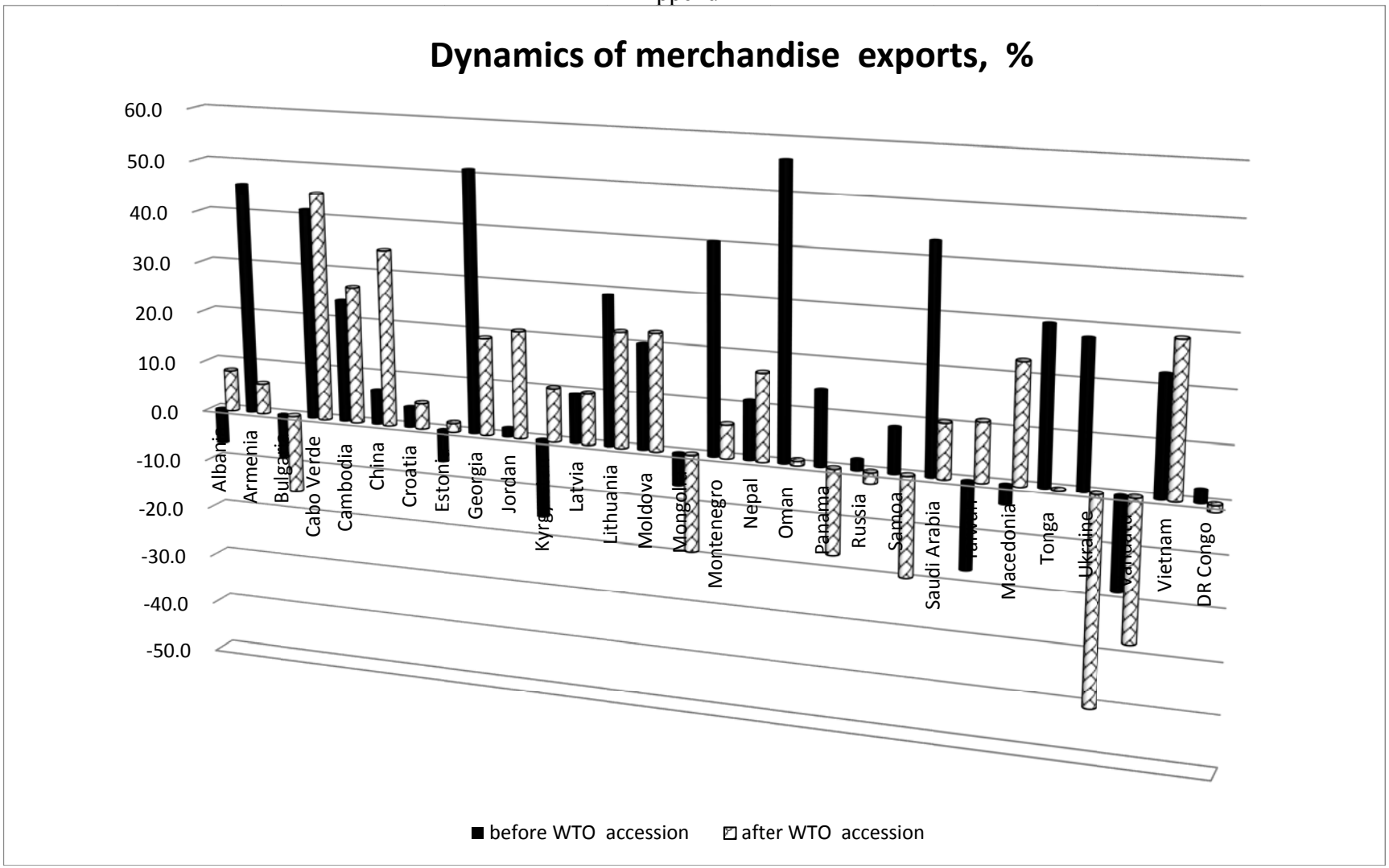
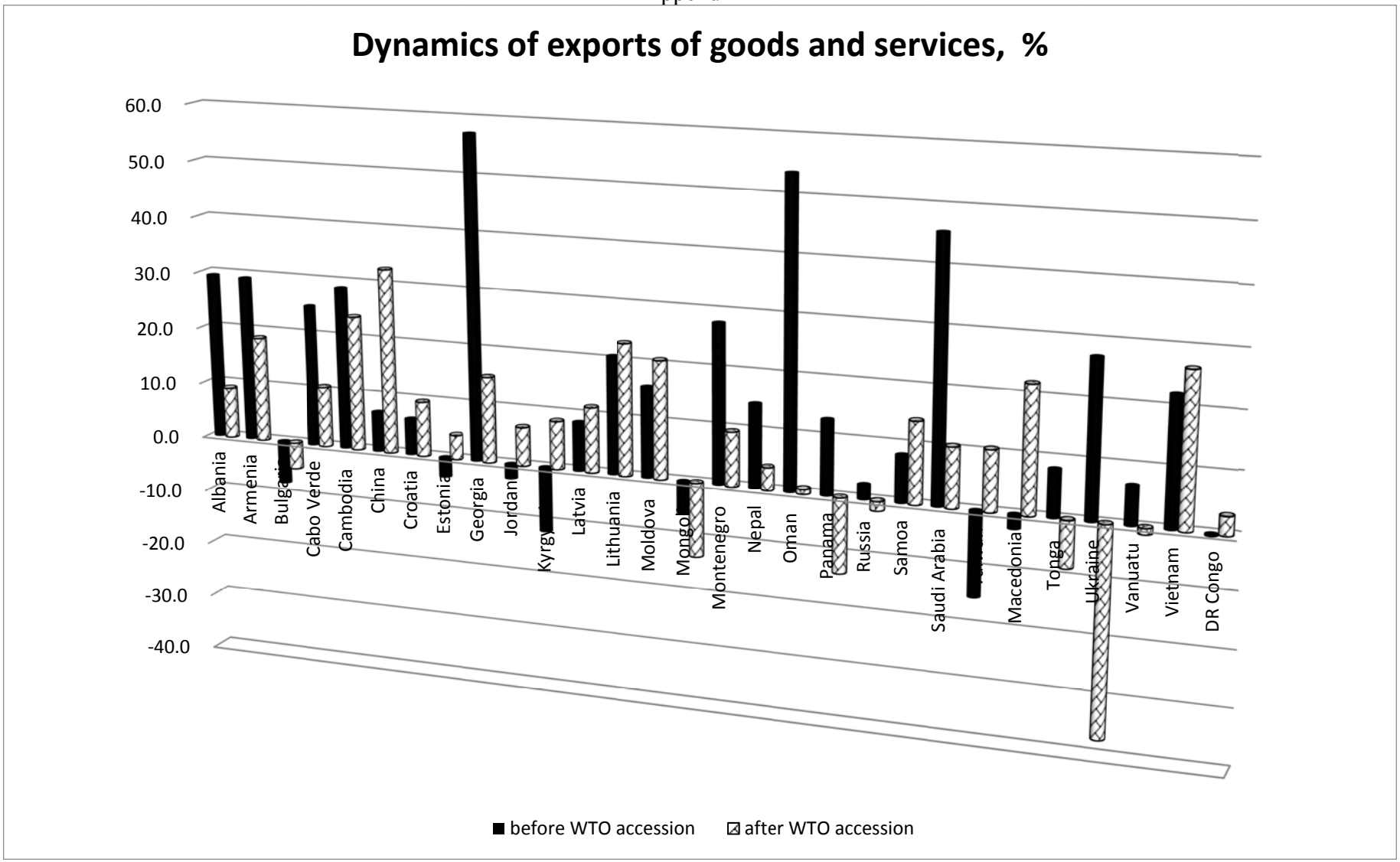
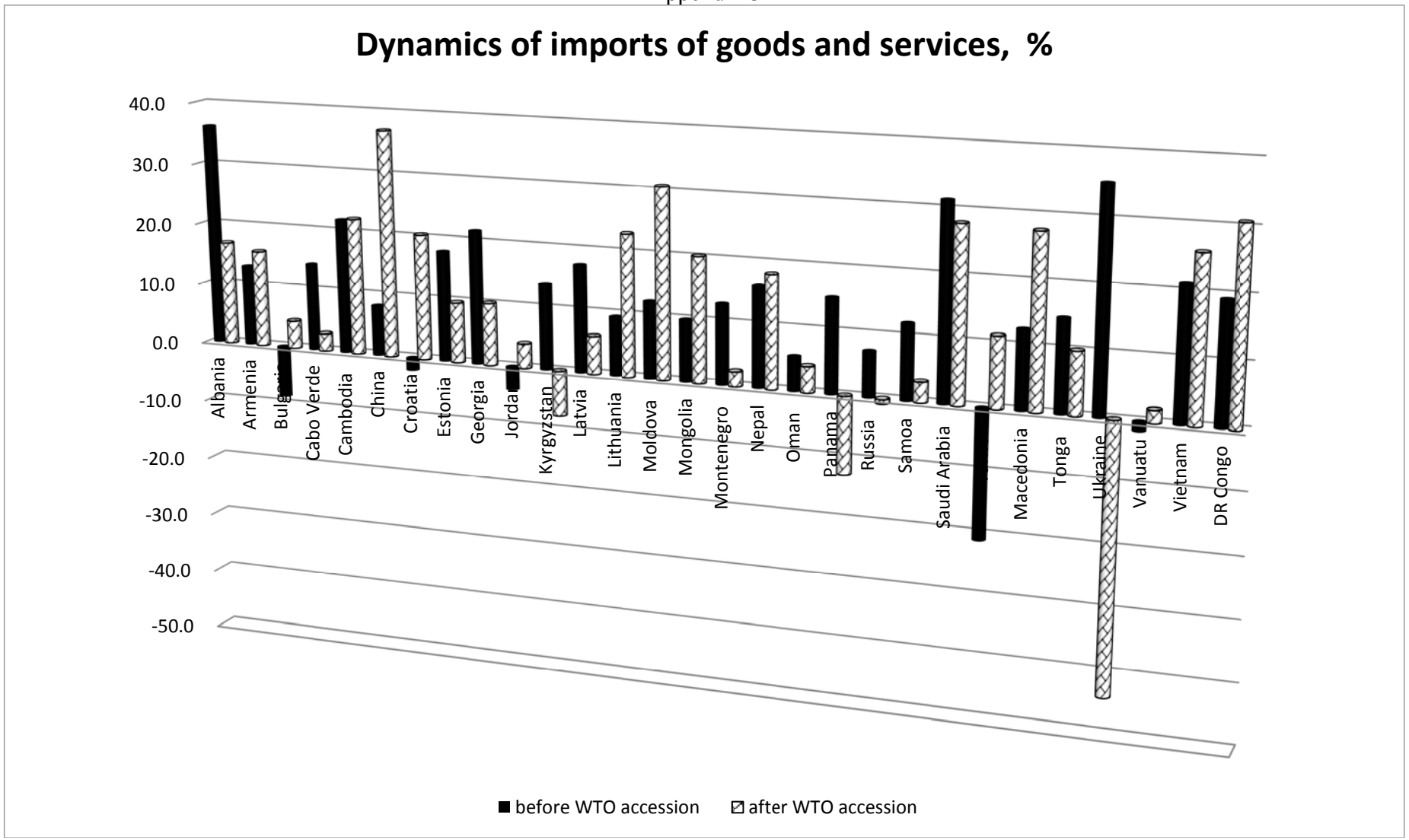
Appendix 1


Dynamics of merchandise exports, %
60.0
50.0
40.0
30.0
20.0
10.0
0.0
-10.0
-20.0
-30.0
-40.0
-50.0
Armenia
Cabo Verde
Cambodia
China
Georgia
Jordan
Latvia
Lithuania
Moldova
Montenegro
Nepal
Oman
Panama
Russia
Samoa
Saudi Arabia
Macedonia
Tonga
Ukraine
Vietnam
DR Congo
before WTO accession
after WTO accession

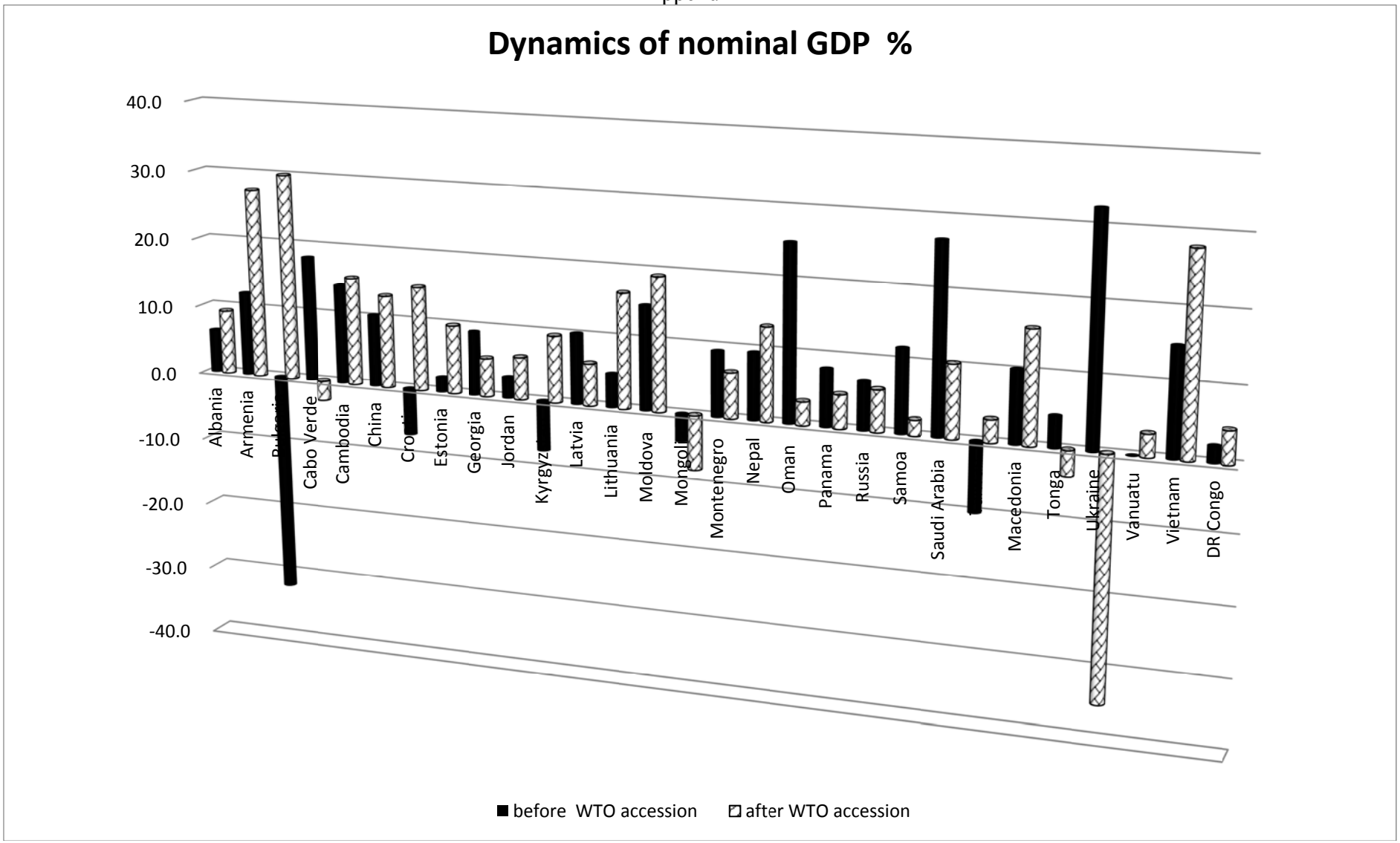
Appendix 2


Dynamics of exports of goods and services, %
60.0
50.0
40.0
30.0
20.0
10.0
0.0
-10.0
-20.0
-30.0
-40.0
Albania
Armenia
Cabo Verde
Cambodia
China
Croatia
Georgia
Latvia
Lithuania
Moldova
Montenegro
Nepal
Oman
Panama
Russia
Samoa
Saudi Arabia
Macedonia
Tonga
Ukraine
Vanuatu
Vietnam
DR Congo
before WTO accession
after WTO accession

Appendix 3


Dynamics of imports of goods and services, %
40.0
30.0
20.0
10.0
0.0
-10.0
-20.0
-30.0
-40.0
-50.0
Albania
Armenia
Bulgaria
Cabo Verde
Cambodia
China
Croatia
Estonia
Georgia
Jordan
Kyrgyzstan
Latvia
Lithuania
Moldova
Mongolia
Montenegro
Nepal
Oman
Panama
Russia
Samoa
Saudi Arabia
Macedonia
Tonga
Ukraine
Vanuatu
Vietnam
DR Congo
before WTO accession
after WTO accession

Appendix 4


Dynamics of nominal GDP %
40.0
30.0
20.0
10.0
0.0
-10.0
-20.0
-30.0
-40.0
Albania
Armenia
Cabo Verde
Cambodia
China
Estonia
Georgia
Jordan
Latvia
Lithuania
Moldova
Montenegro
Nepal
Oman
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Samoa
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Macedonia
Tonga
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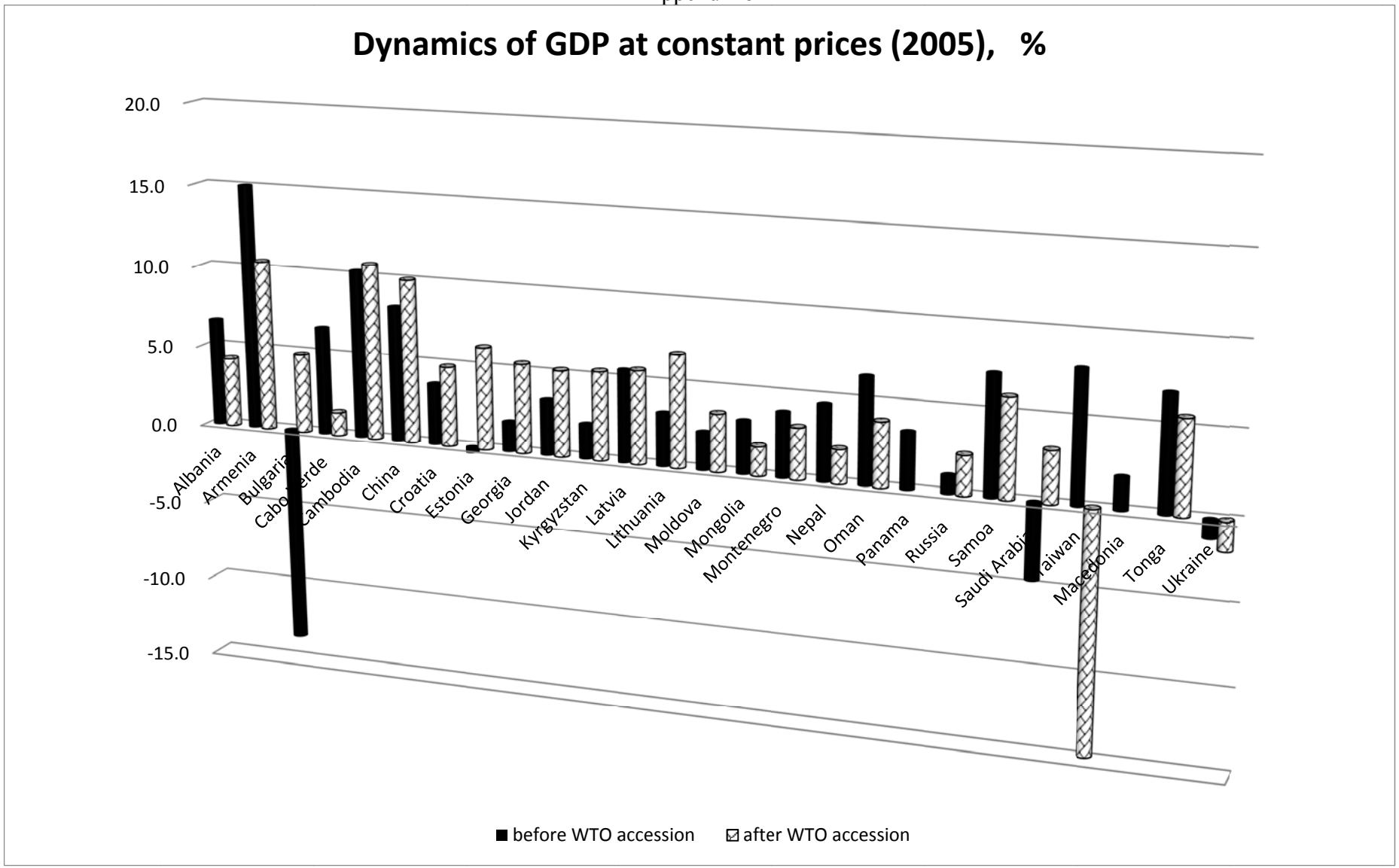
before WTO accession
after WTO accession

Appendix 5


Dynamics of GDP at constant prices (2005), %
20.0
15.0
10.0
5.0
0.0
-5.0
-10.0
-15.0
Albania
Armenia
Bulgaria
Cambodia
China
Croatia
Estonia
Georgia
Jordan
Kyrgyzstan
Latvia
Lithuania
Moldova
Mongolia
Montenegro
Nepal
Oman
Panama
Russia
Samoa
Tonga
Ukraine
before WTO accession
after WTO accession

Economic Development, Geography, and Trade: Evidence from Russian Regions, 2000-2012*

Irina Korgun[+] and Kazuhiro Kumo[++]

Abstract

This paper deals with the problem of economic growth and spatial development in Russia. It follows a theoretical framework of economic geography in terms of factors of the first and the second nature. According to economic geography, natural resource endowment, transportation costs, distance to markets and population distribution among other factors produce strong influence on economic performance of countries and regions. Using data for Russian regions, we test the effect of these factors on the level of economic development in Russian regions during 2000-2012, when they achieved high rates of growth. Our results support earlier theoretical and empirical findings in several aspects. First, we observe a positive effect of trade on economic growth in Russian regions during the period under review. Second, the first nature factors included as a distance to two main trading partners, Berlin and Beijing, were significant determinants of improvements in the levels of economic development across Russian regions. This work differs from others by the fact that we control for natural resource endowment in order to minimize the resource rent effect on regional economic growth in Russia.

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1. Introduction

Resource-dependent nature of economic growth in Russia following the post-Soviet transformation in 1990-2000's is well researched in empirical literature (Cooper, 2006; Kuboniwa, 2012; 2014). High world oil prices during years preceding the financial crisis of 2008 have positively affected aggregate rates of economic growth on the macro-level (Benedictow et al., 2013; Hofman et al., 2012). There were mainly two sources of this effect. Firstly, proceeds from exports received by Russian firms stimulated higher investments and growth of wages. Secondly, rents in forms of various resource-related tariffs and levies increased budgetary gains of the federal government (Kuboniwa, 2012). This produced a multiplicative effect on business, government and consumer spending and in the end led to growing prosperity reflected in growing incomes.

The mainstream literature on economic dynamics in Russia in 2000's predominantly focused on the macro-perspective of foreign trade rather than on its regional impact. However, region-wide effect of export and import deserves more attention due to several considerations of both global and country-level character. First of all, research into regional impact of foreign trade is necessitated by growing international awareness about role and place of regions in the economic development of countries and, more broadly, in the world economy (Storper, 2008). This trend towards the reinforcement of economic activity at the subnational or regional level somewhat countervailed a progressive transfer of certain economic and political functions upward to the plurinational and global levels (Scott, 1999).

Therefore, it is important to understand what connection to global markets Russian regions have by means of their foreign trade. Of special interest is the question whether foreign trade has any impact on economic development in Russian regions which for several decades did not have free access to world markets under a planned system.

Unlike European countries which started reinforcement of economic and political life at regional level since the end of the 1970's (Scott, 1999), Russia witnessed this transformation, albeit rapid, almost two decades later. The empirical research could not keep up with the pace of changes because studies on impact of foreign on regional development levels are not numerous though there were some for the country-level. Thus, more empirical research is necessary for investigating the impact of foreign trade on regional development to support related policy- and decision making.

Aggregated macro-level data and research do not always suit for such purposes because they fail to emphasize regional differences in foreign trade intensity. In a country like Russia characterized by uneven spatial organisation, regions reveal deep variations in their geographic and market characteristics, natural resource endowment, transport infrastructure, etc. (World Bank, 2004). Even for resource abundant regions, resource endowment itself represents no more than one of the factors contributing to higher levels of development rather than being a single source of growth. Also, experience of other countries shows that economic growth is possible in resource-scare countries like Japan, Germany and South Korea well. Therefore, a research question about the relationship between changes in levels of economic development and non-resource factors emerges from this point.

As mentioned above, research into problems of trade and economic development in Russian regions is meaningful from the point of policy making. To be more specific, it can give ideas on how to manage trade patterns in development process under a situation when economic activity is geographically dispersed. 'Lumpiness' of economic development (Rodrick, 2003), which is the case in Russia, could result in competitive and collaborative relations of regions with their trade partners becoming more significant for their economic life.

This paper attempts to address some of these issues by investigating pattern of regional economic development in Russia from the point of its relations with foreign trade and geography. The emphasis is on the period of 2000-2012 when Russian witnessed improvements in the levels of economic development in all its 83 regions. We run a series of empirical tests in order to investigate whether trade plays critical role in determining the level of economic development in Russian regions. If so, to what extent the effect of trade on economic growth can be changed when spatiality is accounted for. With the term "spatiality" we mean distance to major economic partners of Russia, namely, the European Union and East Asia. These would be substituted by the distance from Beijing and Berlin.

After reviewing regional economic conditions and trade development patterns in Russia in section 2, the paper proceeds to discussion on some theoretical issues and factors explaining dynamics of regional development. Section 4 introduced data and methodology to be utilized and presents analytical results and their interpretation. Section 5 discusses some policy implications, and the final section concludes major findings. Our analysis shows that trade and population distribution critically affect regional economies in Russia, the finding being consistent with theoretical works.

Geography too seems to be a significant determinant of development levels across regions and account for some part of the variation in gross regional product (GRP) per capita. When distance to main trading partners, namely, distance from Berlin or that from Beijing, is included into analysis, regions that locate closer to Beijing tend to grow faster.

2. Regional Economic Space and Trade Performance in Russia in 2000-2012

Russian regions differ substantially between each other in level of economic development. In 2011, ten regions out of total 83 accounted for more than 50% of Russia's sum of GRP, while 20 regions accounted for almost 70% of nominal sum of GRP[1]. Top contributing regions include cities of Moscow and Saint-Petersburg, the Moscow regions, Khanty-Mansiysk Autonomous District, Krasnoyarsk and Sverdlovsk region. Size of country's geographic space leads to scattered economic activity: areas of concentration are divided by enormous expanse of "dead space"' (Carluer and Sharipova 2004; Dienes, 2002).

Territorial differences in Russia are very deep-rooted (UNDP, 2007) and were initially set by advantageous resource endowments. But variations in levels of regional economic development had become even more pronounced. This is illustrated well enough in Figure 1. Regions marked by dark colours are usually the ones characterized by higher levels of GRP per capita, while lighter ones are those with lower levels of GRP. As seen from the Figure 1, variations in levels of GRP per capita were quite pronounced in 2010, and the situation did not change much for these ten years up to 2012. And in some cases, for example, between Nothern Tumen and Caucasian Ingush, the difference reached around twenty to thirty times[2]. Exports too are dispersed unevenly across Russian regions. Here Western regions are doing better than the rest of the country[3].

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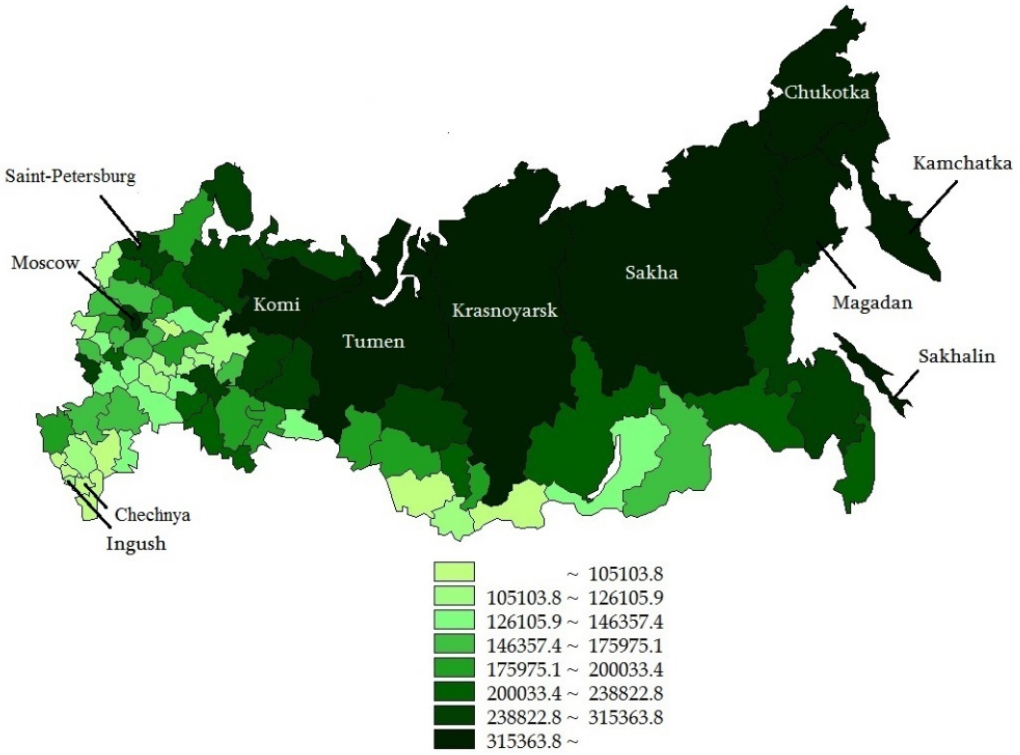
[1] Unified Interdepartmental Statistical Information System Website, <http://www.fedstat.ru/ indicator/ data.do>.

[2] Unified Interdepartmental Statistical Information System Website, <http://www.fedstat.ru/ indicator/ data.do>.

[3] It should, however, be born in mind that to a certain extent this concentration is a result of data extortion: headquarters of big companies are often registered in Moscow or other big cities while their production base, and consequently export base, locates in regions. This fact could also explain

Figure 1. Gross Regional Products per capita, 2010 (in roubles)



Note: All the data in this paper were derived from *Regiony Rossii*, various years, by FSSS, if not noted. All the figures and tables were prepared by the authors.

Increase in inequality in the level of economic development among regions can be largely attributed to two factors. The first is the fact that practices of massive re-distribution of resources by the state were abandoned in the 1990's. Even though they often lead to distortions and misallocations, they sustained economic activities in 'disadvantaged' regions like the ones in the North (Hill and Gaddy, 2003). The other factor could be summed up as an uneven access to economic benefits of growth realized in the 2000's.

There is one quite uncommon thing that becomes quite obvious from Figure 1. Regions with higher levels of GRP are located inland while economically less

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why Moscow and Saint-Petersburg are among top oil and gas exporting regions. In 2011 they exported mineral fuels worth 167.4 billion US dollars and 16.1 billion dollars respectively. It is more than export volumes of net oil producers Tatarstan or Sakhalin for the same year which stands at 16 billion USD and 15 billion USD respectively (Federal State Statistical Service of the Russian Federation (FSSS), 2014). Such data extortion makes an additional reason to account for resource factor when estimating the effect of export on regional economic growth in Russia.

successful regions are usually the ones located closer to capital region and state borders. Such dispersion of GRP across country is strikingly different from what is found in other countries. For example, in China inland regions are less developed than the coastal ones (Li and Xu, 2008; Kwan, 2014). In addition, this type of dispersion of economic activity contradicts to the postulates of theoretical underpinnings of economic geography that says that border regions are more likely to grow faster (Fujita and Mori, 1996). Therefore, in case of Russia we might observe a peculiar type of relations between geography and economic growth. Such relations may result from various reasons including uneven resource endowment and degree of involvement into international trade.

Evidently, increased openness to international trade account for a certain degree of growing regional disparities between Russian regions (Fujita, Kumo and Zubarevich, 2006). After state monopoly for foreign trade was terminated with adoption of trade liberalization act in 1992,[4] foreign trade emerged as one of factors of economic growth. Trade's contribution became especially significant in 2000s when Russia saw an accelerated growth of its foreign trade backed by resource exports (Berkowitz and DeJong 2010; Korgun, 2014). In 2000-2010 the volume of export grew at an average rate 17.69% with pre-crisis levels reaching 22.98% during 2000-2008. Growth rates of import over similar periods seem to be unaffected by geographic positioning of the regions. Also, this may mean that remoteness of some regions does not seem to be a problem for certain regions. However, whether it is so or not needs to be tested empirically.

Peculiarities of Russia's spatial development may result from factors of the first nature (Krugman, 1991), namely, exogenous geographic conditions and resource endowment. The second nature, which is man-made, also must have affected the pattern of Russian economic growth. The first and the second nature of economic geography would be discussed more detail in the section of previous literature, but it should be mentioned here as well. Setting aside a pace of historic process and the fact that there were big time gaps in exploration of regions, which are hard to account for statistically, migration patterns seem to intensify economic differences between the Russian regions too. In the absence of state control for movement of population and depopulation of northern regions, varying levels of population distribution influences

[4] The presidential decree "About Liberalization of Foreign Economic Activity" N 629 as of 14.05.92 and N 1306 as of 27.10.92.

such aspects of economic activity as agglomeration, infrastructure, involvement in foreign trade and many others (Zubarevich, 2012). In context of given study this means that population could also contribute to the observed differences in relations between regional economic development level and trade.

One more point that deserves consideration is the variation in direction of trade flows. When it comes to national level, Russia's principle trading partner is EU, followed by China. In 2012 four European countries – Germany, Italy, Netherlands and Poland – accounted for 36% of Russian exports; China's share was around 8%, equal to that of Germany (FSSS, 2013). However, Far Eastern regions tend to be more oriented towards China and Asia on the whole due to geographic proximity of Asian countries. Up to 70-80% of export of Primorsky, Khabarovsky and Amursky regions, three biggest non-oil producing regions in the Far East, goes to Asia and up to 30-40% to China alone[5]. It could be the case that dominating trade partner influences intensity of foreign trade in particular regions and resulting difference of observed economic growth.

So, taking feature of spatial economic development in Russia into account, we would like to address several points in this study. In the first place we are interested in relations between trade and regional economic growth in the presence of such factors as differences in geographic location, direction of trade flows and distance to economic partners. With this we also aim to answer such questions as: Do regions that locate closer to main economic partners grow faster or not? How does main trading partner (Germany or China effects observed) affect the Russian regional economy? And lastly, Does population level changes relations between trade and growth? To the best of our knowledge, such disaggregation was not done in previous empirical works on trade and economic growth in Russia regions.

3. Previous Studies

Spatiality and its role in economic growth and trade is one of the most prolific area of study in the field of economic geography. Works of Fujita, Krugman and Venables (2001), Rodrick (2002), Venables (2003), to name a few, established strong relations between spatial characteristics of an economy, which they refer to as factors of the 'first nature', trade and economic growth. According to them, such forces as closeness to border with economically strong partners, differences in access to ports

[5] Website of Dalnovostochnoe tamozhennoe upravlenie, URL: <http://dvtu.customs.ru/>.

and transport infrastructure - all influence the trajectory of regional economic growth and often lead to unbalanced pattern of growth with high concentration of economic activity and trade in regions that have better 'first nature' characteristics and low economic growth and sluggish foreign trade in regions that are characterized by relatively unfavourable 'first nature conditions'. This is what Venables (2003) called 'lumpiness' in economic development. Divergent trajectories of growth, though it was set by geography initially, can be intensified in a situation of growing openness to exchanges across national borders. In the presence of intensive trade with foreign partners, agglomeration effect 'within' regions may decrease. This lead us to the question of the 'second nature factors', as defined by Krugman and Fujita (2004).

The 'second nature factors' are often 'man-made' and can either help to overcome unfavourable first nature characteristics or, on the contrary, induce larger discrepancies. The latter is due to increasing return to scale, which is presented in the second nature geography and which causes regions with initially advantageous factor endowment grow faster, thus, causing more divergence in level of economic development between the regions of the same country. However certain 'second nature' characteristics may induce faster economic growth and in this regard foreign trade and transportation conditions are of special importance. As Rodrick (2002) points out, foreign trade in conjunction with transportation can be seen as a 'deeper' factor of economic and social development.

Regional geography is important for trade because it means distance to markets which in its turn determines income (Redding and Venables, 2003a; 2003b). Sharing a border is believed to have a considerable positive effect on bilateral trade (Frankel and Romer, 1999) while remoteness was usually perceived as a disadvantage because it meant higher transportation and transaction costs. Crozet and Koenig-Soubeyran (2004) constructed a model for two regions, a border and an interior region, trading with a country and their results showed that a border region had more advantages and was, thus, growing faster.

Works that explore problems of regional growth and trade in Russia are not numerous. One of the most recent ones were Ledyaeva and Linden (2008), Lugovoy et al., (2007). These works analysed relations between initial level and prospects of economic growth (Ledyaeva and Linden, 2008), export and regional inequality, growth and convergence, geography and economic development. But issues of geography, growth and trade taken together remain largely unexplored. In this respect our work

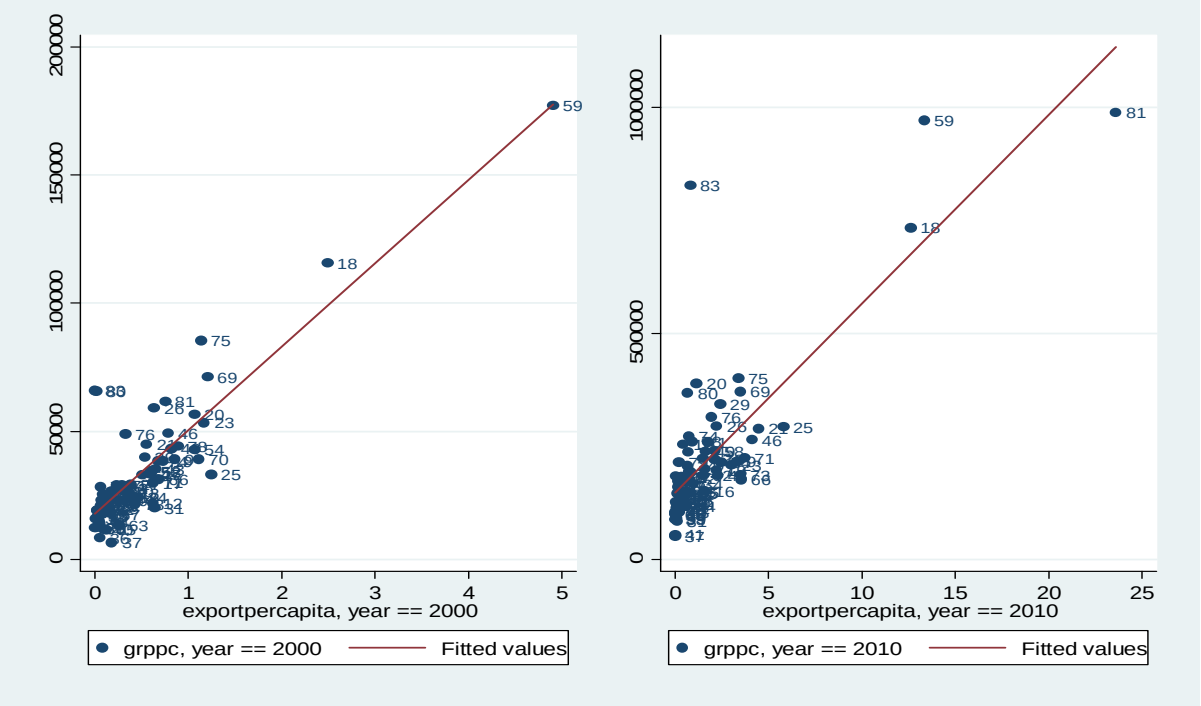
represents a different piece of research that potentially can contribute to the study of designated problems.

Empirical studies established positive and consistent relationship between export of manufactures and economic growth both at a macro and regional levels (Balassa, 1978; Bhagwati, 1978; Krugman, 1987, 1991; Sala-i-Martin, 1994; Frankel and Romer, 1999; Redding and Venables, 2003a). However, in Russia's case the biggest contributor to export is resource sector. Currently, in the year of 2012, oil, gas, minerals account for more than 70% of Russia's total foreign shipments (FSSS, 2013). But the nature of relations between non-resource exports and economic growth remains unclear for Russia. Mainstream research on the problems of economic growth in Russia focused largely on resource rent, including some of the recent works like Cooper (2006) and Kuboniwa (2012). Research on relations between non-resource export and regional growth is important from a point of view of policy making for sustainable and balanced economic growth, which is promoted loudly by the Russian government (Institut sovremennogo razvitia, 2010). To do this, control for resource export is needed.

Investigation on the effects of non-resource export is also important for other considerations. High resource rent is among the reasons for large disparities in development levels among Russian regions when judged by levels of GRP per capita. As Figure 2 shows, there are several regions (two in 2000 and four in 2010) that outperform the rest. These regions in 2000 were represented by Tumen (#59 in Figure 2), Moscow city (#18) and in 2010 they were joined by a gas and oil producer Sakhalin (#81) and very sparsely-inhabited Chukotka (83). An interesting thing is that over ten years regions with minimal level of GRP grew more rapidly than those with maximum level of GRP. Considering the fact that generally resource-producing regions have higher GRP per capita levels, difference in the magnitude of increase may suggest that non-resource regions were growing faster. Thus, control for resource exports in the analysis may help to reveal the difference in economic growth rates depending on the dominating type of trade patterns found among Russian regions.

In accordance with the neoliberal economic theory, the scale of labour pool and the distance to trading partners are important factors that determine trade, both export and import, and influence economic growth (Krugman, 1991). Studies have found positive relations between level of economic development of Russian regions and size of population residing in or migrating to them (Andrienko and Guriev, 2004; Kumo, 2007). Generally, more populous regions have higher income per capita. Because

Figure 2. GRP per capita vs Export per capita for Russian regions, 2000 and 2010.
(GRP per capita: in rubles; Export per capita: in thousand rubles)



Source: Prepared by the authors based on FSSS, various years.

economic networks found in them are more dense, the speed of economic processes is higher. Additionally, they are more likely to export and get more dividends from foreign markets. But there are several exceptions among Russian regions. Some scarcely populated regions achieve higher levels of GRP per capita due to resource rents. These are mostly northern regions of Yamalo-Nenets and Khanty-Mansy that contribute to high GRP per capita levels in Tumen[6] (#59 in Figure 2). Here, GRP per capita in 2010 is far more than that of Moscow city (#18), the political and economic centre of Russia. Thus, it follows that relations between labor pool and trade in case of Russian regions is not straightforward in the presence of large natural resources. This makes another reason to control for resources export in analysis.

Impact of geography on regional economic development level in Russia remains relatively under-researched. Previous studies were dominated by theories of distribution of production forces under a planned economy. There are studies that

[6] The GRP data for Khanty-Mansy and Yamalo-Nenets are involved in data for Tumen, and they cannot be seen individually.

introduce spatial characteristics of interactions among Russian regions (Ivanova, 2007; Lugovoy et al., 2007; Mikhailova, 2004), but very few works considered distance as a factor of economic growth in conjunction with trade and economic growth. Due to large variations in geographic location, regions in Russia developed different trade patterns. As mentioned in more detail previously, Western regions are more oriented towards the EU while the Russian Far Eastern regions share more intensive ties with East Asia and especially with China.

4. Analysis

In this section we conduct statistical analysis on the relationship between economic development level and trade, and analysis on factors other than resource-mining effects, and those that influence trade activity of regions and are thought to induce economic growth in Russian regions. The analysis employs statistical data for the period of 2000 to 2012 taken from official statistics compiled by FSSS, Regiony Rossii, various years. Data to be utilized and the approaches to be selected are described here.

4.1 Data

Explaining variables to be introduced are as follows. The volume of export per capita and that of import per capita are involved, in order to examine the effect of trade on regional economic growth. Geographical factors to be utilized are the followings. First, a dummy variable for regions which take lead in resource mining, namely, 10 leading regions in natural resource mining, is introduced. This variable denotes the first nature of economic geography (Fujita, Krugman and Venables, 2001). Second, in accordance with the suggestion from empirics of trade and economic growth studies as described in previous studies, the distance from the trade partners should be taken into consideration. A variable used is a distance from Berlin or that from Beijing, the main trading partners of Russia in Europe and that in East Asia. It seems to be natural to

assume that proximity to trade partners would have positive effect on regional growth[7] [8].

The so-called second nature factor, which could be generated by human activity, is partially grasped by the average number of working population in the economy of each region. This will be taken as a proxy for the market size of the region, and this is also an indicator of agglomeration effect.

Other control variables introduced should be mentioned. Investment by the federal government per capita and that by the private sector per capita would be used individually. The former may be invested in less-developed regions in order to support peripheries, and the latter may be conducted in advanced regions for its sector's own sake.

As for the explained variable, one may be able to introduce several specifications in order to examine positive or negative effects of regional trade volume on regional economy. One may assume it seems to be better to employ per capita income in order to check the effect of trade on income. Income redistribution, however, reduces regional disparity in income level of Russian regions apparently (Kumo, 2007; Belov, 2010) and it may lead to ambiguous results. If we check (1) the relationship between export and income and (2) that of export and gross regional products, the latter seems to be more efficient for the analysis (Figure 3a, 3b).

Data were collected by region, namely, by federal subject of Russia. Considering the unsettled economic situations and widely-spread non-monetized economic systems during the 1990s (Avdasheva et al., 2007), the period to be investigated is from 2001 to 2012[9]. The data on autonomous okrugs (regions) is, however, very limited and they are not available in some cases especially in the early

[7] Volume of freight by rail, railroad density, motorway density, aggregated indicators of transport conditions obtained through the application of principal factor analyses on these data, or volume of freight by sea port were examined in preliminary analysis, but none of these data gave us significant results.

[8] Additionally, interaction terms between trade and the distance from major trade partners would be involved and their effects were tested. They gave, however, ambiguous results and were not used in the analyses.

[9] The latest statistical yearbook for Russian regions, *Regiony Rossii 2013*, which was published at the end of December in 2013, contains GRP for 2012, not for 2013.

period. The definition and descriptive statistics of the data utilized are described in Table 1.

Figure 3a. Volume of Export (2000-2009) and Income per capita (2001-2010), one-year lag was given to export (all the data were pooled).

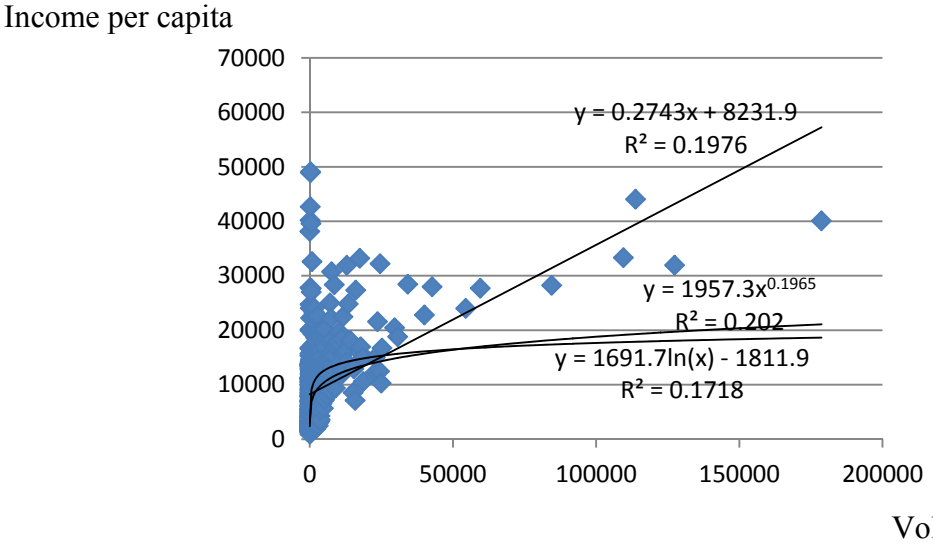
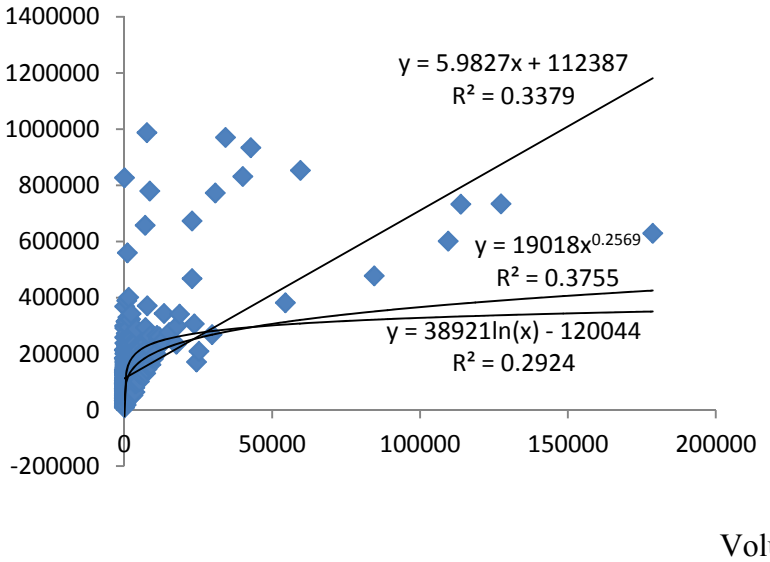


Figure 3b. Volume of Export (2000-2009) and Gross Regional Products (GRP) per capita (2001-2010), one-year lag was given to export (all the data were pooled).



Source: Prepared by the Authors based on FSSS, various years.

Table 1. Definition and Descriptive Statistics of the Data

Variable	Variable Name	Observation	Mean	Standard Deviation	Min.	Max.	Unit	Definition
GRP per capita	-	1044	119986.2	122498.2	6667.9	987417.7	in Rubles	Gross Regioal Products per capita in Current Prices.
Export per capita	ExpCap	961	1.27	2.75	0	32.29	in 1000 Rubles	Volume of Regional Export per capita in Current Prices.
Import per capita	ImpCap	970	0.54	1.17	0	10.98	in 1000 Rubles	Volume of Regional Import per capita in Current Prices.
Labor Power in the Economy	Labor	989	824.8	835.2	20.9	6593.2	in Thousand	Yearly Average Number of Labours in the Eocnomy.
Governmental Investment per capita	GovInves	996	0.05	0.16	0.0011	1.85	in 100 thousand rubles	Yearly Volume of Governmental Investment per capita.
Private Investment per capita	PriInves	989	0.06	0.11	0.0018	1.55	in 100 thousand rubles	Yearly Volume of Private Investment per capita.
Dummy for Resource Mining Regions	ResDummy	996	0.12	0.33	0	1	-	Unity for top 10 resource mining regions, zero for others.
Distance from Berlin	Berlin	996	3085.8	1870.0	530	7953	in Kilometers	Distance of regional capital from Berlin.
Distance from Beijing	Beijing	996	4710.9	1476.7	1345	6829	in Kilometers	Distance of regional capital from Beijing.

4.2 Methods

For estimating the regional development patterns across Russian regions, we follow the theoretical framework of the augmented Solow model (Mankiw, Romer and Weil, 1992), which is extensively used for analysis of variations in income levels and growth patterns among countries. According to the augmented version of the model which represents an extension of production function, output is a function of physical capital, labour and the level of technology. Our specification does not include technology because we assume that in the regions of the same country technology levels are roughly the same. But it includes trade and geography components as discussed earlier. The final specification takes the following form:

Log GRP per capita = ExpCap+ImpCap+Labor+GovInves+PriInves
+ResDummy+Geography (Either Berlin or Beijing)

We take gross regional product per capita in the logarithmic form, taking into consideration about the decreasing effects of explaining variables to scale, and give one-year lag to explaining variables in the right-hand side of equation except for the time invariant geography factors and resource dummy.

The approach to be utilized is panel data regression analysis and pooled ordinary least squares (OLS). Each region is regarded as a panel sample in panel regression analysis. Variables constant with respect to time (distance from Berlin and that from Beijing) would be introduced, therefore not fixed effect models but panel random effect models should be taken as the first selected specification. Pooled ordinary least squares estimation was not chosen by statistical tests involved, but the results of OLS will be presented for reference and robustness check.

The effects of mining sectors on Russian regions are apparent (Kuboniwa, 2012) and they are not the main targets of this analysis. Rather, we aim to check the effect of factors other than mining sectors on levels of economic development in Russian regions. Consistent with the discussion above, our main target relates to the roles of trade and geography. Introduction of a dummy variable for resource-mining regions would allow us to control for the effects of the resource mining sector[10].

[10] A possible explaining variable which denotes the effects of resource mining sectors may be the volume of export from mining sectors. However, correlation between the total export and that of

Thus, our first hypothesis is that trade influences regional economies in Russia and accounts for the difference in levels of GRP. The other hypothesis deals with the role of geography. Namely, we verify the hypothesis that regions which locate close to trade partners may grow faster. For this purpose we would introduce the distance from Berlin and that from Beijing, the largest trade counterparts with Russia in recent years. By doing so, we also aim to check which trading partner has potentially larger effect on the levels of economic development.

Lastly, the period to be examined by this study concerns years of economic boom in 2000's including recession that ensued after the financial crisis of 2008. It is widely believed that during boom years growth was based on exports of resources. While there is a great deal of truth to it, with this analysis we also try to check whether or not factors other than resource producing sectors have also provided solid foundations for positive dynamics.

4.3 Results and Interpretation

Results that were obtained are shown in Table 2. GRP per capita was chosen to be a dependent variable as it should be the most relevant indicator[11]. Qualitatively results of random effect model panel regression and those of the pooled OLS are in the same direction. Inclusion of variables constant with respect to time requires that we should use random effect models in estimating panel regression models, as mentioned earlier. Qualitatively the results are almost the same in whatever specification of the estimated equation. Hence, from here the discussion will be made basically in accordance with the results identified as Specification (5) or (6) in Table 2a.

Almost all the regression coefficients obtained expected results, and the results seem to be stable. Especially we would like to mention about the robustness of the positive effect of per capita export volume and import volume on GRP per capita. The variable always obtained significant and positive coefficient in any of the specifications. The implication of this result is clear-cut and the volume of export and

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mining sectors is very strong because more than 70 % of export from Russia is composed by natural resources.

[11] In the preliminary analyses the authors tried to use income per capita or expenditure per capita. In both cases the resource-mining region dummy variable and distance neither from Berlin nor from Beijing obtained significant results. Income redistribution must affect regional economic conditions and GRP per capita should be regarded as more adequate indicator in this case.

Table 2a

Estimation Results by Random Effect Panel Regression Analysis. Explained variable: Log (GRP per capita)

VARIABLES	Specification 1	Specification 2	Specification 3	Specification 4	Specification 5	Specification 6
ExpCap	0.0986***	0.0976***	0.102***	0.0922***	0.0924***	0.0922***
	(0.0104)	(0.0105)	(0.0101)	(0.0104)	(0.0104)	(0.0103)
ImpCap	0.265***	0.262***	0.236***	0.243***	0.243***	0.245***
	(0.0237)	(0.0243)	(0.0230)	(0.0229)	(0.0229)	(0.0229)
Labor		3.72e-05	0.000159**	8.31e-05	0.000108*	0.000106*
		(6.06e-05)	(6.20e-05)	(6.33e-05)	(6.41e-05)	(6.35e-05)
GovInves			-0.982***	-0.891***	-1.037***	-0.938***
			(0.292)	(0.288)	(0.296)	(0.287)
PriInves			5.235***	5.229***	5.057***	5.153***
			(0.507)	(0.502)	(0.507)	(0.501)
ResDummy				0.670***	0.570***	0.562***
				(0.160)	(0.166)	(0.165)
Berlin					5.53e-05**	
					(2.71e-05)	
Beijing						-7.29e-05**
						(3.26e-05)
Constant	11.33***	11.30***	10.99***	10.98***	10.82***	11.32***
	(0.0512)	(0.0693)	(0.0799)	(0.0783)	(0.113)	(0.171)
Wald chi2(2)	315.86	315.58	481.30	507.95	514.12	515.64
Prob > chi2	0.00	0.00	0.00	0.00	0.00	0.00
R-sq within	0.23	0.23	0.33	0.33	0.33	0.33
R-sq between	0.43	0.42	0.44	0.55	0.56	0.56
R-sq overall	0.31	0.32	0.36	0.39	0.40	0.40
Observations	935	935	934	934	934	934
Number of id	82	82	82	82	82	82

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

import per capita definitely increase the volume of gross regional products per capita in Russian regions. As for controlling variables, both governmental investment per capita and private investment per capita show expected and significant results. The governmental investment was made in comparatively poorer regions, and this may be the compensation for the poorness of the regions. On the contrary, the private investment was made in comparatively richer regions.

Table 2b
Estimation Results by Ordinary Least Squares. Explained variable: Log (GRP per capita)

VARIABLES	Specification 1	Specification 2	Specification 3	Specification 4	Specification 5	Specification 6
ExpCap	0.148***	0.144***	0.153***	0.132***	0.130***	0.131***
	(0.00914)	(0.00934)	(0.00915)	(0.0101)	(0.0100)	(0.0100)
ImpCap	0.160***	0.148***	0.126***	0.137***	0.148***	0.151***
	(0.0200)	(0.0209)	(0.0202)	(0.0202)	(0.0200)	(0.0201)
Labor		5.49e-05*	0.000120***	8.83e-05***	0.000110***	0.000105***
		(2.89e-05)	(3.08e-05)	(3.13e-05)	(3.12e-05)	(3.11e-05)
GovInves			-1.270***	-1.152***	-1.377***	-1.250***
			(0.227)	(0.226)	(0.227)	(0.223)
PriInves			3.745***	3.717***	3.404***	3.590***
			(0.443)	(0.439)	(0.437)	(0.434)
ResDummy				0.371***	0.257***	0.261***
				(0.0813)	(0.0833)	(0.0830)
Berlin					6.31e-05***	
					(1.24e-05)	
Beijing						-7.57e-05***
						(1.48e-05)
Constant	11.30***	11.27***	11.08***	11.08***	10.91***	11.44***
	(0.0252)	(0.0315)	(0.0423)	(0.0419)	(0.0540)	(0.0817)
Observations	935	935	934	934	934	934
R-squared	0.343	0.346	0.400	0.413	0.429	0.429

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

The dummy variable for resource abundant regions obtained a significant and positive coefficient. Although this result could be expected, the following needs to be mentioned here. That is, even when one controls the effect of resource-mining regions, still there are several factors that affect strongly regional economic development level in Russia. These results other than for resource–mining regions are obtained under the

condition that the effect of resource mining regions is controlled; hence, one can interpret that all the variables which obtained significant coefficients are effective on regional economic growth even if resource-mining sectors do not work.

What should be mentioned about one of the results in examining the agglomeration effect is that the volume of labour resources in regions obtained significant coefficient in three of the five specifications which involved the size of labour power. Among which included all the explaining variables into the regression model in Table 2a, and in all the specifications for OLS in Table 2b. In this regard the overall results show that not only the first-nature factors, namely, resource endowment or other time-indifferent factors, but also the second-nature, man-made, factor, namely, population distribution or agglomeration positively affects regional economy.

More attention should be paid to the results for distance from Berlin or that from Beijing. The former obtained positive and significant coefficient and the latter variable obtained negative and significant coefficient. This means that the closer the region is to Beijing, the higher the gross regional product per capita of the region, and vice versa. In preliminary analysis we tried to include distance from Moscow, Russia's capital, in order to check how proximity to the capital region affects regional variations in development levels. However, the results obtained were same as those for distance from Berlin: hence, we do not include them here. On the contrary, the distance from Berlin, the second leading trade partner of Russia in 2012 (following Netherland, see FSSS, 2013) and the most important economic partner for many Western regions did not obtain comparable coefficients with the distance from Beijing. Thus, our hypothesis regarding the positive effect of proximity to China or East Asia on trade and growth in Russian regions received statistical evidence. Moreover, the result shows comparative importance of the direction of trade flows.

5. Discussion and Policy Implications

Two main discussion points emerge from the results obtained. First, international trade plays an important role in economic development in Russian regions. This fact should deserve more attention in the Russian context because transition towards greater openness to trade has not been long in time and is far from complete. The significance of trade does not change whether or not the first nature geography is taken as a distance to main trading partners (Table 2a). This result is somewhat surprising because effect of trade could be intensified, or lessened, by geography since geographic distance also means economic distance due to its

connection to trade costs. Thus, international trade has enough explanatory power to account for difference in income levels and growth patterns of the Russian regions.

Second, geography is an additional and important determinant of regional economic growth, understood here as the level of GDP per capita[12]. Higher coefficients for Beijing were not expected because, historically, Germany has always played an important role as a major trade partner, based on the role which was supported by long-term investment and technology cooperation in bi-lateral (Russia-Germany) and multilateral (Russia-EU) mode. Statistical importance of Beijing may be seen as an evidence of shift in Russia's development pattern from Europe-oriented towards Asia-oriented, which was actually declared officially in 2008[13]. Several assumptions could be offered to possibly explain this phenomenon. The fact that a large part of Russia's territory lies in Asia makes China as the closest economic partner for many Russian regions. Consistent with the previous discussion, geography becomes an important factor in determining directions of trade flows in a more open economy. On the other hand, bigger role of China could be explained by complementarity of industrial complexes between regions of the two countries[14] (Kang, Ch. 2014). Plausibility of these assumptions still needs to be verified empirically since the extent of contribution of exports to China was not fully covered. Nevertheless these findings may be in favour of growing importance of Asia for the Russian economy, or at least they may be the signs that a more balanced export-driven growth pattern is a possible development scenario for Russian regions.

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[12] The order of magnitude of the impact of distance to trading partners, Beijing and Berlin, should also be taken into account. When checked for, standardized Beta coefficients, that show the relative strengths of the variables used, distance turns out to have stronger impact than population and resource abundance. For details see Appendix Table 1.

[13] The necessity to pay more attention to Asia-Pacific was mentioned in the Concept of the Foreign Strategy of the Russian Federation 2008, and was strongly advocated in the new version of the document in 2013. See "Concept of the Foreign Policy of the Russian Federation as of July 12, 2008", available at: <http://www.mid.ru/brp_4.nsf/0/357798BF3C69E1EAC3257487004AB10C> and Concept of the Foreign Policy of the Russian Federation as of February 12, 2013, Available at: <http://www.mid.ru/bdomp/nsosndoc.ns-f/e2f289bea62097f9c325787a0034c255/0f474e63a426b7c344257b2e003c945f!OpenDocument>

[14] Certain similarity in production forces created under planned communist system has been rapidly changing lately due to rapid structural shifts in Chinese economy (Kwan, 2013)

With regard to policy implications, the following could be suggested based on the results of this research. Since international trade, both export and import, has stable and positive effect on the regional economy, it is important to introduce various support programs for international trade. These programs need to consider the effect of proximity to foreign trade partners and provide enough opportunities to develop trade in both European and Asian directions. More support for non-resource trade can aid economic growth in resource-poor regions. Considering the strength of the first nature factors, infrastructure development is an essential part of improvements in the fundamentals of regional economic growth and of integration into the world trade by Russian regions.

6. Concluding Remarks

The second-nature factor, population distribution, must have effects on regional economy as indicated in theoretical studies and the analytical results for Russia in this paper have shown as well. What we have to emphasize here is, however, it is apparent that regions which locate closer to main economic partners grow faster. Although the direct effects of economic performances of trading partners were not examined, geography does matter much in defining levels of regional development in Russia.

In this paper we explored the problem of trade and economic growth in Russia. Our discussion deals with relationship between regional economic growth and trade in connection with other factors that induce growth, namely, geography and population agglomeration. The results that were obtained here are consistent with previous studies in the aspect that they provide evidence for significant impact of trade, geography and agglomeration on economic development. In the case of Russian regions proximity to trade partners seems to be important factors determining economic dynamics in regions.

Results obtained through analyses also show that there are important changes in Russian trade patterns. They tend to be directed more towards China than Berlin that used to be the main partner for Russia in both industrial and trade aspects. In the coming years orientation towards China, or more precisely, East Asia on the whole, may intensify due to government policies aimed at development of the Russian Far East and the current political situations induced by Ukrainian/Crimean incidence.
Analytical results by this study are robust but still there are certain limitations.
Government policies for regional development were not taken into account though some of them must influence level of gross regional product per capita. Also, the

analysis did not include possible effect of exchange rate as well as changes in the rates for transportation, though what is important is not physical distance but economic distance. Potential effect of these factors could be, however, explored in future studies.

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Appendix Table 1: Estimation of Standardized Beta-Coefficients (by OLS only)

VARIABLES	(1)	(2)
ExpCap	0.41***	0.41***
	(0.01)	(0.01)
ImpCap	0.21***	0.22***
	(0.02)	(0.02)
Labor	0.11***	0.11***
	(0.00003)	(0.00003)
GovInves	-0.17***	-0.15***
	(0.23)	(0.22)
PriInves	0.22***	0.24***
	(0.44)	(0.43)
ResDummy	0.096***	0.097***
	(0.08)	(0.08)
Berlin	0.14***	
	(0.00001)	
Beijing		-0.14***
		(0.00001)
Constant	-	-
Observations	934	934
R-squared	0.429	0.429

Evolution of international trade policy and its impact on regional development: a case of Northeast China[+]

Liudmila V. Popova[*]

Abstract

The impact of foreign trade and FDI on China's economic growth is well documented. Similarly, there are a number of studies evaluating the overall or sectoral effect of China's WTO accession on its economy. Few works however are devoted to the examination of the WTO impact for individual regions of China, as well as to identification of the relationship between the growth of foreign trade, attraction of FDI and GDP growth at regional level. The author considers the case of Northeast China, which economic growth accelerated in 2000s. To identify the sources of this growth, the author takes into account the effect of market liberalization after the WTO accession, as well as an impact of regional development policy launched in 2003. The conclusion is that the basis for acceleration of economic growth in the region is the development of private enterprises, which dominate in both local economy and foreign trade.

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I. Introduction

The impact of trade and foreign direct investment on China's economic growth is well studied. Similarly, there are a number of studies evaluating the impact of WTO accession on its economic development. However, most research focuses on the study of the effect on the economy as a whole. Few works are devoted to the examination of the consequences of market liberalization under the WTO for individual regions of China, as well as to the identification of the relationship between the growth of foreign trade, attraction of FDI and GDP growth at regional level. As China is a big country with huge regional differences in geographic and economic terms, the regional impact of WTO accession deserves separate research.

Under a positive effect of foreign trade and FDI for the Chinese economy, we usually understand the effect from that for its eastern provinces, which dominate China's foreign economic relations. However, the eastern zone is a special case. Firstly, the policy of openness started there much earlier than in inland areas. Secondly, eastern provinces were given unprecedented tax and administrative benefits, as well as subsidies to attract FDI and expand exports. Preferential trade regime along with favorable geographical location allowed eastern China to jump on the train of export-led growth. As for interior regions, they were not provided with the same amount of preferential policies, therefore their development relied largely on other sources rather that exports or FDI. Only since early 2000s, China began to promote various programs to spur economic development in inland areas. This coincided with the entry into the WTO, which provided opportunities to inland regions to access global markets.

This article examines the impact of regional development policy and accession to the WTO on Northeast China (东北). This region covering three provinces – Liaoning, Jilin and Heilongjiang, − is an old industrial base of China with the dominance of heavy industries and a high significance of agriculture. Northeast China is most closely located among other China's regions to Northeast Asia including Japan, R.Korea, and Russia, the key economic partners of the country. With the beginning of the reform, Northeast China began lagging behind of the more developed eastern provinces. Its growth accelerated again only since the launch of Rejuvenation program and China's entry into the WTO.

In this paper, we investigate the development of Northeast China to answer the following questions. Firstly, what is the basis of economic growth acceleration in Northeast China since the turn of a new century? Secondly, the region has experienced an expansion of both inward FDI and foreign trade during the previous decade. Does

the foreign trade in the region develop according to the pattern observed in eastern provinces with a complementarity between FDI and trade, high contribution of the FIEs to both exports and imports, and the involvement of these enterprises in mostly processing operations? Whether there is a relationship between trade and economic growth in a case of Northeast China? Thirdly, whether liberalization of external relations as a result of the WTO agreements and the development of private businesses has led to strengthening economic ties with neighboring countries of Northeast Asia, particularly Japan, R.Korea and Russia?

The rest of the paper is organized as follows. In Section II, a brief review of basic theoretical concepts concerning mutual relation between trade, FDI and GDP growth provides the context for the paper. In section III, we evaluate an evolution of international trade policy, as well as an effect of foreign trade and inward FDI on China's economic growth. In Section IV, we attempt to assess an impact of WTO accession and regional policy on development of Northeast region. In Section V, we investigate the patterns of foreign trade among provinces of Northeastern China. Finally, Section VI concludes the paper.

II. Theoretical background and literature review

The effect of foreign trade and inward FDI on economic growth has been an important subject of debate for several decades. In the literature, many studies find that FDI and international trade contribute positively to economic growth (Chen et al., 1995; Harrold, 1995; Lardy, 1995; Pomfret, 1997; Pan, 1998, for China; Sengupta and Espana, 1994, for South Korea; Yue, 1999, for Southeast Asia; and Dowling, 1997, for the Asian high performing economies; Greenaway, 1998, for the developing countries in general). *[Yao Shunjie, 2006]* Trade is believed to promote the efficient allocation of resources, allow a country to realize economies of scale, facilitate the diffusion of knowledge, foster technological progress, and encourage competition both in domestic and international markets that leads to an optimization of the production processes and to the development of new products.

To establish the linkage between trade and economic growth is not an easy task. Van den Berg and Lewer observe the causality between trade and growth seems to have a bi-directional nature: at one side of the relationship, trade seems to enhance growth. On the other side, higher levels of development and better technologies lead to a larger degree of trade among economies. [**Mejía**, J.F., 2011] Levine and Renelt's

study highlights the complexity of the relationship between trade and economic growth, and the necessity to take into account other variables − such as economic, social, and political factors besides exports or trade policy − as they also exert an influence both on trade and growth. In other words, an increased level of exports alone or a more outward oriented policy per se do not cause economic growth. [*Afonso Óscar, 2001*] According to the position defended by Rodrı´guez and Rodrik [1999] and Rodrik, Subramanian, and Trebbi [***Mejía**, J.F., 2011*], the effects of trade policy on growth are usually intertwined with the effects of other economic policies (for example, industrialization policy, regional or social policies, etc.) that are implemented simultaneously. This makes it very difficult to differentiate between the trade's effect on growth and the growth effects of those other policies. Moreover, they support that economic growth eventually depends more on those other policies than on trade policy by itself.

The "industrialization strategy approach", which appeared in the 1980s, while supporting an outward oriented and export-led development, still justifies an active role of the government in promoting certain type of exports and assisting in technology absorption from abroad during the implementation of industrialization strategy. The purpose of the governmental intervention is to help the companies to produce more advanced products with higher value added [*Todaro and Smith, 2006*]. The "industrialization strategy approach" argues that, largely, the success of the export-oriented East Asian economies would be unthinkable without an active government intervention and the associated industrial policies.

Most empirical results support the argument that FDI can promote output growth. Direct foreign investment is followed by equipment and machinery, by management, technology and enterprise spirit. While FDI could create greater export potential, more domestic firms may benefit from new technology and management expertise, which in turn will expand international trade.

In the international economics literature, two key aspects of possible relationship between FDI and international trade are discussed: (1) whether FDI inflow is a complement to, or a substitute for, international trade; and (2) whether international trade causes inward FDI or the other way round. The substitutive relationship indicates that an increase in foreign direct investment will decrease international trade and vice versa, while the complementary relationship indicates that they move in the same direction. In terms of the causality, if there is causality from trade to FDI, then trade will attract inward FDI, and vice versa.

In terms of causality, most economists suggest a two-way causal link: trade will first cause FDI, and FDI may eventually cause trade. Many firms trade in a foreign market at the beginning because trade is easier and less risky than FDI. After learning more about the social, political and economic conditions, the firms establish subsidiaries in the foreign market, and foreign subsidiaries may eventually begin to export.

The results of some empirical studies indicate that the relationship between FDI and trade tends to be complementary between developed and developing countries, while the relationship is likely to be substitutive between developed countries. Thus, Goldberg and Klein [1998] studied the response of international trade of selected Southeast Asian and Latin American countries to direct investment from Japan and the United States. They found that FDI flow from Japan to Southeast Asian countries significantly increased the bilateral trade. In the same time they discovered little evidence of substitutive or complementary relationship between direct investment and bilateral trade between Latin American countries and either the United States or Japan, or between the Southeast Asian countries and the United States.

Kwang J. and Singh H. [1996] analyzed the causality link between FDI and export for eleven countries, which were important FDI recipient economies during the period 1969-1993. According to their findings, in Ecuador, Greece, Portugal and Thailand, exports caused FDI, and only in Singapore, there was an evidence of FDI causing exports. In other cases (Colombia, Costa Rica, Malaysia, Egypt, Mexico, and Nigeria) exports and FDI were unrelated.

As can be seen from the above, the relationship between international trade and FDI are complex. It is very difficult to predict whether FDI inflow is a complement to, or a substitute for, international trade. Similarly, it is difficult to determine accurately the impact of foreign trade on economic growth.

III. International trade, inward FDI and their effect on economic growth in China

During the three decades of reforms, China’s foreign trade growth was spectacular. Trade has increased much faster than its domestic production − whereas GDP rose at an annual average rate of 10.0 percent from 1980 to 2012, exports and imports grew by 15.6 percent per annum over the same period. After China's entry into WTO, trade expansion has further accelerated − from 2001 to 2008 exports expanded at an outstanding rate of 24 percent per year, and imports at 22 percent, twice as fast as

world trade. China climbed up to the top of world exporters, its share in world exports jumped from 1.4 percent in 1990 to 3.9 percent in 2000, and then to 11.7 percent in 2013.

Since the reforms, China experienced a dramatic improvement of commodity composition of its exports – at the start of reforms, the country mostly exported primary products, but over time, the ratio of the finished products increased significantly exceeding 90 percent. Steady trade growth was associated with rapid diversification of China's manufacturing capacities from labor-intensive into capital- and technology-intensive products since the mid-1990s. As a result, China has become key world exporter of many consumer electronics, computers, telecommunication equipment and household appliances, while the share of textiles as the major export category declined.

It is widely accepted that foreign trade has been a major source of GDP growth in China, and there is mutual causality between the two variables. Wei Weixian drew the conclusion through co-integration analysis and variance analysis that 31 percent of economic growth in China ascribed to the export-oriented strategy, while the contribution of economic growth to that of export was less than 10 percent. The results of calculations of the contribution of foreign trade to economic growth made by Lin Yifu and Li Zhengjun, who improved the traditional single equation model and built simultaneous equations, suggested that 10 percent of the export growth leads to one percent of economic growth. Other estimates suggest that from 2005 to 2007, net exports contributed to between 2 and 3 percentage points of GDP growth. [*Li Yuhong, Chen Zhongwen, San Changjian, 2010]*.

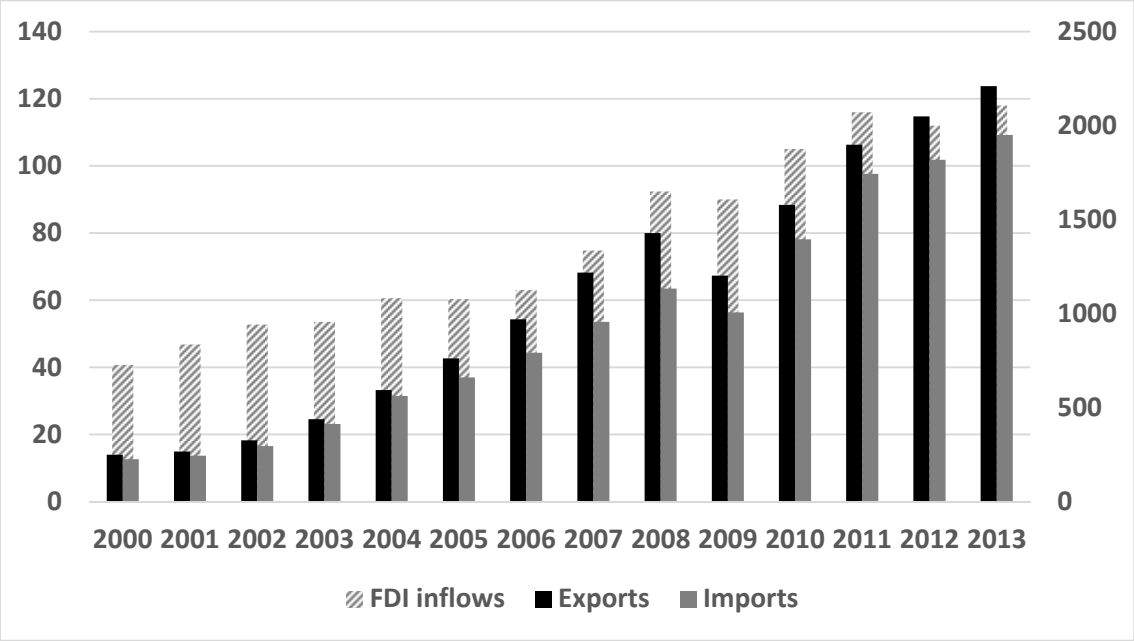
The outstanding development of China's foreign trade is the result of its involvement in the global value chains and of the large inflows of FDI into its manufacturing industry since its reform and opening up in late 1970s. By the end of 2012, China had attracted a total of over US$1344 billion FDI inflows cumulatively, making it the most important recipient of FDI after the United States. The large FDI inflows have made great contributions to China's economic development, in terms of promoting capital formation, employment creation, export promotion, and technology transfer. Improved investment environment and released market access level for foreign enterprises after WTO accession have made China a more attractive destination for foreign investors. China's actual utilization of FDI had increased by 2.5 times from 46.9 billion in 2001 to 117.6 billion in 2013.

We may assert positive correlation between FDI inflow into the Chinese economy and national production growth. Obviously, in case of China foreign trade and FDI are complementary, as increasing amounts of FDI caused greater volumes of export and import. This relationship became more apparent during the last decade. A bulk of foreign direct investment is involved in the so-called "processing trade". Early in 1980s, the Chinese customs regimes were divided into two categories: ordinary and processing trade. Ordinary trade is normal trade that does not benefit from special customs arrangements and tariff preferences. In order to serve export promotion strategy, a processing trade regime was set up under which imports were free of duty and value-added taxes, and products using imported inputs were required to be exported. Thus processing trade regime facilitated processing trade. International processing operations, which in the 2000s accounted for half of China's exports and 40 percent of its imports, drove the growth of China's foreign trade and reflected the integration of China's manufacturing industry into international supply chains.

Due to introduction of two customs regimes, the foreign trade sector in China has acquired a dualistic character, as foreign and domestic firms have specialization in different types of trade. Foreign firms have played a crucial role in expansion of processing trade. They dominated this type of trade carrying 85 percent of processing exports and imports in 2011 (against 55 percent in mid-1990s). *[Lemoine Francoise, 2013]* Foreign firms are responsible for a lion's share of China's exports of high technology products − they accounted for over 80 percent of this category of exports. Active involvement of FIEs into processing operations explains their high overall contribution to China's foreign trade (foreign affiliates are responsible for half of China's exports and approximately for 45 percent of its imports). [2013 年中国对外贸易发展情况] It is believed, that China's external trade consists largely of business-to-business transactions between final assembly processes located in China and foreign manufacturers of high-value components. Chinese firms (private as well state-owned) play a marginal part in processing trade and are mainly engaged in ordinary trade.

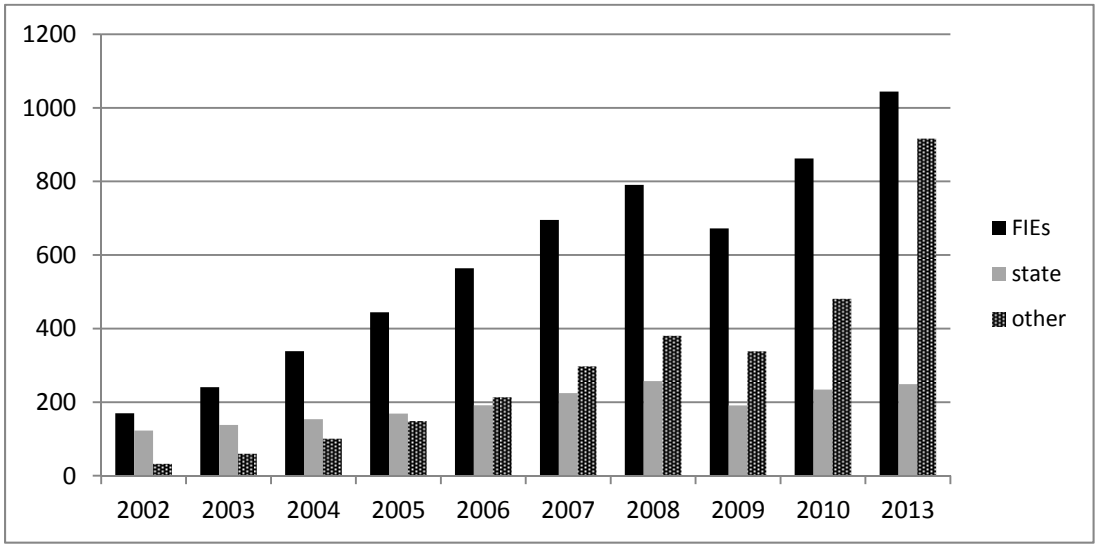
China's joining the WTO induced further escalation of its foreign trade and greater volumes of FDI, which caused acceleration of economic growth. (Pic.1) Upon the WTO accession, China has made corresponding adjustments on domestic economic policies, laws and regulations and strengthened protection of intellectual property rights that has greatly improved business environment and enhanced competition in domestic market. Major concessions were made in reducing tariff levels (an average tariff rate has been reduced from 16.4 percent in 2000 to 9.8 percent in 2010),

removing non-tariff trade barriers and cancelling import quotas and import license system on some imported goods. More investment fields such as finance and telecommunication in service industry and automobile and high-tech industries in second industry opened up, and market access conditions for foreign investment were eased.



Pic.1. China's foreign trade (right scale) and FDI inflow (left scale), 2000−2013, billion USD. Source: 2014 年中国统计年鉴.

What is more important, the WTO accession has speeded up implementation of market reforms. Because of privatization of state-owned enterprises, the number of SOEs has decreased by 56 percent during 2001−2009, while employment in the sector has fallen by 32.6 percent. [*Zhang Zhimin, Zhang Xin, Cui Riming, 2013*] According to the WTO accession agreement, China released market access for domestic private enterprises to previously restricted areas including financial services, infrastructure and utilities, which stimulated their rapid development. Thus during the same period of 2001−2009, the number of private industrial enterprises increased more than three times. Foreign trade liberalization provided companies with any type of ownership equal rights to foreign trade. This allowed private businesses to become active participants of exports and imports transactions. Their contribution to China's exports increased from 10 percent in 2002 to 40 percent in 2013. (Pic.2)



Pic. 2. China's exports by type of enterprise, 2002-2013, billion USD. The 'other' type refers to private and collective enterprises. Source: 2014 年中国统计年鉴.

From industries' aspect, FDI into tertiary industry in last decade developed very fast. In 2000, tertiary-sector FDI comprised 30.5 percent of realized FDI inflow value; by 2012, the share had grown to 56 percent. From 2000 to 2013, in manufacturing the share of actually utilized FDI fell from 63.5 to 37.4 percent. [2014 年中国统计年鉴] This sectoral shift in FDI reflects three factors: the opening up of services sectors to FDI, an increasing competitiveness of domestic Chinese manufacturing enterprises because of SOE reforms, but also rising costs for labor and other resources in coastal China. Another change that occurred after the accession to the WTO, concerns changes in motivation of foreign investors. Rising household income explains greater orientation of FIEs towards China's domestic market than it was in the early stages of reform when export motivation prevailed.

The acceleration of China's foreign trade in 2000s was achieved at the cost of growing imbalances. Economic activity was increasingly dependent on external demand. The ratio of exports and imports to GDP reached 66 percent in 2007. The degree of openness was unusually high for a country of this size and level of economic development, which made anxious the Chinese experts and policy-makers pointing out that rising degree of openness increases the vulnerability of the Chinese economy.

Before early 2000s, China's foreign trade was relatively balanced, and its surplus never exceeded 4 percent of its GDP. However, from 2005 to 2008, following China's foreign trade boom its surplus surged from 2 percent of GDP to more than 7 percent in 2007, mainly due to trade surpluses with the USA and the EU. [*Lemoine*

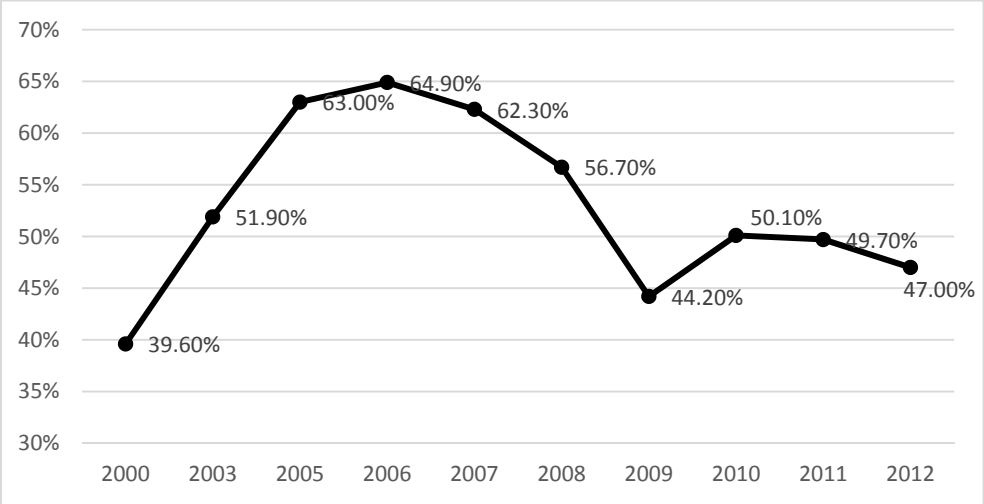
Francoise, 2013] The trade surplus, together with the large inflows of FDI and short-term capital since the mid-2000s, have led China to accumulate huge amounts of foreign exchange reserves. Processing trade was the major source of the trade surplus: between 2000 and 2013, a cumulative surplus in processing was 3 trillion USD. A major contributor to China's growing trade surplus since 2005 were foreign affiliates who account for the overwhelming share of processing trade operations and high-technology exports.

Foreign trade imbalance causes tensions with major trading partners and even the rise of protectionist policies in those countries. This was supported by growing number of trade disputes within WTO involving China and accusations of dumping against it, as well as increased pressure on the country, so that it continue to further revalue its currency. In recent years, China became the third member after the United States and the EU in terms of the number of disputes within WTO in which it is involved as either a defendant or a plaintiff. During the period from July 2005 to the end of 2014, the value of the Chinese RMB against the US dollar rose more than 25 percent.

The global crisis has revealed that China's economy was vulnerable to external shocks. The impact of the global crisis on foreign trade was extremely severe. In 2009, imports declined by 17.5 percent, exports by 17.8 percent. Both ordinary and processed exports were hit by the crisis. In 2009, exports and imports contracted in value terms, and although they rebounded in 2010 and 2012, their share in GDP has fallen. The openness of China's economy to foreign trade has come back in 2012 to its 2002 level. China's foreign trade surplus declined from 7 percent of GDP in 2007 to 3 percent in 2010 and further to 2 percent in 2011. Facing a sluggish world economy, China cannot expect external demand to contribute to its economic growth as much as in the past.

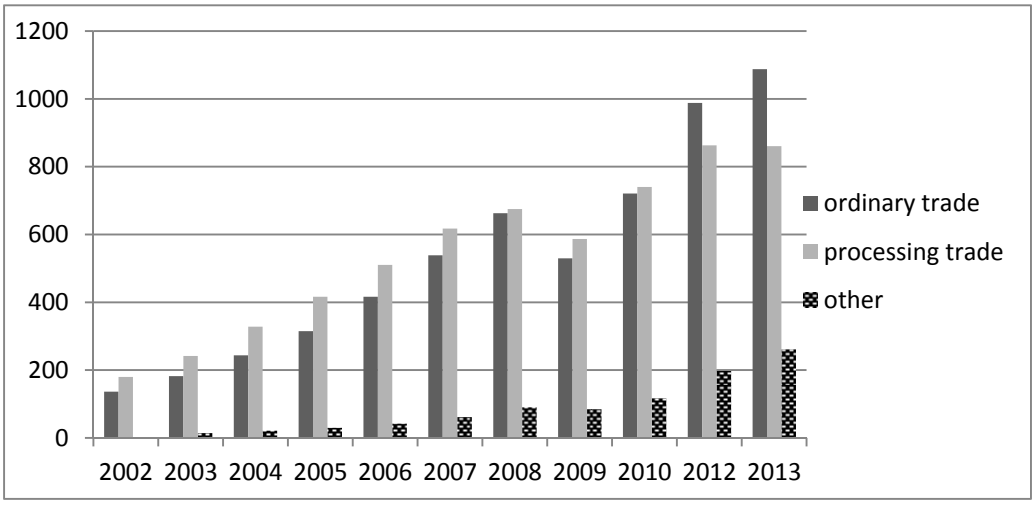
High dependency of Chinese economy on global markets and overwhelming role of the FIEs in exports and imports, which are mostly involved in processing trade, became a matter of concern for Chinese authorities. They understood the vulnerability of this pattern of growth for the economy. Before eruption of global crisis in 2008, the government launched foreign trade reform along with other measures envisaging falling share of processing operations and contribution of the FIEs in Chinese exports and imports, as well as diminishing reliance on international demand. To promote balanced growth, the focus was put on supporting domestic market development and encouraging trade activity of Chinese firms. Tax incentives for foreign invested enterprises were withdrawn in 2008 when China adopted a uniform tax system for

domestic and foreign firms. The subsequent global crisis convinced the authorities of the correctness of those measures and enabled them to deepen the reforms.

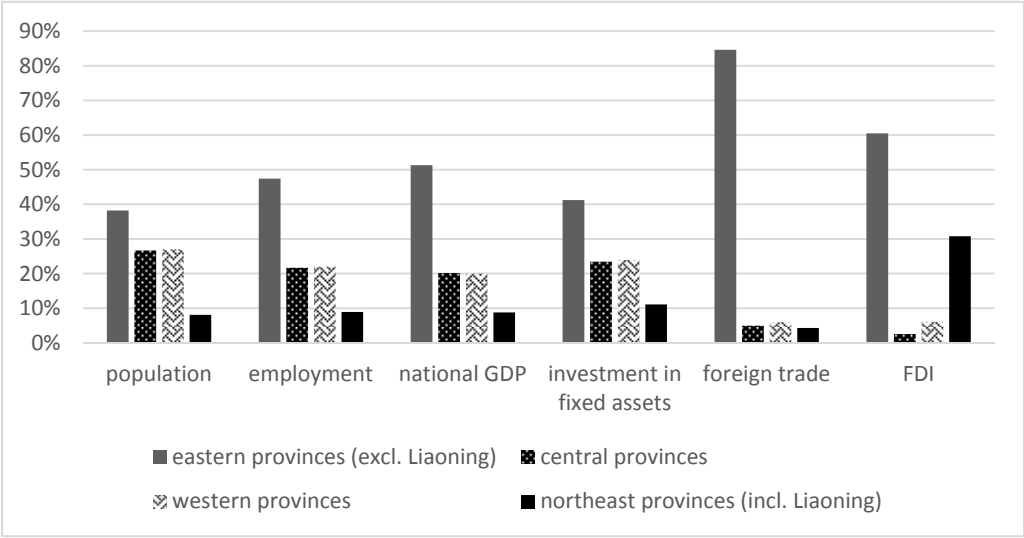


Pic. 3. Foreign trade as a share of China's GDP (%), 2000-2012. Source: 2014 年中国统计年鉴.

Sluggish external demand along with steps towards more balanced growth and revaluating yuan have brought visible results. First, we may observe diminishing of foreign invested enterprises' dominance in China's foreign trade, which share in Chinese exports after reaching a peak of 58.3 percent in 2005, moderated subsequently to 47.3 percent in 2013 and now stands about the level of Chinese private firms. (Pic. 3) Second, processing trade as a share of exports also fell from 54.7 percent in mid 2000s to 39 percent in 2013. Since 2012, ordinary exports exceeds the processing operations – this seem to be a long-term trend of changing the configuration of established trade pattern. (Pic.4) This could be interpreted as well as a return to the pattern of trade existed before the introduction of processing trade regime. Third, after the crisis export-and-import to GDP ratio declined and returned to pre-WTO level of openness. This also can serve as an indicator of China's greater reliance on domestic demand than it was before the crisis. Finally, its trade and current account surpluses initially grew rapidly, moderating slightly since 2008.



Pic.4. Ordinary vs. processing trade in China's export, 2002-2013, billion USD. Source: 2014 年中国统计年鉴.



Pic. 5. Contribution to major economic indicators by China's regions (%), 2012. Source: 2014 年中国统计年鉴.

An important feature of Chinese trade and investment development has been a high concentration of exports and FDI in eastern region − more than 80 percent of Chinese exports and FDI are located in provinces like Guangdong, Jiangsu, Fujian and Shanghai. (Pic. 5) The uneven regional distribution of FDI in China is a result of its gradual reform policy that favored coastal provinces by establishing special economic zones and offering preferential tax treatment. According to initial concept of reforms, described as a ladder-step theory, the eastern provinces, which had better resource endowment and geographical advantages for export-oriented FDI, were designated the

first region to experience export led industrialization and speedy economic growth. [Fan Cindy C., 1997] A series of preferential policies heavily favored the eastern region at the expense of inland China.

FDI fueled much of the rapid economic leap of the developed regions of China, but led to unbalanced regional growth and widen income inequality across regions within the country. In the 1990s, income disparity has become so large that the regional policy set forth in the Ninth Five-year plan suggested the need to correct an uneven regional development. In the spring of 1992, Deng Xiaoping announced that the economic success of the southern provinces should be a model for the rest of the country. [*Tanimoune N.A., et al., 2013*] In 2000, the central government announced its 'West Development Strategy'. Since late 1990s, to support the development of China's central and western regions, the government has been encouraging both domestic and foreign investment in these inland provinces and increasing the level of their openness so that they can reap benefits from trade.

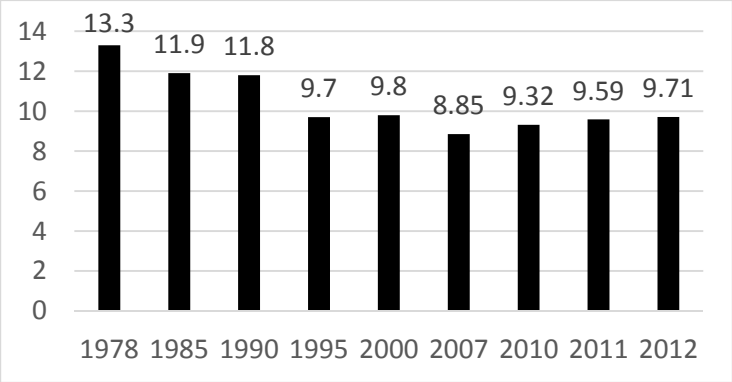
After China's accession to the WTO, economic growth has been shifting westward from the eastern provinces to the central and western regions. The increase in cost of labor, land and public resources such as electricity, water and gasoline, as well as abolishing of tax preferences for FDI, eliminate the comparative advantage of the eastern part of China. The advantages enjoyed by the east region are also diminishing due to severe competition.

Thus, the accession to the WTO provided opportunities not only to coastal provinces, but also to inland regions to access the world markets. Trade liberalization has made more attractive FDI in inland areas, where the cost of labor is still lower than in the coastal part of the country. The improvement of China's domestic transportation and logistical systems has also increased the accessibility of the inland regions to foreign markets. They are attempting to realize possibilities of the export-oriented economic growth pattern that has been so successful in the coastal regions, and increasingly involving in international supply chains.

IV. Northeast China's economic development: an impact of WTO accession and regional policy of economic revival

Northeast region, or Donbei, is the old industrial base of China, hosting many traditional heavy-industrial firms such as steel plants, metal mines, oil refineries, and shipbuilding factories. Most enterprises in the region were established in the 1950s with the help of the Soviet Union. The majority of them were large state-owned

enterprises, which played a significant role in the industrialization of the country under Mao Jiedong. With the transition in 1978 to a policy of reform and opening up these enterprises started to face operational losses, difficulties of sales, overstaffing, ageing production facilities, the heavy burden of maintaining social infrastructure and distributing pensions to retired workers. The region fell behind the fast-growing eastern provinces of the country. During the reforms, the proportion of the northeastern regions' industrial output as a share of the national total declined from 16.5 percent to 9.3 percent by 2002 (the lowest figure was registered for 2007 (8.85 percent), largely due to the legacy of a centrally planned economy. (Pic.6)



Pic. 6. Northeast China in China's national GDP (%), 1978-2012. Source: 中国统计年鉴.

In 2003, to stop the rapid economic decline of the northeastern China, the central government launched a strategic plan for the rejuvenation of the traditional industrial bases in the region (中国东北振兴计划). Originally, the plan envisaged reconstruction and re-equipping with modern equipment of "old industrial bases", i.e. enterprises built in the 1950s. Lately, this plan has become an essential part of a comprehensive policy of economic alignment of different regions of China. In 2012, the central government has adopted a new strategy of regional development, which allocates as two independent courses a strategy of revival of old industrial bases throughout China without emphasis on specific regions and the plan for the development of the northeastern region.

The Chinese authorities acknowledged the main problem in the northeastern region was its overreliance on state sector – in early 2000s, state-owned enterprises accounted for 70 percent of the total industrial assets, a much higher percentage than in other regions. Taking this in mind, the northeastern rejuvenation scheme foresaw

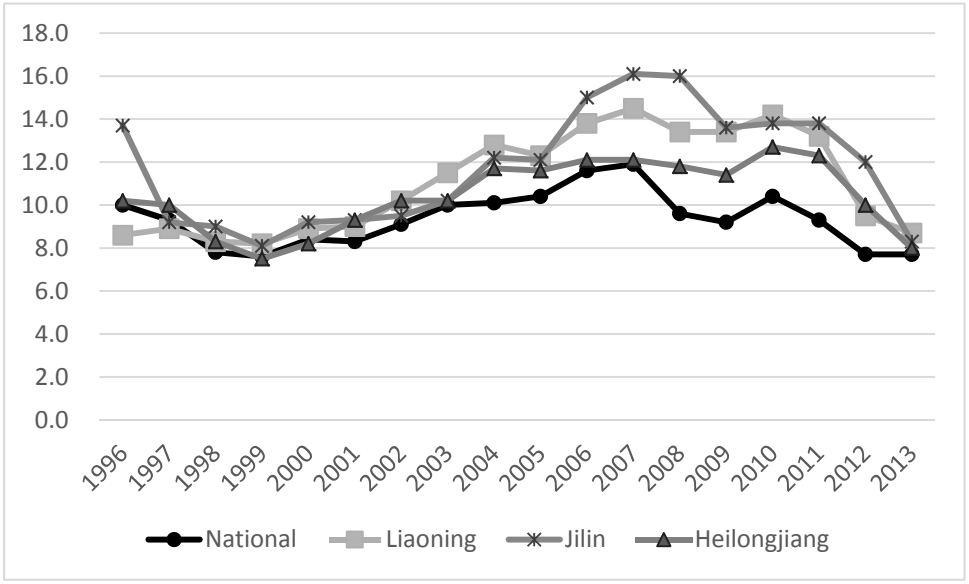
structural adjustments in terms of ownership reform and encouragement of more market mechanisms in the region in order to accelerate growth. In this way, the northeastern rejuvenation scheme differed significantly from the 'Western development program' − another strategic plan which implementation started earlier, − as the latter focuses mostly on infrastructure development such as building railroads, highways, and electricity networks. [*Cheng Li, 2004*]

In spite of the importance of revitalization plan of the China's northeast, the central government did not provide special fiscal preferences and direct funding from the central budget. Unlike in other parts of the country, financial support by Beijing of the northeastern region during the 2000s, and, particularly after 2012, has been of a targeted nature limited to assistance of individual companies and projects, which can be seen from inter-budgetary transfers. In addition, relatively low lending from the banking sector also suggests the region has not been a priority in the credit policy of the banking system. In 2012, Beijing has also reduced investment activity in the region. *["Social'no-ekonomicheskoe razvitie Severo-Vostochnogo Kitaya", 2012]*

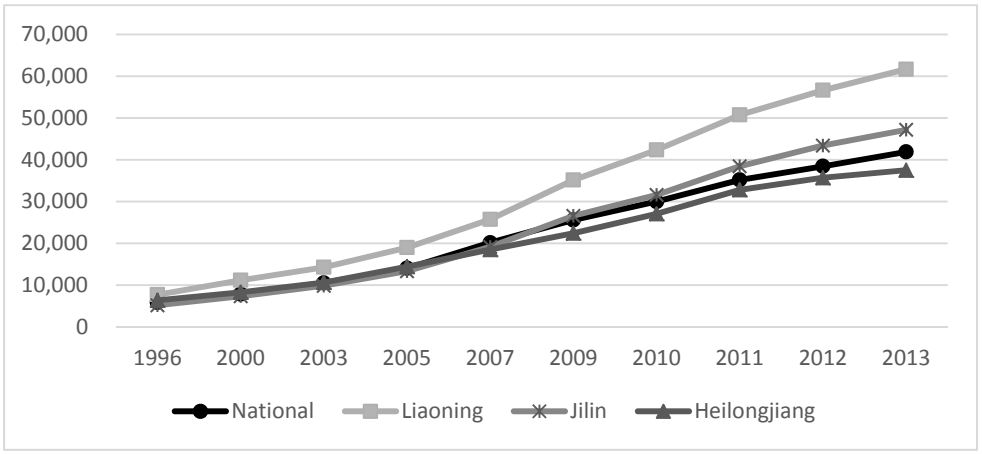
Northeastern rejuvenation was motivated by the strategic need to promote economic integration between China, South Korea and Japan. In view of this, an important role in the development policy of Northeast region is given to expansion of foreign trade and attraction of foreign investment. Implementation of the northeastern rejuvenation scheme coincided with China's accession to the WTO, obligations under which matched general approach to structural reforms in the region. Liberalization of the market along with promotion of private sector contributed to improvement of business environment in the region and its greater attractiveness for foreign investments.

In general, the revitalization plan of old industrial bases in Northeast China has a positive effect on regional economy, whose growth since 2003 accelerated and stands above the national average. The growth varies among the provinces of the Northeast, but it constantly exceeds the corresponding indicator for China by 1-7 points (Pic.7). After the global crisis, the growth of the region decelerated though to a lesser extent than for China as a whole due to lower dependence on global markets. In 2012-2013, the growth declined from more than 10 percent to 8.6 percent. Nevertheless, because of higher growth over the last decade, the proportion of regional output of Northeast China in national GDP increased from 9.32 percent to 9.71 percent. Northeast China has seen an improvement of standard of living, as since the crisis per capita GDP was

growing more rapidly than in China overall, particularly remarkable is the development of Jilin province.



Pic. 7. Real GDP growth, China vs. Northeast China (y/y, %). Source: 2014 年中国统计年鉴.



Pic. 8. Per capita GDP growth, yuan per year. Source: 中国统计年鉴.

The growth of investment in Northeast region also exceeded the national average. Most of them came to industrial production, which led to the enhanced development of the secondary sector, and construction. The contribution of service sector in regional output, except for Heilongjiang, on the contrary, declined. As an old industrial base, industrial structure is heavily skewed towards heavy industry, accounting for over 79 percent in Liaoning and nearly 70 percent of the total industrial

value-added in Jilin province in 2013. Heilongjiang and Jilin provinces are also important national processing and production base of cereals and meat in China.

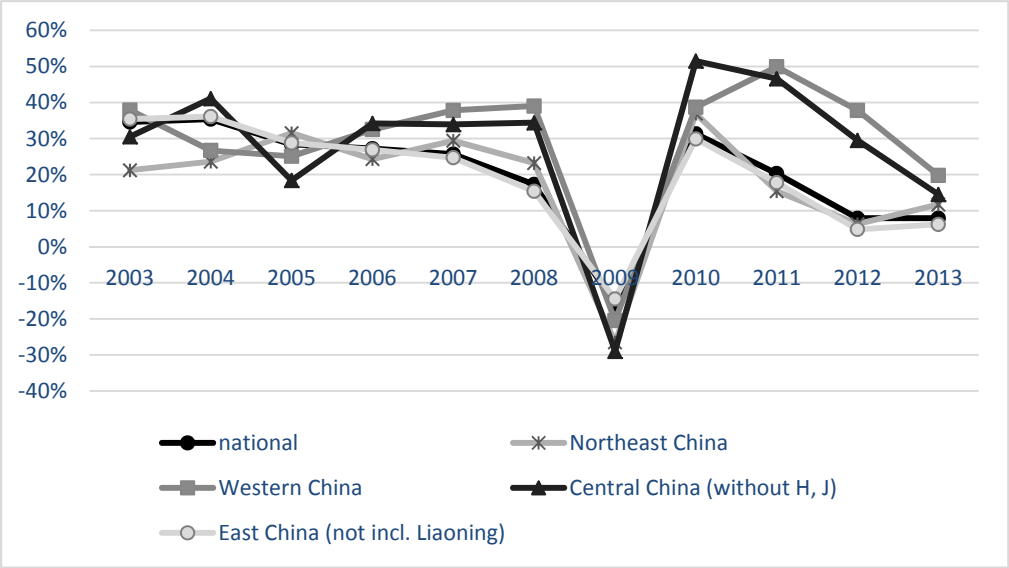
Since 2002, the Northeast region has undergone a radical privatization of a state sector, which share in industry declined from 79 to 41.8 percent in 2012, however, for China on average, this figure if below 30 percent. State owned industrial enterprises still play an important role in the region's industrial development. Thus in 2013, 10.5 percent of industrial enterprises in Heilongjiang were state-owned or state-holding, but they accounted for 47.2 percent of the total gross industrial output value, though the share has dropped from 59.7 percent in 2009. In Liaoning province, state-owned enterprises still contribute about 24 percent to the province's gross industrial output.

Among the three provinces of Northeast China, Liaoning is the largest in terms of GDP, accounting for 49 percent of the total of Northeast China. In 2012, the province's GDP ranked the seventh among all the provinces and municipalities in China. Liaoning is also economically the most developed province in the region, as due to its geographical location it enjoyed advantageous of an outward orientation and accelerated growth typical for coastal region (since 1986 under the new scheme of economic and geographical division of the country Liaoning was included into the Eastern region).

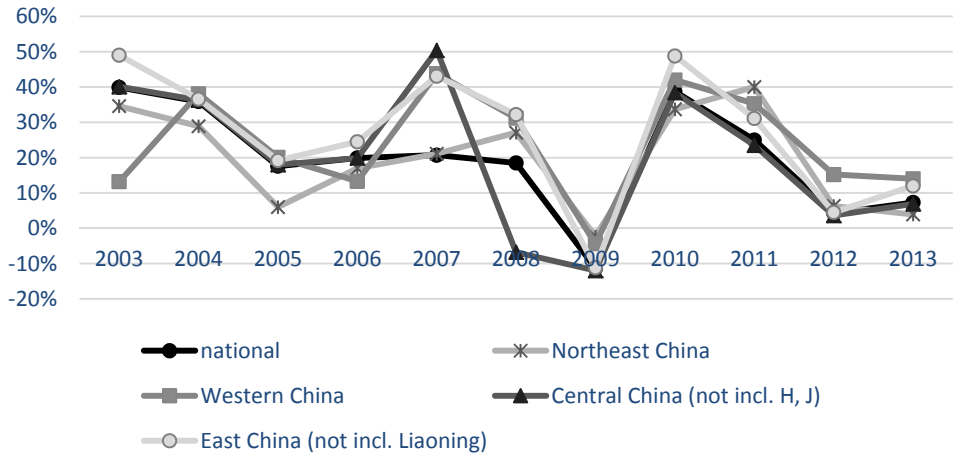
With the beginning of realization of the Development Plan, the highest growth among three provinces (and actually one of the most dynamic in China) was observed in Jilin province. In 2012, the growth of its gross regional product (GRP) was 12 percent, whereas in Heilongjiang it accounted for 10 percent, in Liaoning - 9.5 percent. The acceleration of economic growth in Jilin took place due to an increase in industrial production (petrochemicals, automotive and chemical industries), represented by large companies such as Jilin Oil Field, Changchun First Automobile Manufacturing Factory, Jilin Chemical Industry Corporation. The share of manufacturing in GRP of Jilin province increased from 35 percent in 2003 to 46.7 percent by 2013.

After China joined the WTO, contribution of individual regions in China's foreign trade has changed. If we divide China into four macro-regions (Eastern provinces, Western China, the Central region and the Northeast, to which we assign also Liaoning province), we can highlight some major trends in the development of foreign trade since the early 2000s up to the present. Firstly, from mid-2000s foreign trade in central and western regions is being increasing more rapidly than in other regions of China. Consequently, in the period 2000-2013 the share of these regions in

national exports rose from 3.9 to 6.3 percent for Central region and 4.0 to 8.1 percent for Western provinces, while in imports it increased from 2.2 to 4.2 percent and from 3.2 to 5.1percent, correspondingly. (Pic. 9, 10) Enhanced contribution of these less developed regions in national trade associates with the effect of liberalization, which was translated primarily in the growth of private sector activity, as well as with the implementation of regional policy, increasing production costs on the coast, and some other factors. However, trade development is less sustainable in these regions comparing to coastal zone, as during the crisis it dropped more considerably, than in developed provinces.



Pic. 9. China's export growth by region, (y/y, %). Source: 2014 年中国统计年鉴.



Pic. 10. China's import growth by region, (y/y, %). Source: 2014 年中国统计年鉴

With regard to Dongbei, the pace of development of exports and imports in the region were about the same as in eastern China, only in some years, mainly since the global crisis, the growth of trade (mostly import) is higher than both the national rate, and the growth of trade in coastal provinces. Therefore, the region's share in China's foreign trade during the post WTO period even slightly decreased (from 5.4 to 4.0 percent in export and 4.9 and 4.7 percent in import). The most significant growth of trade turnover, particular imports, in Northeast China was observed in Heilongjiang province, but this, largely, is associated with its mediation activity.[15] Although the export quota of Northeast China increased somewhat since early 2000s, even in Liaoning province it is not only lower than in other developed eastern provinces, but also lesser than the national figure.[16] As to contribution of the developed eastern provinces in China's foreign trade, it somewhat decreased, although the region still dominates in the country's foreign economic exchanges.

By its patterns of trade, Northeast China is not a homogeneous region. The region is divided into three parts: coastal belt of Liaoning province, inland territories and border zone. Historically tax and administrative preferences in foreign trade and attraction of FDI were unevenly distributed within the region. In the middle of 1980s, they were provided for coastal zone of Liaoning province, which enabled it to promote extensive foreign relations much earlier comparing to interior regions of Dongbei. Inland territories of Northeast, including much of Heilongjiang and Jilin provinces, as well as internal regions of Liaoning, began to enter the international markets later than the coastal zone. They were not provided with the same preferences as coastal regions. During the 1990s, tax preferences were extended to internal and border areas. However, preferential policies did not had complex nature and only partially replicated the experience of the coastal zone. Even after the start of the rejuvenation program in the Northeastern China, its interior regions did not receive any additional preferences in foreign trade. According to experts from the Chinese Academy of Sciences, who built an econometric model of growth of China taking into account the effect of the policy of openness, such a policy in the coastal area of China in 1990s accounted for about 20

[15] Much of its exports is not produced in the province, whereas most of the imports is consumed elsewhere in China.

[16] In 2012 export quota for Liaoning province was 14.5 percent, Jilin – 3.1 percent, Heilongjiang – 6.5 percent. The corresponding figure for Jiangsu was 37.7 percent, Zhejiang 40.2 percent, Guangdong – 61.8 percent. National average was 24.1 percent.

percent of their growth, while it added only 4 percent in central and western regions. [*Ivanov S.A., 2012*] In general, according to Jin Fengjun, the degree of external openness of inland areas of Dongbei is less than the tax regimes existed in the coastal provinces and even lower than that in western region.

The third area are regions bordering with Russia. Since the mid-1990s, companies located in border areas were given the right to import goods at preferential tax rates[17], and for some types of commodities, they were actually abolished. Simplified procedures for cross-border trade and support from the local authorities allowed companies and individuals to pay fewer taxes than in other parts of the country. In addition, the companies from border territories received benefits in the form of export subsidies and significant awards from the local authorities depended on the results of international economic activity. In 1996, the population residing in border areas was allowed to import duty free goods worth of 1,000 yuan, in 2008 this sum increased to 8,000 yuan. [*Ivanov S.A., 2012*] Since the mid-2000s, many tax incentives have been replaced by targeted transfers from the central budget, thus the central government of China continued to support border trade.

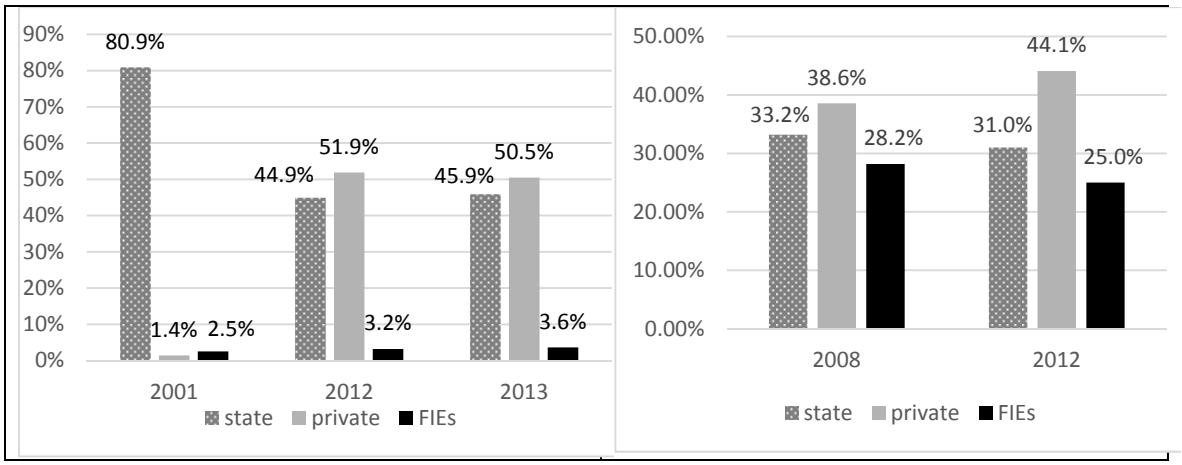
Due to the tax and administrative preferences, the coastal zone of Liaoning province and the border area of Heilongjiang Province have made significant progress in the development of foreign trade. In 2010, the share of the coastal zone in regional foreign trade was above 50 percent, its contribution to Dongbei's GDP accounted for 25 percent. Border regions added another 12 percent to foreign trade of Northeast China, while their percentage in GRP was only 2 percent.

Dongbei is the only China's region, which has a negative balance of trade because of faster growth of imports than export in Jilin and Heilongjiang provinces. When in the 1980s China just launched its export-led industrialization, it required at first to import modern equipment and technologies from abroad in order to produce goods for export, so at that time it also had a negative trade balance. We may suppose that while two inland Northeast provinces started to enter the international markets much later than the coastal zone, they are now at the stage of upgrading production facilities with imported machineries and expertise.

The public sector reform has reduced the role of SOEs in the economy of the region and spurred rapid growth of private companies. Granting rights to private enterprises to enter international markets under the WTO commitments also

[17] Customs duty was reduced by 50 percent from standard rate.

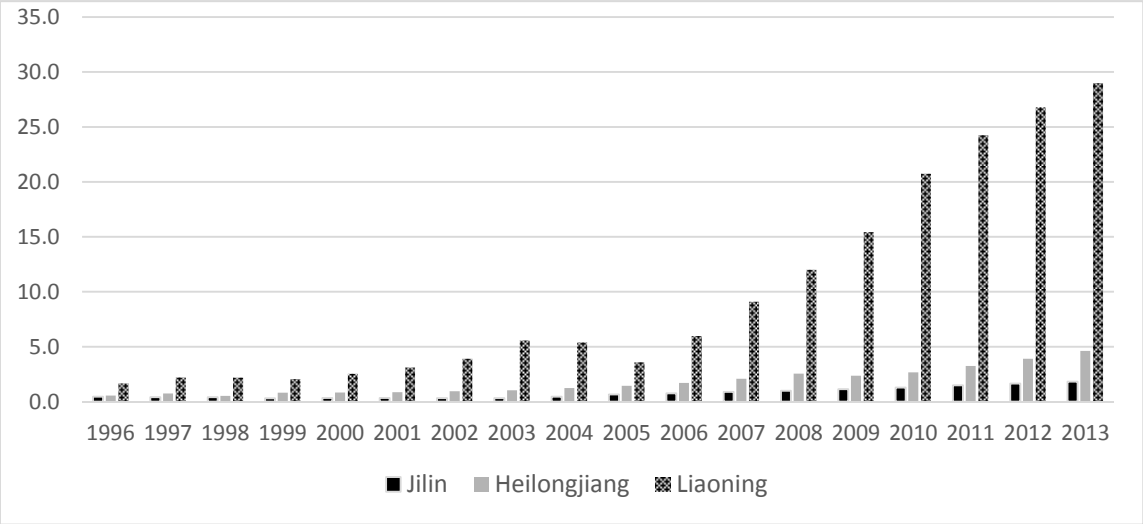
strengthened their participation in foreign trade. The structure of trade in terms of type of participating companies has changed dramatically. Over less than a decade, private sector has become a dominant player in the regions' foreign trade. For instance, its share in foreign trade of Heilongjiang accounted for only 1.4 percent in 2000, but had already exceeded 50 percent by 2013. During the same period, the share of state enterprises in provincial foreign trade decreased from 81 to 45percent. (Pic. 11) In general, these structural changes in Heilongjiang and Jilin provinces were more radical in comparison with eastern regions, while in Liaoning province, though the contribution of private sector to foreign trade also increased, it is still dominated by the FIEs.



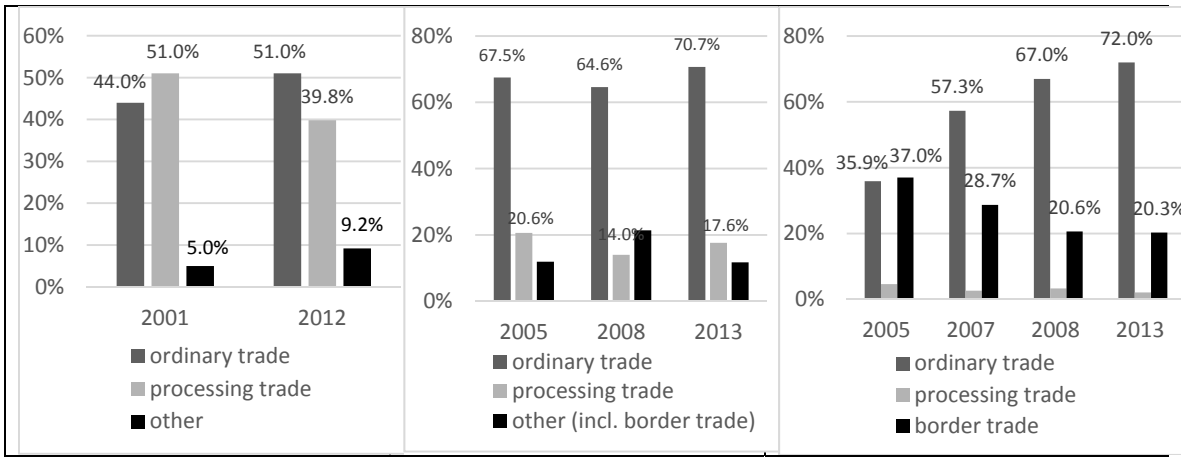
Pic.11. Foreign trade of Heilongjiang (left) and Jilin (right) provinces by type of enterprise, 2001-2013 (%). Source: Statistical yearbooks of Heilongjiang and Jilin, various years.

Market liberalization under WTO significantly improved investment climate in China's northeast, whereas restructuring of SOEs provided foreign companies with new investment opportunities in sectors formerly controlled by the state. This was supported by increased inflow of FDI into the region.While in early 2000s the three provinces attracted only 9.1 percent of total FDI into Chinese economy, by now their stake is above one third of total mostly owing to a prominent role of Liaoning province. During the last decade Liaoning experienced a boom in attracting of FDI – since 2005 an annual influx of FDI into the province rose by almost ten times, consequently, the province come up to be the third largest recipient of foreign investments in China after Guangdong and Jiangsu. Other two provinces – Heilongjiang and Jilin have also became more attractive for foreign capital having received larger amount of foreign

investments. (Pic. 12) Another positive impact of WTO accession was improvement of commodity composition of regional exports, which is manifested in a steady increase of the share of finished products and machinery.



Pic. 12. Annual FDI inflows into Northeastern provinces, 1996-2013, billion USD. Source: statistical yearbooks of Heilongjiang, Jilin and Liaoning provinces, various years.



Pic. 13. Export by type of trade: Liaoning province (left), Jilin province (middle), Heilongjiang province (right) (%). Source: statistical yearbooks of Heilongjiang, Jilin and Liaoning provinces, various years.

Due to geographical location, Dongbei promotes close economic ties with neighboring countries, including Japan, R.Korea, Russia and North Korea. In 2000s, the region experienced diversification of investment partners and trade relationships,

though the countries of Northeast Asia remained to be its major export and import markets. The growth of economic ties with developing countries in Latin America, Africa, and Southeast Asia was noticeable.

FDI and foreign trade, as well as in case of eastern provinces, are complementary, as greater FDI inflows cause larger volumes of imports and exports. Even though the import and export of enterprises with foreign capital increased significantly, especially in Jilin province, nevertheless the foreign trade of private Chinese companies grew even faster. Therefore, in all provinces of Northeast China there was an increase of ordinary trade, while the share of processing trade, even in Liaoning province, is declining. Processing trade is almost insignificant for Heilongjiang province. This means that the growth of foreign trade is mainly generated by the private sector. All these changes are consistent with the general trend observed in the eastern region with the difference that the proportion of ordinary trade in Heilongjiang and Jilin provinces is significantly higher than in China as a whole (in Heilongjiang its share increased from 36 to 72 percent in 2005−2013, whereas in import of Jilin it reaches 95 percent).

V. Patterns of foreign trade development among provinces of Northeastern China

General trends and development patterns of northeastern China may be illustrated by the example of Jilin province. Jilin has sought to revitalize its old industrial base since 2004, and the secondary sector after years of decline strengthened again its contribution to provincial economy constituting more than 50% of GDP in 2010 (Table 1). The trend extended to 2013, with the secondary sector accounting for two-thirds of total growth. Automobiles along with petrochemicals are being identified as the pillar industries of the province, represented by the Changchun First Automobile Manufacturing Factory (FAW). (Table 2) In particular, Jilin aims to grow and consolidate its position as a car and automotive components export base.

Table 1. Composition of GDP, %

	1980	2005	2013
Primary	27.6	17.3	11.3
Secondary	53.0	43.7	52.8
Industry	48.1	37.7	46.7
Tertiary	19.4	39.0	35.9

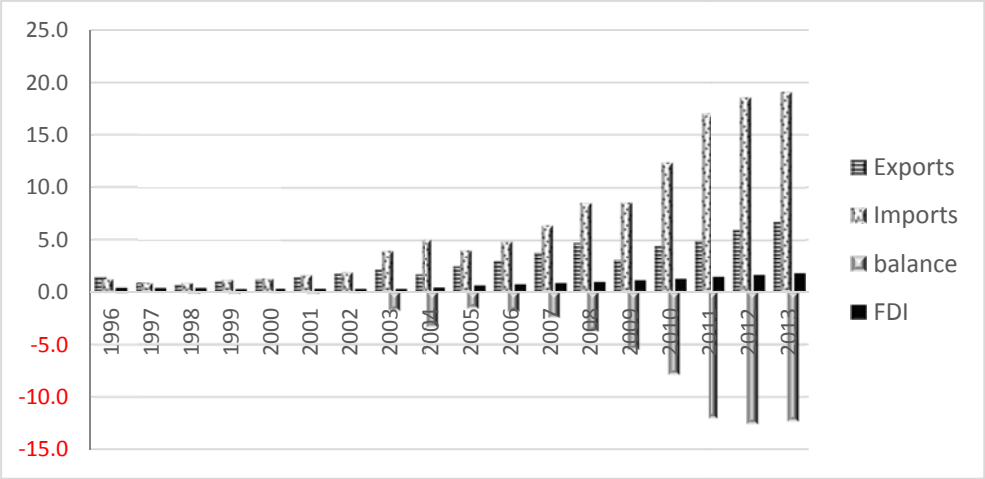
Source: Jilin statistical yearbook 2014.

Table 2. Share of leading industry groups (2013)

	% share of gross industrial output
Manufacture of automotive	27.5
Processing of food from agricultural products	14.3
Chemical raw materials and chemical products	7.4
Manufacture of non-metallic mineral products	6.8
Medical and pharmaceutical product	6.1
Smelting and pressing of ferrous metals	4.1
Manufacture of food & beverage	3.9
Processing of timber	3.7

Source: Jilin statistical yearbook 2014.

Upon the entry into the WTO and the adoption of a program for revival of the old industrial bases in Northeast China, the province embarked on the path of rapid development. The growth of provincial GDP since 2006 is remarkable – it is not only the highest among the provinces of Dongbei, but, probably, is the highest in China. In 2008, it reached 16 percent. The growth of foreign trade also accelerated – in average, trade expanded by almost 24 percent up to 2008. The volume of foreign trade increased from 3.7 billion USD in 2002 to 25.85 billion USD by 2013. Along with this, trade deficit has also grown up quickly. (Pic. 14)



Pic. 14. Foreign trade, balance of trade, and FDI inflows in Jilin province, 1996-2013.
Source: Jilin statistical yearbook, various years.

There has been an improvement in the export structure, which resulted in the growth of the share of finished products including machinery and electrical goods. Before 2003, provincial export was dominated by agricultural products, which accounted for 60 percent of total. Since the 11th Five-Year Plan (2006-2010), manufactured goods comprise nearly 70 percent of exports, half of which are electrical equipment and high-tech products. [*Alexandrova M.V., 2013*] After FAW Group and German Volkswagen Group established a joint venture in 1992, leading articles of import came to be products related to the automotive industry. In 2008, automobile, automobile parts and components comprised almost half of import; in 2013, these items has already exceeded 71 percent of total. Besides automobiles and spare parts other new major export items of Jilin became chemical products, processed agricultural products, modern pharmaceuticals, high-tech products, textiles and furniture.

Ordinary trade ranks the first among the forms of trade in Jilin province. From 1994 to 2013, its share in total export-import operations increased from 64.9 to 83.5 percent, which is considerably higher than national figure (49 percent). Processing trade focuses mostly on the production of goods with low value added primarily in labor-intensive industries. It is a more important type of trade in Jilin in comparison with Heilongjiang province, yet over the years, it has not been rising as fast as an ordinary trade. Another type of trade is cross-border trade[18], but again unlike Heilongjiang, cross-border trade is a small percentage of the total volume of trade − in the last ten years, this segment was only about 2.5−5 percent of the total and tends to decrease. The reduction is due to a general decline in trade with North Korea, as well as inconvenience of border crossing Hunchun−Makhalino on the border with Russia for trade.[19] [*Alexandrova M.V.*, 2012]

A rapid expansion of ordinary trade in Jilin's export and import is closely associated with an explosive growth of Chinese private enterprises. In 2006, their export for the first time exceeded the export of state-owned enterprises. The role of foreign invested enterprises in foreign trade of Jilin is rather significant; however, their share in the foreign trade of the province, as well as that of the public sector, is gradually decreasing. According to recent data, the share of the FIEs in provincial

[18] Jilin has a border with North Korea (1206 km) and Russia (232,7 km).

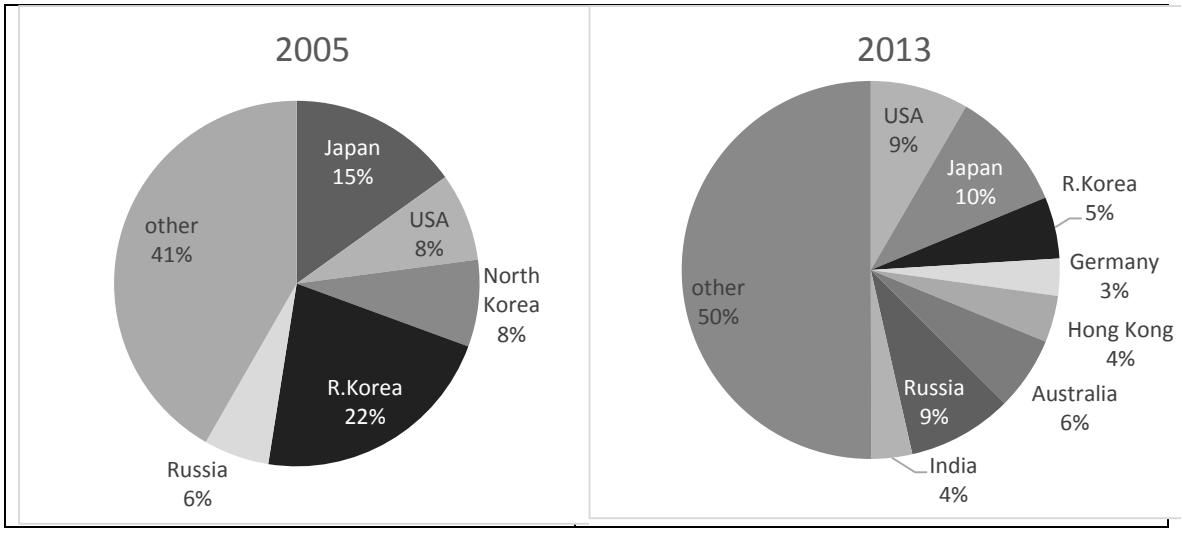
[19] The Russian population in border areas prefer to trade through the transitions of Heilongjiang province, Suifenhe – Grodekovo, for instance.

export accounted for 25 percent, that of the private enterprises − 44.1 percent of the total. One explanation for that phenomenon, besides the fact that trade by Chinese private companies are growing faster, is that foreign investors coming in Jilin have different motivation in comparison with FDI in coastal provinces. Investments by FIEs in inland regions of China are more oriented towards China's domestic market, than for exports, though this issue deserves separate investigation. This was not the case of eastern China, where the bulk of FDI was involved in processing operations with subsequent export of assembled goods. Specificity of Jilin's foreign trade lies in the fact that contribution of one company (the FAW Group) to export and import of the province constitutes two thirds of total volume. Thus in 2013, the FAW's share in Jilin's export was 74.9 percent.

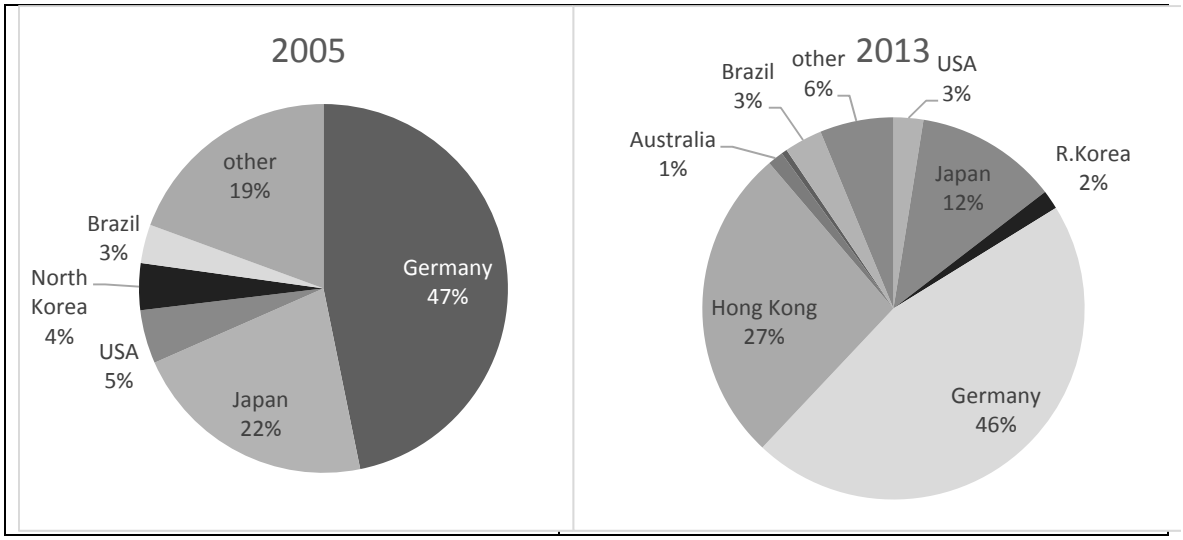
During the reforms, the province has greatly expanded the number of its trading partners and diversified trade flows. The provincial authorities eagerly promote trade relations with emerging markets and developing countries in different regions of the world, but also attach great importance to increasing trade with Australia. Japan, the US, Russia, and R.Korea are the leading four export destinations of Jilin province, and the total value of export to these countries took up 51.9 percent of the 2006 total. Over time, export markets are becoming less concentrated, the list of key trading partners changes. The four countries accounted for 33 percent of the 2013 export value, with Australia ahead of R.Korea. Export to North Korea was also significant, but declined since the global crisis. In terms of import, Germany, Hong Kong and Japan are the top three import countries of Jilin province accounting for 46, 27, and 12 percent respectively of the total. The overall import from the three countries took up 85 percent of the total in 2013. Thus, specialization of Jilin in automotive industry leads to a very high proportion of Germany as the major import source of the province. As per trade with Russia, it was steady growing before the global economic crisis: in 2005, import from Russia amounted to almost 12 percent of import volume of the province, then since the crisis its share has dropped to less than one percent. (Pic. 15, 16)

Although Jilin receives much less FDI than the better-positioned province of Liaoning, and actually even less than neighboring Heilongjiang, the province has seen a sustainable growth of foreign investments. The reform of a public sector, as well as the implementation of WTO commitments, significantly increased the attractiveness of the province to foreign investors. The inflow of FDI reached 450 million USD in 2004, and four years later, the amount was close to 1 billion USD; by 2013 it almost doubled again to nearly 2 billion USD. More than two thirds of FDI go into the manufacturing

sector and the proportion of such investment is increasing: for example, in 2003 the second sphere attracted 71.5 percent of FDI, in 2012 − about 85 percent. Due to Jilin's prominence in the automotive industry the bulk of FDI are involved into manufacturing of transportation equipment. Investments are also encouraged in the sectors of auto parts, pharmaceuticals, food processing, computer application and software, and other areas. Although over the past decade an inflow of foreign investments into Jilin increased, the province accounted for only 1.5 percent of total FDI received by China in 2013 (2.5 percent in 2011).



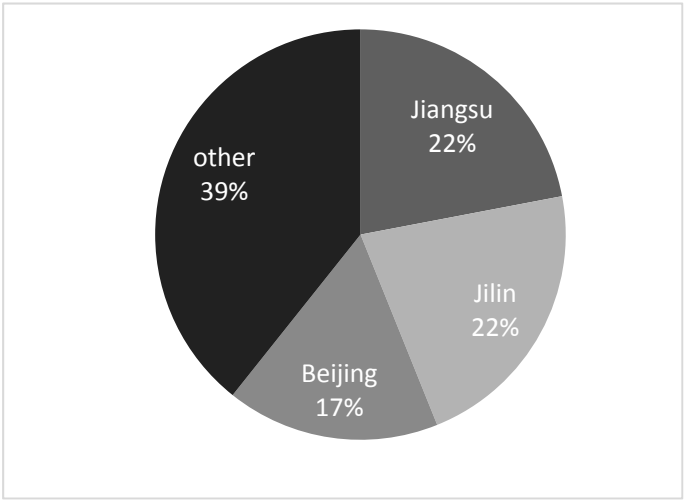
Pic. 15. Export of Jilin province by country (2005, 2013). Source: Jilin statistical yearbook, 2006, 2014.



Pic. 16. Import of Jilin province by country (2005, 2013). Source: Jilin statistical yearbook, 2006, 2014.

The rise of FDI inflows in the province relates to the arrival of big investors, including leading TNCs like American food producers Cargill, Inc. and PepsiCo, Inc., the Dutch-British Royal Dutch Shell, followed by German companies Volkswagen and Audi, the Japanese Toyota, as well as the Korean producer of automotive tires − Kumho Tyres. [*Alexandrova M.V.*, 2013] Among recent large FDI projects in the province was an opening in 2012 of a new automotive plant in Chanchun by Toyota Motor as a joint venture with China FAW Group.

The sources of FDI inflow to Jilin province are overwhelmingly concentrated, with Hong Kong, Germany, R.Korea and Japan as the main capital donators. If for Japan and R.Korea Jilin province is not among the priority locations for investments in China, then to Germany, this province has the highest priority for FDI along with Jiangsu. [2013 中国外商投资报告] In 2012, the two provinces attracted 22 percent of German investments in China each that was the largest amount of FDI in that year from this particular country. (Pic. 17)



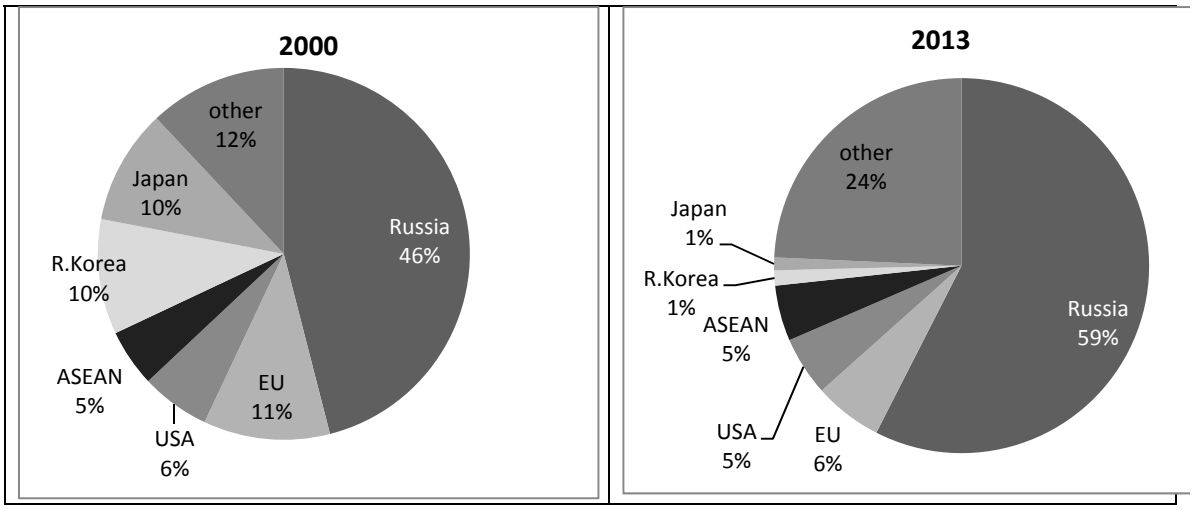
Pic.17. Distribution of German FDI across China's provinces, as % of total inflow, 2012. Source: 2013 中国外商投资报告。中华人民共和国商务部。Pp. 49−51.

The case of Jilin represents an obvious relationship between increasing FDI inflows into the province and the growth of its foreign trade: the greater volumes of foreign investments generate larger export and import. This resembles the pattern of growth of eastern provinces with the difference that it emerged there a decade earlier, in the 1990s, while in Jilin this mechanism was launched by market liberalization under the WTO, as well as the reform of the public sector. Since the opening up of Jilin province took place later than in coastal China, acceleration of foreign trade in the

province was not only due to the upsurge of export and import by FIEs, but was also connected with the growth Chinese private businesses and their increasing internationalization.

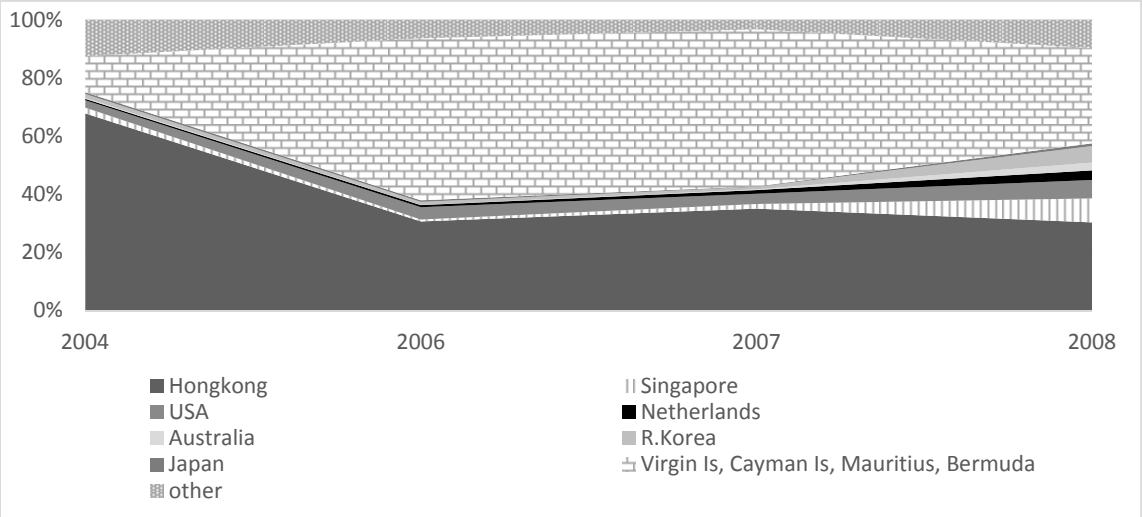
Heilongjiang province also began internationalizing its economy later compared to the eastern provinces; since many of its basic enterprises produced defense articles, the bulk of the output were not exported. The share of foreign trade in the province's GDP was small. After joining the WTO, foreign trade expanded rapidly by almost 30 percent annually before the global crisis.

During the years of reform, the number of trading partners has enlarged considerably, but still we cannot say that its foreign trade is diversified. (Pic.18) Because of geographical proximity, Heilongjiang's trade tie with Russia is strong. Trade with Russia amounted to 22.4 billion USD in 2013, 57.5 percent of the province's total trade. Province generates up to a quarter of China's foreign trade with Russia, and about the third of Chinese investments into the Russian economy. Development of trade with Russia is based largely on cross-border trade, which operates in the province since 1994; however, a significant part of turnover is not produced in Heilongjiang, but is re-exported from more developed provinces of the country. [*Alexandrova M.V., 2009*] Large-scale re-export activities are largely responsible for a steady increase of finished goods and machinery in provincial export (76 percent in 1998, 92 percent by 2007), though we also should recognize structural advancement of local industries.



Pic.18. Heilongjiang foreign trade by country (2000, 2013), (%). Source: Heilongjiang statistical yearbook, 2001, 2014.

Cross-border trade accounts for 20 percent of the total turnover of the province, though its share has been declining. From the beginning of 1990, almost 90 percent of Heilongjiang's export to Russia accounts for five groups of products: clothing, electrical, footwear, textiles and agricultural products. Since the ESPO pipeline was put into operation, oil has become the main commodity purchased in Russia, and in 2012, it occupied 79 percent of imports, greatly surpassing other items dominated in the 2000s, such as timber, iron-ore, fertilizers, and petroleum products.[20] *["Social'no-ekonomicheskoe razvitie Severo-Vostochnogo Kitaya", 2012*] The US, Brazil, Saudi Arabia, Angola, Iraq and Malaysia were other major trading partners of the province. The share of Japan and R.Korea in its foreign trade reduced from 10 percent each to only one percent.



Pic. 19. FDI inflow into Heilongjiang province, as % of total. Source: Heilongjiang statistical yearbook, 2001, 2014.

FDI inflows began growing into the provincial economy after the accession to the WTO. In absolute figures, Heilongjiang attracts almost ten times less FDI, than Liaoning, but larger amounts comparing to Jilin. The foreign companies are mostly investing into six sectors: equipment manufacturing, energy sector, petrochemicals, food, pharmaceutical and timber processing industry. Hong Kong is Heilongjiang's largest source of foreign investment. A decade ago, its share was 70 percent in total

[20] Purchases of hydrocarbons via ESPO are done by a subsidiary of CNPC in Daqing, so they are recorded in Heilongjiang's foreign trade statistics.

utilized FDI, though its stake decreased to 35% by 2006−2008, and then recovered again. (Pic. 19) In 2013, Hong Kong actually invested a total of 2,619 million USD, accounting for 56.8 percent of the total utilized FDI. Other major foreign investor in 2013 included Virgin Islands, the UK, Singapore and the US. Direct investments from Japan and R.Korea also improved somehow, but still they stay low. The province is not a priority site for FDI from both of these countries.

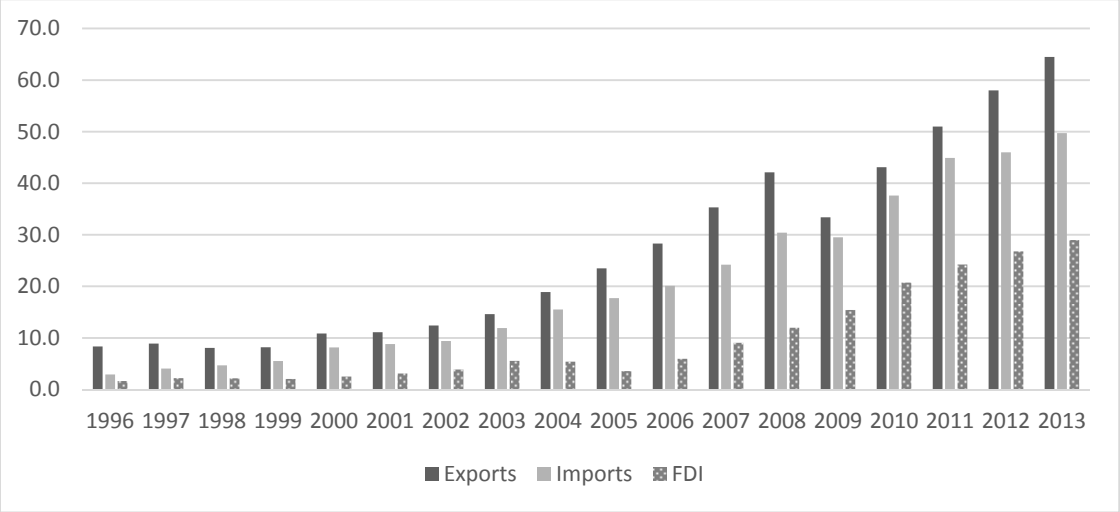
In contrast, Liaoning province maintains very close trade ties with Japan and South Korea, thanks to geographical proximity. In 1990s, three key partners were Japan, the USA, and Hong Kong, which recently was replaced by R.Korea. Japan is a key trading partner for Liaoning: during many years, it accounted for about 1/3rd of provincial turnover in average, though in mid-1990s Japan's share reached 37 percent, but then with the diversification of trade relationships it decreased to 20 percent by 2008 and further to 15 percent[21] in 2013. In general, falling contribution of the three main trade partners in the provincial trade is a long-term trend: in 1998, they occupied 60 percent of the total, in 2006 − only 45 percent, and in 2008 less than 40 percent. [崔日明, 陈付愉, 2008; Alexandrova M.V., 2011] Trade with Russia is not large – Russia's share ranges between 2-3% of provincial turnover and not entering the list of top ten trade partners. Major import sources in 2013 were Germany, Japan, South Korea and Australia. Electronics comprises about 60 percent of total provincial exports. Other major export items include primary products such as agricultural and fisheries products, raw materials including metals. Liaoning also exports automobiles, auto-parts and machine tools.

Leveraging its proximity to Beijing (as well as to South Korea and Japan), it has been able to attract the largest amount of FDI in northeastern China and expand its infrastructure network. In 2009, in terms of annual inflow of FDI, Liaoning advanced to a third position among China's provinces after Jiangsu and Guangdong. (Pic. 20) Liaoning is attracting FDI with the aim to take advantage of the emergence of China as the world's largest automotive market.

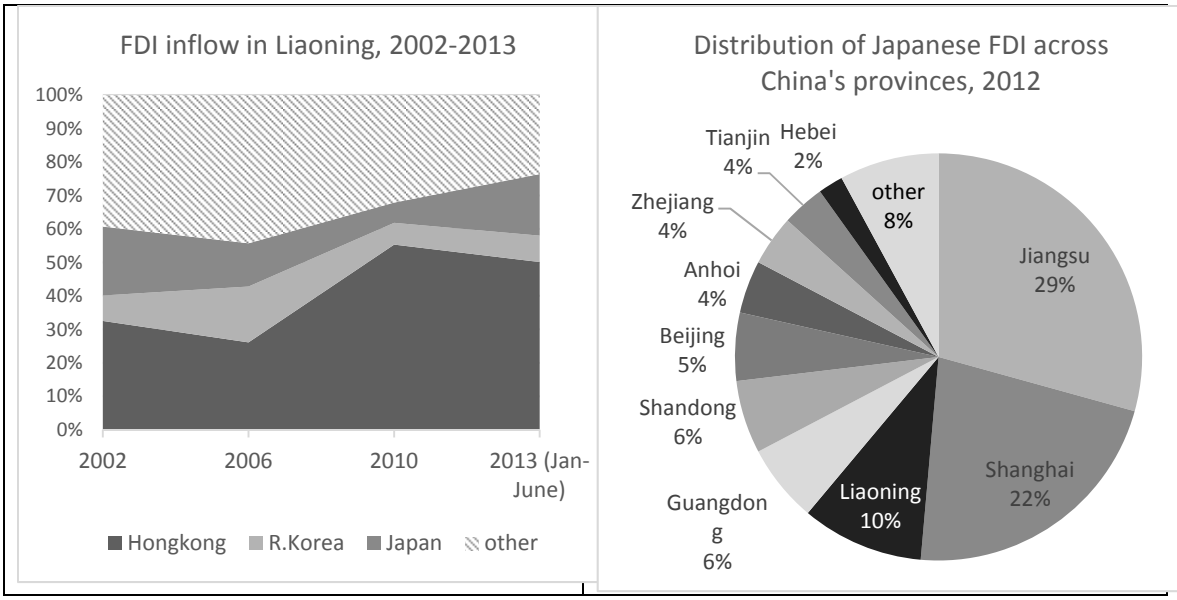
At the start of reforms, the number of investors into the regional economy was limited; by 2001, it included more than 30 countries. Among major sources of FDI were Hong Kong, Japan, South Korea and the US, which share of total utilized FDI in 1998 accounted for 77.5 percent, by 2010 it decreased to 71.2 percent. Whereas the shares of R.Korea and particularly Hong Kong significantly enlarged, those of Japan

[21] The figure for 2014 is for exports.

and the United States decreased by two times. In 2013, utilized FDI from Hong Kong amounted to 15.2 billion USD, accounting for 52.3 percent of the total utilized foreign investments. Yet for Japan, Liaoning remains one of the most important destination for FDI – in 2012, the province held the third position for Japanese investors as the most attractive location for direct investments after Jiangsu and Shanghai. (Pic. 21) For



Pic. 20. Foreign trade and FDI inflow into Liaoning province, 1996−2013, billion USD. Source: Liaoning statistical yearbook, various years.



Pic.21. FDI annual inflow in Liaoning province by country, 2002-2013 and distribution of Japanese investments across China's regions (%), 2012. Source: Liaoning statistical yearbook, various years; 2013 中国外商投资报告.中华人民共和国商务部.Pp. 45−46.

Korean investors Liaoning is also among top priorities for FDI amongst Chinese regions. In 2012, it held the 6th place as an important site for Korean investments after Jiangsu, Beijing, Shandong, Shenxi and Shanghai. Other major sources of FDI are Taiwan and Singapore. [2013 中国外商投资报告]

Enterprises with foreign investment are playing an important role in Liaoning's trade, though over time their share is gradually decreasing due to faster growth of trade by private and state companies. In 2013, FIEs comprised 45.3 percent of provincial foreign trade and accounted for almost 80 percent of exports of high-tech products of the province.

VI. Conclusion

In the present paper, we have analyzed the sources of economic growth acceleration in Northeast China since the launch of a rejuvenation policy and entry into the WTO. Moreover, we have investigated the relationship between trade and economic growth in the region, as well as the similarity of the pattern of its foreign trade to a case of eastern China. Finally, we examined whether liberalization of external relations as a result of the WTO accession has led to strengthening economic ties with neighboring countries of Northeast Asia, particularly Japan, R.Korea and Russia.

We conclude with the following. Economic restructuring and radical ownership reform within the rejuvenation scheme supported acceleration of GDP growth in Dongbei in 2000s. Along with market liberalization under WTO, that gave impetus to the development of private enterprises, whose role in the economy and foreign economic activity enhanced dramatically over a decade and is more visible than in the coastal belt of China. Although FDI inflows into the region also increased, as well as exports by the FIEs, the real drivers of growth in the region are private enterprises. Northeastern China is not a homogeneous region, as it reveals different patterns of trade. The coastal zone of Liaoning by its pattern of trade belongs to developed eastern provinces of China, as processing operations and the FIEs are playing significant role in its internationalization process and economic growth. The other two provinces are relying less on this mechanism of growth, and their trade expansion is largely driven by the Chinese private businesses. Therefore, the pattern of economic growth based on high processing trade and participation of foreign invested enterprises in foreign trade transactions, which until recently was typical for the eastern provinces, along with high dependence on external markets, is not wholly replicated in the Northeast region of

China. As for the impact of the WTO on the development of foreign economic relations of Dongbei provinces, we can observe a greater diversification of these relations comparing to pre-WTO period due to the growing economic ties with developing and emerging markets. Consequently, the share of Japan, R.Korea and Russia in foreign trade of the provinces declined, whereas the role of these countries as direct investors into the region's economy has not changed significantly. Economic relations with North Korea are unstable.

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Technical Cooperation and its Effects on the Sustainability of SMEs in Restructuring Traditional Industry Areas: A Survey on Japanese Local Cities, Nagano and Kitakyushu[+]

Yoshihiro Kameyama[†]

Abstract

This paper reports some results of research with specific inquiry into two regional urban areas in Japan: Nagano and Kitakyushu. These regions have engaged in establishing knowledge intensive industries in order to transform the traditional economy. With using survey data and new additional data obtained from internet and telephone research in Nagano and Kitakyushu, this paper investigate a spatial spread of technical cooperation; how often, with whom where do, in what means, and for what purposes, of small and medium-sized firms has had on its continuation. The analysis results show the following two points. 1) The firm who had strong relationship with overseas in past should tend to decrease the number of employment. 2) The firm who had strong relationship with university, industrial research institute and industrial supporting organization in past should tend to increase the number of employment. The latter reveals that the increase of employment would be derived from the existence of research personnel who are needed in order to inquire together with university and so on. These results suggest that the research and development is important factor for local development and SMEs development.

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1. Introduction

This paper reports some results of research with specific inquiry into two local regional economies in Japan: Nagano and Kitakyushu. These regional economies have engaged in establishing knowledge intensive industries in order to transform the traditional economy since the second half of the 1980s. With using original survey data and new additional data obtained from internet and telephone research for small and medium-sized enterprises in Nagano and Kitakyushu, this paper investigate a spatial spread of technical cooperation; how often, with whom where do, in what means, and for what purposes, of small and medium-sized enterprises has had on its continuation. The analysis result showed the following two points. 1) The firm who had strong relationship with overseas in past should tend to decrease the number of employment. 2) The firm who had strong relationship with university, industrial research institute and industrial supporting organization in past should tend to increase the number of employment. The latter reveals that the increase of employment would be derived from the existence of research personnel who are needed in order to inquire together with university and so on. These results suggest that the research and development is important factor for local development and SMEs development.

Regarding the cause of Japan's "lost decade", some literature such as Harada (1998) and Ikeo (2001) advocate that Japanese social and economic system have been kept in 1970s structure and this structure have brought out today's stoppage in the business. Similarly, Seki (1997) argues that industrial structure in each local economy constructed until early 1970s has been effective in today's state of each city. In any case, both on the national and local level, Japanese economy seem to be rocked in old social and economic system. Although we don't inquire into closely these discussions, especially the truth of the initial point, the point under discussion that prior condition influences current state is interesting. The context of this discussion is common with that of dynamic externalities that deal with the role of prior information accumulation in local area on current productivity. The essence of this study is in inquiring into the process and the effects of knowledge spillovers in the city.

On the other hands, we have to see the industrial hollowing-out phenomenon in local cities. The availability of cheap labor in overseas locations attracts assembling activities and knowledge intensive new businesses such as those in the information and communication technology (ICT) related industry are blooming in large metropolitan areas where wages are high. What is happening, then, in medium-size regional cities, remote from the core metropolitan area? Traditional industries which had sustained the

past development of these cities are in decline due to the foreign competition and the low degree of product differentiation. This industrial hollowing-out phenomenon seriously affects the local labor market.

Location of the knowledge intensive industries is sensitive to agglomeration economies because their most important input – knowledgeable workers – is highly mobile drawn to highly wages. Agglomeration may occur when the concentration of knowledge workers creates an attractive environment for other workers of this kind. Given that Japan as a whole has a comparative advantage in knowledge intensive industries, the core metropolitan areas may continue to attract talent if their agglomeration economies are strong. This could increase core-periphery disparities. Alternatively, agglomeration economies may also be at work locally enabling regional towns and cities to prosper on the basis of knowledge intensive industries. From the policy standpoint of maintaining relatively well-balanced regional growth in Japan, it is highly desirable that medium-size regional towns and cities be repositioned and be able to compete within the context of the international integration of production networks in East Asia.

From the beginning of the 2000s, The Japanese government has already shown keen interest in this issue. The Ministry of Economy, Trade and Industry (METI) launched the Industrial Cluster Plan which designated 19 regions as “industrial clusters” with the aim of forming a mutual cooperation mechanism linking the local networks of small and medium enterprises. Also the Ministry of Education, Culture, Sports, Science and Technology (MEXT) has promoted Intellectual Cluster Initiative nominating 18 regions as “intellectual clusters” so as to promote university-industry cooperation. Also in these industrial clusters, the history of industrial accumulation of Nagano and Kitakyushu is old, and the technology which originated in mass-produced type manufacturing system has cultivated it. It is each small and medium-sized firms that have accumulated such technology. The cluster strategy is developed for strengthening of the production capacity of such small and medium-sized firms. Although deployment of the cluster strategy in Nagano and Kitakyushu will pass for ten years, what influence has promotion of the innovation activity which utilized industry-academia-government cooperation had on the small and medium-sized firms?

According to the concern of urban economics, it is necessary to investigate what kind of influence it has had on the corporate activity of small and medium-sized firms to development of regional economy through knowledge externality. Although that two or more firms raise production capacity and R&D capability in the same area

is a factor which leads to development of regional economy, it will be essentially important that such firms continue. With using survey data and new additional data obtained from internet and telephone research in Nagano and Kitakyushu, this paper investigate a spatial spread of technical cooperation; how often, with whom where do, in what means, and for what purposes, of small and medium-sized firms has had on its continuation.

2. Theoretical Background

The new economic geography (Fujita, Krugman and Venables, 1999) provided one answer for the reason of why and where agglomeration economies form. However, these studies have deliberately avoided inquiring into closely the roles of innovation and/or knowledge spillovers in agglomeration economies. This is almost all attributed to Krugman's statement: knowledge spillovers "are invisible; they leave no paper trail by which they may be measured and tracked, and there is nothing to prevent the theorist from assuming anything about them that she likes (Krugman, 1991, p.53)." Whereas, it is recognized as a challenge for anybody seeking any relevant spatial economic model of knowledge spillover to be able to address: "not only that knowledge spills over but also why those spillovers decay as they move across geographic space (Audretsch and Feldman, 2004)." After a while, as Fujita and Thisse (2001) correctly observed, existing knowledge spillover model has the weakness of leaving vague the sources of external economies, and the underlying mechanism of the local interaction is not clearly defined. Those previous studies have not considered explicitly what kind of interaction of firms and people can generate the externalities of communication and technological exchange. They usually assume that the increase in the number of locally participating agents may increase interaction, keeping the actual interaction in the black box.

The literature about knowledge spillovers in the city is not new. Almost all of the previous studies about knowledge spillovers in the city (industrial concentrations) are attributed to Marshall's seminal work. Marshall (1890) stated that knowledge spillovers and formation of skilled labor pooling are creating "something in the air" in agglomeration economies of specific industry. In later years, Jacobs (1969) argued that the most important knowledge spillovers come from other industries rather than same industry as oneself. In Jacob's words, "In cities with many organizations supplying so many bits and pieces of work, it is possible to start a new exporting organization while depending upon others for many of the goods and services one needs (Jacobs, 1969, p.

181).” Most studies on Marshall’s specialization and Jacob’s diversification examine the effects of these externalities on urban growth with inconclusive discussion as to whether specialization or diversification is conducive.

Based on this concept, many previous studies examine the effects of Marshall’s specialization and Jacob’s diversification on urban growth with inconclusive discussion as to whether specialization or diversification is conducive to urban growth (Glaeser, Kallal, Scheinkman and Shleifer, 1992; Henderson, Kuncoro and Turner, 1995). In addition, recent advanced studies linking these original studies of dynamic externalities to others concerning geographical proximity and usages of patent citation as an innovative output have their origin in Jaffe, Trajtenberg and Henderson (1993). Some of these new studies such as Shefer and Frenkel (1998) and Paci and Usai (1999) revealed that both Marshallian and Jacobian externalities have positive effects on regional innovative activity, especially in high-tech industries. However, in general, when we measure the effects of externalities or knowledge spillovers from industrial agglomeration, we assume implicitly the existence of externalities and/or spillovers even if an actual interaction exists or not. In fact, these empirical studies face the difficulties of a lack of census data and ambiguous concepts of the measurement of “innovation,” “knowledge,” “spillover (externality)” and “proximity.”

Since almost all of these previous empirical studies use census data to investigate the evidence of external economies without taking actual relationships among firms and/or industries, we can hardly expect that any usable data-set is readily available. In general, when we measure the effects of externalities or knowledge spillovers from industrial agglomeration we assume implicitly existence of externalities or spillovers even if an actual interaction exists or it doesn’t exist. For this reason, it is unavoidable to conduct questionnaire survey to investigate the firms’ actual relationships among business partners of industry-academia-government through real communication mode: how often, with whom where do, in what means, and for what purposes. The recent literature using survey data, for example, Adams (2002), Charlot and Duanton (2004, 2006), Arita, Fujita and Kameyama (2006), Hamaguchi and Kameyama (2007, 2008) and Okamuro (2007), has increased. The use of survey data enables us to measure actual existing relationships between industry, universities, and government, including intra-industry relationships. For example, Adams (2002) showed that academic spillovers are highly localized because managers will not pay high transport costs to hunt down university research, since university research has the characteristics of open science, which are that it is reasonably current

and not proprietary in USA. Charlot and Duanton (2004, 2006) showed that being in a larger and more educated city causes workers to communicate more and in turn this has positive effects on wages in France. Arita, Fujita and Kameyama (2006), Hamaguchi and Kameyama (2007, 2008) and Kameyama (2011) used a similar questionnaire survey to investigate actual relationships of small and medium-sized firms with industry-academia-government business partners through the real communication mode: How often, with whom, where, by what means, and for what purposes? These studies showed the effects of intraregional cooperation between industry, universities, and government, including the effects of intra-industry cooperation on the growth of small and medium-sized firms in Japan, Korea and China.

Although these previous studies investigated the effects of technical cooperation on the R&D activities with grasping the relation between the degrees of innovation, geographic ranges of technical cooperation by business partners, there is structural problem. It is at the time when independent variable and an explanatory variable are the same. That is, it is analyzing what kind of influence it has had on the R&D activities when technical cooperation of firm at a certain time is the same. Originally, since the R&D activities which utilized industry-academia-government collaboration will require fixed time before seeing a result, it is essentially accompanied by a time lag. For conquest of this problem, it is possible to carry out a questionnaire anew to the same sample firms. However, if time passes, the sample firms may not continue. As realistic solution, we can make new data to investigate the continuation and recent performance of sample firms through the internet and telephone research. After that, we can investigate the effects of technical cooperation of the firm at a certain time on the continuation) of a company at present by making new data (variable).

Many previous studies can already be seen in the context relevant to industrial organization and management-of-technology theory about continuation of a firm, or factor of entry and recession (Audretsch, 1995; Cefis and Marsili, 2005; Winters and Stam, 2007). For example, Cefis and Marsili (2005) investigated the effects of a size of business, company age, the circumference environment (industrial structure and regional structure) of a company, the kind of innovation, and what kind of influence technical cooperation of a firm on continuation of a firm further. However, these previous studies did not take spatial range of technical cooperation into consideration. Therefore, this paper investigate what kind of influence a spatial spread of the

innovation activity including technical cooperation of small and medium-sized firms has had on its continuation.

3. The Formation of Industry Cluster in Japanese Local Regional Economies, Nagano and Kitakyushu

3.1. Location of Nagano and Kitakyushu

Figure 1 shows the locations of the two local regional economies, Nagano and Kitakyushu.

Figure 1: The Location of Nagano and Kitakyushu in Japan

Nagano Prefecture is located in the central part of the Honshu Island. Nagano Prefecture is traditionally classified into four areas: Hoku-Shin (North), Toh-Shin (East), Chu-Shin (Central) and Nan-Shin (South). The region of Nagano Prefecture has been called “Shinano” since a long time ago. And, “Shin” is derived from “Shinano”. The city where population is the biggest in each area is Nagano city (377,626 inhabitants), Ueda (156,852), Matsumoto (242,086) and Iida (102,446), respectively. Nagano city, the capital of Nagano Prefecture, is the core cites of Japan. And, Matsumoto city is the special cities of Japan which located in the about 63 kilometers south from Nagano city. In the Nan-Shin area, Suwa bloc (Suwa basin) was a major

production center of precision machinery and equipment manufacturing industry known as Eastern Switzerland in the 1960-80s. The constituent in the Suwa bloc is three cities such as Okaya (50,690), Suwa (50,091) and Chino (55,617), and two towns and one village. The Suwa bloc is not only geographically but also economically closely connected to Matsumoto city. Nagano Prefecture is traditionally connected with Tokyo by two routes. The one route is served by super express train, called the Hokuriku-Shinkansen which takes about 224 kilometers and less than one hour and forty minutes from Nagano station to Tokyo station through the other three stations in Nagano Prefecture and three stations in Gunma, Saitama and Tokyo Prefecture. This route is also served by the express highway, called the Joshin-Etsu and Kan-Etsu highways that start from Nagano city to the northeastern part of Tokyo. It takes about 204 kilometers and two and a half hours by a car. Ueda and Saku city are located along this route. The other route is served by rapid train, called the Super-Azusa which takes about 225 kilometers and less than two hours and forty minutes from Matsumoto station to Shinjuku station through the other four stations in Nagano Prefecture and five stations in Yamanashi and Tokyo Prefecture. This route is also served by the express highway, called the Chuo highway that starts from Matsumoto city to the eastern part of Tokyo. It takes about 208 kilometers and two and a half hours by a car. Okaya and Suwa city are located along this route.

Fukuoka Prefecture is located in the northern part of the Kyushu Island. Fukuoka city, the capital of Fukuoka Prefecture, is the cabinet-ordinance designated cities of Japan with about 1.5 million inhabitants. And, Kitakyushu city is also the cabinet-ordinance designated cities of Japan with 0.9 million inhabitants. Since being the cabinet-ordinance designated city, these two cities have the same legal status as a prefectural government. The two cities have followed different trajectories. Fukuoka city, known in the past as “Hakata”, has been lively commercial port since the medieval age engaging in trade with China and Korea. Commerce and services always have been main economic activities of Fukuoka city. Kitakyushu city was the biggest city in Kyushu Island until Fukuoka city topped it in the late 1970s. The decline of Kitakyushu city can be attributed to the loss of the locational advantages once both coal and iron ore could be imported from Australia. Moreover, the appreciation of the yen following the Plaza Accord in 1985 weakened the competitiveness of the Japanese steel industry including that of Kitakyushu city. The two cities are separated by about 67 kilometers of distance which takes just 15 minutes by super express train, called the Sanyo-Shinkansen. The distance from Kitakyushu to Tokyo by ground is about 1,100

kilometers which corresponds to about five and a half hours in the super-express train, Sanyo-Shinkansen, while by the air it takes less than two hours. Actually the flight takes almost the same time as flying to Shanghai. Thus the region has a geographical advantage as the gateway to East Asia.

3.2. Trajectory of Industrial Development in Nagano and Kitakyushu

The trajectory of industrial development in Nagano and Kitakyushu has some common features. The industrial development of each region started in Meiji Period (1868-1912). In this period, Empire of Japan started policy of increasing wealth and military power for the purpose of catching up with European countries. As one of concrete plan for that, Empire of Japan invested heavily in developing Tomioka and Yahata for the purpose of hasting the modernization of Japan. This started with present-traditional industry such as silk-reeling and textile in Tomioka, and steel and iron in Yahata.

3.2a Nagano

In this process, the governmental factory of silk reeling was established on the present-Tomioka city in Gunma Prefecture in the next prefecture of Nagano Prefecture. So-called Tomioka Seishi (Tomioka Silk Mill) in Japanese has started since 1872. Recently, it became famous as World Heritage to be added to the World Heritage List as a Cultural Site in 2014. The location factors were in yielding good silkworm cocoon and water, and in getting coal for steam engine of factory from hinterland. Though there are various opinions about the results of this factory, in a negative opinion, this factory did not function well, and was sold to the private enterprise in early 1893. However, the technology of silk reeling was spread to various places in Nagano Prefecture through the knowledge spillover derived from on the job training. As a famous success case, we know some private enterprises “Rokkou-sha” was established in Matsushiro in the suburb district of present-Nagano city, and “Chuuzan-sha”, “Kaimei-sha” and “Katakura-gumi” were established in present-Okaya city. Each private enterprise made efforts to establish original technology. As a result of that, for example, “Chuuzan-sha” succeeded in the development of the yarn-making machine, so-called “Suwa-Shiki”, which became the nucleus machine of the silk industry in Japan. The silk reeling industry prospered until time when artificial fiber gained the power. In this time, since it is labor-intensive as compared with the present age, the location of the manufacturing industry with most recent plant emerged spinout of the

related small and medium-firms by undertaking a maintenance and repair of a machine. During World War II, several machinery firms evacuated from Tokyo and settled in the Suwa bloc. Many of these evacuation firms were engaged in the manufacturing industry of military affairs and airplane relation. They found a rich pool of local mechanical suppliers who used to engage in the textile factory machine repairing. After the war ended, they remained in this region and the machinery industry became the leading industry of the region. The precision industry became the main industry in the Suwa bloc, and general machinery became the main industry in Ueda city until early 1970s. Especially, precision equipment manufacturing such as watch and music box production prospered and the region gained a nickname of "Switzerland of Japan" because the availability of clean air and water there was essential to such industries. Seki (1997) argued that making to microelectronics advances, and it took place to machine metallic industry the change in various regions of Japan in 1970s. This thing held true for Nagano Area. And, it shifts from the situation in which it specializes in the precision machine to the machine metalworking whole on reflecting the intensification of the competition. Thus, although basic industry had been actively changed in accordance with an economic change, *Keiretsu* intragroup transactions still became strong. Especially, although Seiko Epson Corporation has located in head quarter in Suwa city, the small and medium sized firms in nearby regions became business transactions with Epson. The city economy has fall into a definite recession by the strong yen-caused recession since Plaza Accord. Because of the big enterprise like Seiko Epson reduced production and relocated to developing countries, the small and medium sized firms that had done *Keiretsu* intragroup transactions through business affiliation up to now did the spin-off under condition that independence is requested in spite of favoring or not.

3.2b Kitakyushu

In other hands, the governmental plant of iron and steel was established on the present-Yahata Higashi word of Kitakyushu city. This is the first modern iron mill in Japan. So-called Yahata Seitetsu (Yahata Iron and Steel Mill) has started since 1901. The location factors were in getting rich mineral resource like coal and limestone from hinterland, and shipping iron-ore wagon from China and Korea by way of good natural harbor, Moji-port. As a turning point of this establishment, present-Kitakyushu city and nearby region became a heavy and chemical industry zone. In this time, it is the same as that of Nagano Prefecture described previously, since it is labor-intensive as

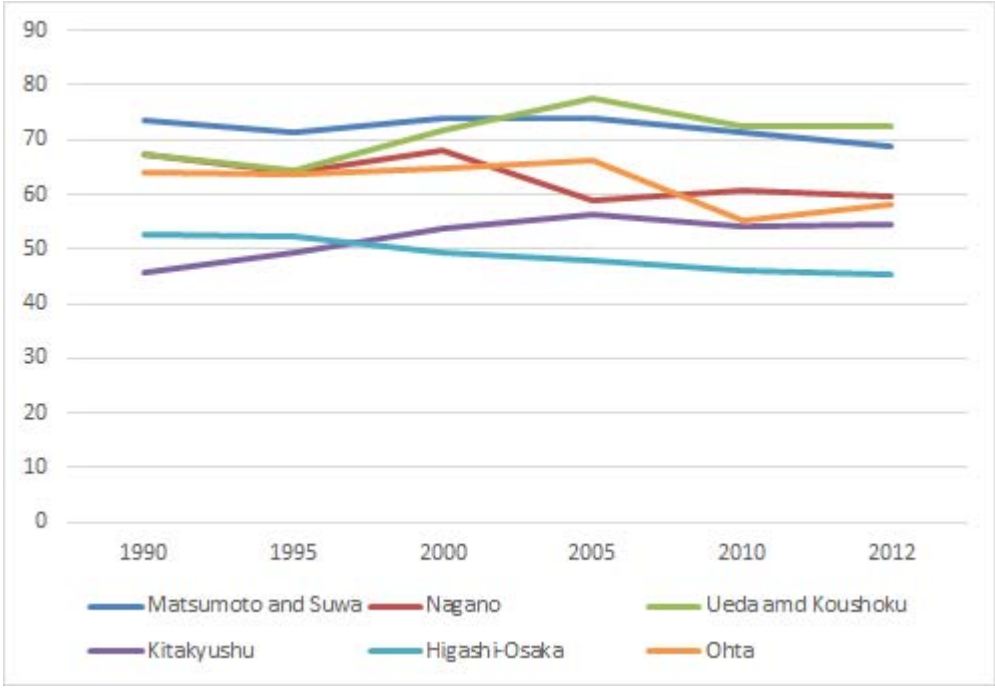
compared with the present age, the location of the manufacturing industry with most recent plant emerged spinout of the related small and medium-firms by undertaking a maintenance and repair for plant of iron and steel. For example, present-Yaskawa Electric Corporation and Krosaki Harima Corporation spun out from Yahata Seitetsu. Yaskawa Electric separated from the steel industry, have been manufacturing the industrial robot, and became a leading company even in Japan today. Moreover, Mitsui High-tec, Inc. and over ten firms spun out from Yaskawa. And, because of damages of war were lighter than other large cities such as Tokyo, Osaka and Nagoya in World War II, the Japanese steel production of postwar days was pulled by Kitakyushu industrial zone for a while. However, operating depend on old equipment was attributed to the pursuit of other big cities revived afterwards. Essentially, as mentioned in above, the decline of Kitakyushu industrial zone can be attributed to the loss of the locational advantages once both coal and iron ore could be imported from Australia. In any case, the negative locked-in effect has become influencing to Kitakyushu industrial zone. The city economy has fall into a definite recession by the strong yen-caused recession since Plaza Accord. Because of the big enterprise like Nippon Steel reduced production, the small and medium sized firms that had done *Keiretsu* intragroup transactions through business affiliation up to now did the spin-off under condition that independence is requested in spite of favoring or not. Now, some firms have already founded a new business field while making the best use of the technology that accumulated in the past, others have struggled to find their new business field based on their technological accumulations.

3.3. Government Policy Support

As explained in above section, the regional economy of both Nagano and Kitakyushu became *Keiretsu* intragroup transactions until 1980s. The average age of firms in Kitakyushu and Nagano Area is relatively higher. In any case, higher firm age reveals that it has long history and many accumulations in cooperative activity of each firm. In these regions, we can see the experience of regional decline due to the recession of the basic industry is also similar as in the existence of innovative firms that depend upon accumulated technology. The small and medium-sized firms with a sense of crisis in Nagano began to tackle research and development activity in the second half of 1980. However, the firms in Kitakyushu had the blunt motion which starts research and development activities. This difference is derived from the differences in industrial structure. Seki (2001) represented that the ability of

Suwa/Okaya city is not inferior in the accumulation of technological variety and the depth of the dynamic engineering than Ohta ward in Tokyo though they are a local city. Because five machine metallic industry such as 1) metal industry, 2) general machinery, 3) electric machinery, 4) transportation machinery and 5) precision machinery based on old type-JSIC are played in the core role for whole manufacturing industry, Seki (1997) values these industries when he evaluates the regional economy. According to his calculation, the share of these industries in Ohta ward is over 60 percent. Then, we follow this concept, and the shares of these five industries in the region treated in this paper are revealed in Figure 2. This figure reveals the large shares in Ueda and Koushoku area, and Matsumoto and Uuwa area. That of Kitakyushu have increased since early 1990s. This figure contains the data of Japanese largest SME clusters Higashi-Osaka and Ohta wards as a reference.

Figure 2: The Share of Five Industries in Each City Based on the Shipment Value



(Source) Census of manufacturing (various years)

Each region receives some support from government programs. MEXT includes Fukuoka and Kitakyushu city, and Nagano-Ueda Cluster (Cooperative Link for Unique Science and Technology for Economy Revitalization) Program as “intellectual clusters” and subsidizes key research and development activities by private firms and universities in these regions. In each region, local inter-institutional

steering organizations, involving local governments, higher education and research institutions, and private firms, play a central role in local coordination, information sharing, and consultation with the ministries. METI, in turn, under its own "Industrial Cluster Plan" provides support to these regions. The Suwa/Okaya/Matsumoto area of South-Central Nagano is supported by the METI Program. Although the area lacks academic institutions prominent in scientific research inside, firms of the area can depend on interaction with Shinshu University in Nagano City as well as the intellectual resources along the Chuo highway which connects Tokyo and Nagoya through the Suwa/Okaya/Matsumoto area in its mid-point.

The discussion so far can be summarized as followings. Kitakyushu is located furthest from Tokyo but the region is the core of Kyushu Island with a relatively large local market area. Nagano is the closest to Tokyo but it is smaller in size. Economically, the Kitakyushu is the combination of service-oriented Fukuoka city and industrial Kitakyushu, while Nagano is very much industrial economy. Such characteristics have been influenced by historical trajectories. Industrial cities are affected more seriously by the recent changes in economic structure of Japan and suffered severe employment loss. Admittedly, Kitakyushu and Nagano are also pursuing knowledge-based industrialization. In fact there are several important examples of spin-offs from the traditional industries. For example, ITC-based firms in Kitakyushu are being established based on the *keiretsu* subcontracting relation with Nippon Steel. In other instances, small and medium sized firms in machinery and precision equipment sectors in Nagano are cooperating to acquire new technologies suitable for the ITC industry.

4. Survey in Nagano and Kitakyushu

4.1. Data Collection

Our data-set comes from Survey Questionnaire on the research project of International Comparison of Industrial Clusters in East Asia, organized by The International Centre for the Study of East Asian Development (ICSEAD) and JSPS KAKENHI. We restricted the respondents to firms related to information and technology located in Zhongguancun Science Park, Beijing, China conducted in 2005 and 2008; Seoul Digital Complex and Daedeok Valley, Korea in 2005 only, and Shiwhwa Industrial Complex, Korea in 2008 only; Sendai, Japan in 2005 only, Nagano, Japan in 2005 and 2008, Kitakyushu, Japan in 2005, 2008 and 2009. The questionnaire

was designed to determine in what form, on what purpose, and how often firms make contact with business partners, and how geographical distance affects such interactions. This paper use the data of survey questionnaire conducted for Nagano and Kitakyushu in 2008. And, based on the firm list of this, we conducted internet and telephone research to obtain new additional data such as firm's continuation, the number of employment and so on in 2014. About 75 and 82 effective replied firms in Nagano and Kitakyushu respectively, we conducted follow-up investigation through internet and telephone research in order to check the continuity of our samples and to get the number of employment in 2014. We could identify the 68 firms have continued on their business both in regions, and not identify 7 in Nagano and 14 firms in Kitakyushu. About these survived 136 firms, we get the number of employ. Figure 1, 3 and 4 shows the locations of our sample firms on the each local regional economies, Naganoa and Kitakyushu.

Figure 3: The location of our sample firms in Nagano region

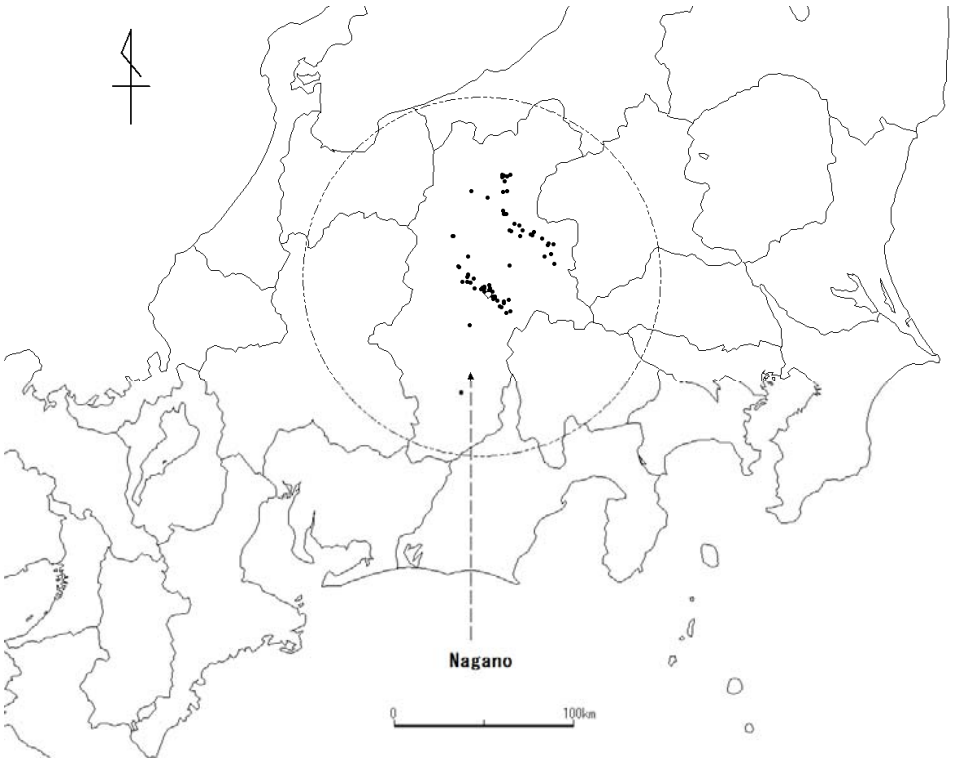
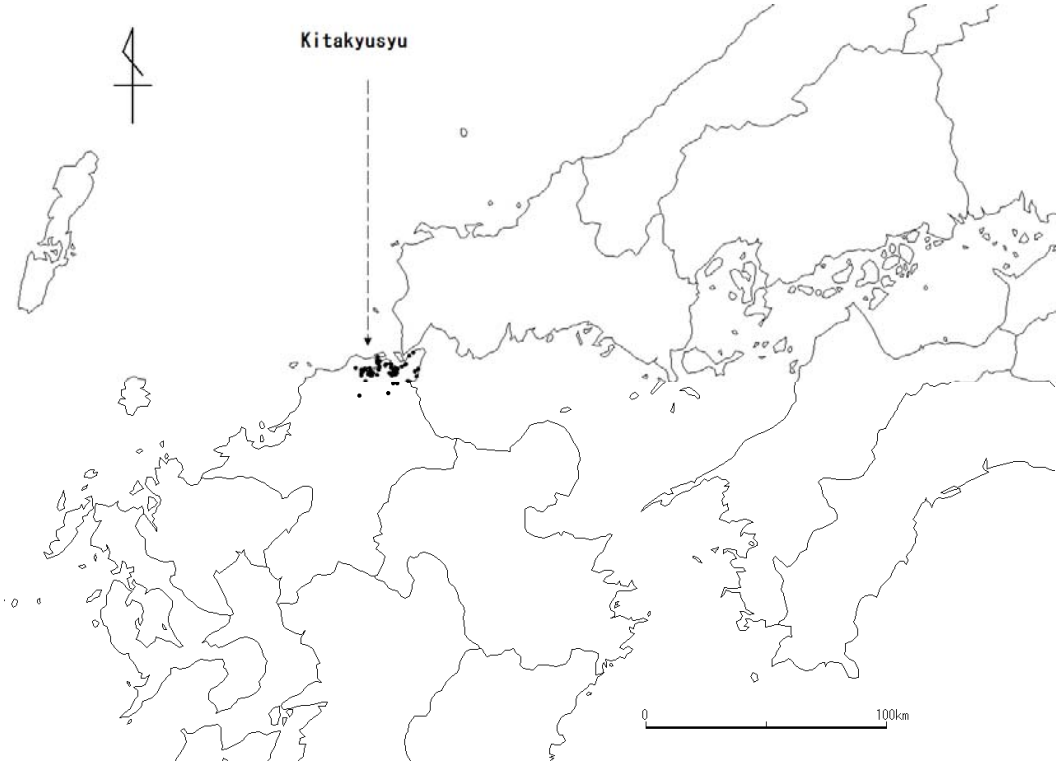


Figure 4: The location of our sample firms in Kitakyushu region



4.2. Data Description

The main industries of the Nagano Area are “General machinery”, “Electric machinery”, “Electronic components and device” and “Entrusted development of software”. In addition, the main industries of the Hoku/Toh-Shin Area are “Entrusted development of software”, “General machinery”, “Electric machinery” and “Electronic components and device”, and shows that those of Chu/Nan-Shin Area are “General machinery”, “Electric machinery” and “Electronic components and device”. Although it appears that the firms locate in both Hoku/Toh-Shin and Chu/Nan-Shin Area are rooted in manufacturing industry, the former area’s firms have are likely to expand their technologies to related information service business such as “Entrusted development of software”, whereas the latter area’s firms are diversifying less. The main industries of Kitakyushu Area are “Electric machinery”, “Electronic components and device” and “Entrusted development of software”. This tendency applies to the Kitakyushu and Fukuoka City. The existence of “Electronic components and device” is noteworthy though there is not much data. It differs from industries such as “General machinery” and “Entrusted development of software” which originated from long term accumulation of industry peculiar to the city. That is to say, the origin of these

industries is comparable to the subcontracting and/or Keiretsu of iron and steel industry (NSC: Nippon Steel Corporation). However, these comprise a group with spun-off from NSC as the steel and iron industry declined. The primary industries of Kitakyushu and Nagano Area have developed since microelectronics revolution in 1970s. This is consistent with Seki's (1997) observation that the microelectronics revolution was absorbed in early 1970s and dispersed to local cities.

Table 1: Summary Statistics of Sample Firms in Nagano

	Year	Mean	Standard deviation	Coefficient of variation	Max	Min
Firm age in 2008 from the established	-	32.71	17.14	0.52	77.00	1.00
Number of employment	2004	69.89	106.06	1.52	560.00	1.00
	2007	64.54	79.16	1.23	360.00	1.00
	2013	55.15	73.57	1.33	391.00	0.00
Number of researcher (R&D staff)	2004	4.07	6.82	1.68	40.00	0.00
	2007	4.94	8.59	1.74	60.00	0.00
Sales amount (Million Yen)	2004	1115.45	1987.83	1.78	10869.00	0.00
	2007	1674.96	4752.25	2.84	36557.87	0.00
R&D expenditure (Million Yen)	2004	28.39	114.00	4.01	890.00	0.00
	2007	27.84	80.35	2.89	475.20	0.00
R&D share relative to sales amount (%)	2004	4.70	11.59	2.46	77.00	0.00
	2007	5.43	11.75	2.16	75.00	0.00
Number of patent	2004	1.83	4.13	2.26	20.00	0.00
	2007	1.96	4.54	2.31	23.00	0.00

(Source) Authors

Table 2: Summary Statistics of Sample Firms in Kitakyushu

	Year	Mean	Standard deviation	Coefficient of variation	Max	Min
Firm age in 2008 from the established	-	37.10	26.19	0.71	111.00	2.00
Number of employment	2004	89.47	168.80	1.89	850.00	2.00
	2007	84.59	163.23	1.93	870.00	2.00
	2013	80.96	148.02	1.83	730.00	0.00
Number of researcher (R&D staff)	2004	3.54	6.96	1.97	40.00	0.00
	2007	3.84	7.41	1.93	40.00	0.00
Sales amount (Million Yen)	2004	1495.87	1976.07	1.32	8276.00	10.00
	2007	2087.22	3013.89	1.44	11800.00	15.00
R&D expenditure (Million Yen)	2004	15.63	54.85	3.51	342.00	0.00
	2007	37.81	101.85	2.69	480.00	0.00
R&D share relative to sales amount (%)	2004	3.45	14.13	4.10	95.00	0.00
	2007	4.28	15.14	3.53	80.00	0.00
Number of patent	2004	5.63	26.93	4.79	184.00	0.00
	2007	8.41	30.93	3.68	172.00	0.00

(Source) Authors

Table 1 and 2 shows the summary statistics from our survey data such as “firm age from the year established”, “number of employment”, “number of employee engaged in R&D”, “sales amount”, “R&D expenditure”, “R&D share relative to sales amount” and “number of patent”. As shown in the tables, the average age of our sample firms in Nagano and Kitakyushu is almost the same, about thirty two to thirty seven years. Some sample firms have about seventy seven to one hundred eleven years of history from their establishment. It reflects regional characteristics of each clustering area. The enterprises are relatively small in terms of the average employment, with a size of about 70, 65 and 55 in Nagano Area, and about 89, 85 and 81 in Kitakyushu Area. The average firm size of Kitakyushu Area is larger than that of Nagano Area. Although the one definition of Japanese small and medium firm is less than 300 employments, almost all of our sample firms are small and medium firm. It is common to each clustering area that annual firm sales amount increased during 2004-2007. This applies to the average scale of R&D expenditure as well. The proportion of R&D expenditure relative to sales amount in Nagano Area is in the ranges of about 4.7 to 5.4 percent (4.7 percent in 2004 and 5.4 percent in 2007). That in Kitakyushu Area is in the range of about 3.5 to 4.3 percent (3.5 percent in 2004 and 4.3 percent in 2007). In general, the lower proportion of R&D expenditure relative to sales amount may be due to as the labor-intensiveness of R&D in the region. Firms in Nagano Area have engaged in R&D activities utilizing industry-academia-government cooperation. This emphasize that Firms in Nagano Area have been utilizing externalities or knowledge spillovers as an external resource more effectively compared with that in Kitakyushu Area.

5. Technology Cooperation and its Effects on the Sustainability of SMEs in Nagano and Kitakyushu

In this section, after seeing the spatial spread of technical cooperation of our samples at the investigation time in 2008, we investigate what kind of the innovation activity including technical cooperation (cooperation between companies and industry-academia-government collaboration) of small and medium-sized enterprises has influenced on its continuation.

5.1. The Nature of Technology Cooperation in Nagano and Kitakyushu

In the questionnaire, we asked the space range of business connections and technical cooperation of small and medium-sized enterprises. Regarding this question, Table 3 and 4 shows the space range of business connections and technical cooperation of sample firms at the investigation time in 2008. The stage of business connections and technical cooperation is classified into four, (1) Accepting Order, (2) Shipping Order, (3) Information Exchange, and (4) Research and Development. The partner of business connections and technical cooperation has classified into three, 1) Same Industry, 2) Cross Industry, 3) University, Industrial Research Institute and Industrial Support Organization. The located point of the partner of business connections and technical cooperation is classified into four, 1) Nearby intraregional, 2) Kanto or Kyushu, 3) Domestic, 4) Oversea Area. Then, the number of firms means how many partners of business connections and technical cooperation the replied sample firms have. And, the number of total firms means how many accumulated partners of business connections and technical cooperation the replied sample firms have.

First, regardless of the stage, it turns out as a fundamental tendency that the space range of business connections and technical cooperation of sample firms of each region have concentrated in nearby intraregional area. Second, about the stage of (1) Accepting Order, it was suggested that business connection of each region is performed in narrow space regarding Same Industry. It was also suggested that the total number of business connection regarding Cross Industry of Kitakyushu is bigger than that of Nagano. And, it was suggested that the number of technical cooperation regarding University, Industrial Research Institute and Industrial Support Organization of Nagano is bigger than that of Kitakyushu. About the stage of (2) Shipping Order, it was suggested that business connection of each region is performed in narrow space regarding Same Industry and Cross Industry, and technical cooperation of each region is unidentified regarding University, Industrial Research Institute and Industrial Support Organization. About the stage of (3) Information Exchanger, it was suggested that technical cooperation of each region is performed in narrow space regardless of type of business partners. About the stage of (4) Research and Development, it was suggested that technical cooperation of Nagano is performed in narrow space regardless of type of business partners. On the other hand, it was suggested that technical cooperation of Kitakyushu is performed in broad space regarding Same

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Table 3: The Space Range of Business Connections and Technical Cooperation of Sample Firms in Nagano

	Location of Business Cooperative Partners				Total	Location of Business Cooperative Partners				Total	Location of Business Cooperative Partners				Total
	Neaby intraregion	Kanto	Domestic	Oversea		Neaby intraregion	Kanto	Domestic	Oversea		Neaby intraregion	Kanto	Domestic	Oversea	
①Number of firm having business cooperative partners	32	34	27	11	104	28	31	24	6	89	7	3	2	0	12
②Number of business cooperative partners (cumulative total value)	96	208	145	26	474.5	152	299	343	20	813	13	16	6	0	35
Average (=②/①)	2.98	6.12	5.37	2.36	4.56	5.41	9.63	14.27	3.33	9.13	1.86	5.33	3.00	-	2.92
①Share of number of firm having business cooperative partners (%)	30.77	32.69	25.96	10.58	100.00	31.46	34.83	26.97	6.74	100.00	58.33	25.00	16.67	0.00	100.00
②Share of number of business cooperative partners (%)	20.13	43.84	30.56	5.48	100.00	18.65	36.74	42.15	2.46	100.00	37.14	45.71	17.14	0.00	100.00

(2) Shipping Order

	Same Industry					Cross-industry					University, Industrial Research Institute and Industrial Support Organization				
	Location of Business Cooperative Partners				Total	Location of Business Cooperative Partners				Total	Location of Business Cooperative Partners				Total
	Neaby intraregion	Kanto	Domestic	Oversea		Neaby intraregion	Kanto	Domestic	Oversea		Neaby intraregion	Kanto	Domestic	Oversea	
①Number of firm having business cooperative partners	31	20	19	17	87	27	21	19	5	72	1	1	0	0	2
②Number of business cooperative partners (cumulative total value)	153	88	62	38	341	327	129	181	8	644	1	1	0	0	2
Average (=②/①)	4.94	4.40	3.26	2.24	3.92	12.11	6.12	9.50	1.60	8.94	1.00	1.00	-	-	1.00
①Share of number of firm having business cooperative partners (%)	35.63	22.99	21.84	19.54	100.00	37.50	29.17	26.39	6.94	100.00	50.00	50.00	0.00	0.00	100.00
②Share of number of business cooperative partners (%)	44.87	25.81	18.18	11.14	100.00	50.78	19.95	28.03	1.24	100.00	50.00	50.00	0.00	0.00	100.00

(3) Information Exchange

	Same Industry					Cross-industry					University, Industrial Research Institute and Industrial Support Organization				
	Location of Business Cooperative Partners				Total	Location of Business Cooperative Partners				Total	Location of Business Cooperative Partners				Total
	Neaby intraregion	Kyushu	Domestic	Oversea		Nearby intraregionl	Kyushu	Domestic	Oversea		Nearby intraregionl	Kyushu	Domestic	Oversea	
①Number of firm having business cooperative partners	30	22	17	13	82	28	16	15	3	62	28	12	7	1	48
②Number of business cooperative partners (cumulative total value)	127	105	63	32	327	106	68	75	6	254	80	24	15	1	120
Average (=②/①)	4.22	4.77	3.71	2.46	3.98	3.77	4.22	4.97	2.00	4.09	2.86	2.00	2.14	1.00	2.50
①Share of number of firm having business cooperative partners (%)	36.59	26.83	20.73	15.85	100.00	45.16	25.81	24.19	4.84	100.00	58.33	25.00	14.58	2.08	100.00
②Share of number of business cooperative partners (%)	38.74	32.16	19.30	9.80	100.00	41.62	26.63	29.39	2.37	100.00	66.67	20.00	12.50	0.83	100.00

(4) Research and Development

	Same Industry					Cross-industry					University, Industrial Research Institute and Industrial Support Organization				
	Location of Business Cooperative Partners				Total	Location of Business Cooperative Partners				Total	Location of Business Cooperative Partners				Total
	Neaby intraregion	Kanto	Domestic	Oversea		Neaby intraregion	Kanto	Domestic	Oversea		Neaby intraregion	Kanto	Domestic	Oversea	
①Number of firm having business cooperative partners	11	8	3	5	27	9	7	5	1	22	23	9	4	0	36
②Number of business cooperative partners (cumulative total value)	32	21	11	14	78	48	16	18	1	83	72	21	14	0	107
Average (=②/①)	2.86	2.63	3.67	2.80	2.87	5.28	2.29	3.60	1.00	3.75	3.13	2.33	3.50	-	2.97
①Share of number of firm having business cooperative partners (%)	40.74	29.63	11.11	18.52	100.00	40.91	31.82	22.73	4.55	100.00	63.89	25.00	11.11	0.00	100.00
②Share of number of business cooperative partners (%)	40.65	27.10	14.19	18.06	100.00	57.58	19.39	21.82	1.21	100.00	67.29	19.63	13.08	0.00	100.00

(Source) Authors

Table 4: The Space Range of Business Connections and Technical Cooperation of Sample Firms in Kitakyushu

①Number of firm having business cooperative partners	32	32	31	6	101	36	31	27	10	104	7	7	5	0	19
②Number of business cooperative partners (cumulative total value)	196	195	191	8	590	272	438	2050	1525	4285	47	50	70	0	167
Average (=②/①)	6.13	6.09	6.16	1.33	5.84	7.56	14.13	75.91	152.50	41.20	6.71	7.14	14.00	-	8.79
①Share of number of firm having business cooperative partners (%)	31.68	31.68	30.69	5.94	100.00	34.62	29.81	25.96	9.62	100.00	36.84	36.84	26.32	0.00	100.00
②Share of number of business cooperative partners (%)	33.22	33.05	32.37	1.36	100.00	6.35	10.22	47.84	35.59	100.00	28.14	29.94	41.92	0.00	100.00

(2) Shipping Order

	Same Industry					Cross-industry					University, Industrial Research Institute and Industrial Support Organization				
	Location of Business Cooperative Partners				Total	Location of Business Cooperative Partners				Total	Location of Business Cooperative Partners				Total
	Neaby intraregion	Kyushu	Domestic	Oversea		Nearby intraregionl	Kyushu	Domestic	Oversea		Nearby intraregionl	Kyushu	Domestic	Oversea	
①Number of firm having business cooperative partners	34	27	26	10	97	27	22	16	7	72	0	0	0	0	0
②Number of business cooperative partners (cumulative total value)	231	125	154	23	533	239	238	218	20	715	0	0	0	0	0
Average (=②/①)	6.79	4.63	5.92	2.30	5.49	8.85	10.82	13.63	2.86	9.93	-	-	-	-	-
①Share of number of firm having business cooperative partners (%)	35.05	27.84	26.80	10.31	100.00	37.50	30.56	22.22	9.72	100.00	-	-	-	-	0.00
②Share of number of business cooperative partners (%)	43.34	23.45	28.89	4.32	100.00	33.43	33.29	30.49	2.80	100.00	-	-	-	-	0.00

(3) Information Exchange

	Same Industry					Cross-industry					University, Industrial Research Institute and Industrial Support Organization				
	Location of Business Cooperative Partners				Total	Location of Business Cooperative Partners				Total	Location of Business Cooperative Partners				Total
	Neaby intraregion	Kyushu	Domestic	Oversea		Nearby intraregionl	Kyushu	Domestic	Oversea		Nearby intraregionl	Kyushu	Domestic	Oversea	
①Number of firm having business cooperative partners	23	22	20	4	69	23	13	11	5	52	24	10	10	0	44
②Number of business cooperative partners (cumulative total value)	90	100	73	16	279	91	105	124	17	337	47	21	20	0	88
Average (=②/①)	3.91	4.55	3.65	4.00	4.04	3.96	8.08	11.27	3.40	6.48	1.96	2.10	2.00	-	2.00
①Share of number of firm having business cooperative partners (%)	33.33	31.88	28.99	5.80	100.00	44.23	25.00	21.15	9.62	100.00	54.55	22.73	22.73	0.00	100.00
②Share of number of business cooperative partners (%)	32.26	35.84	26.16	5.73	100.00	27.00	31.16	36.80	5.04	100.00	53.41	23.86	22.73	0.00	100.00

(4) Research and Development

	Same Industry					Cross-industry					University, Industrial Research Institute and Industrial Support Organization				
	Location of Business Cooperative Partners				Total	Location of Business Cooperative Partners				Total	Location of Business Cooperative Partners				Total
	Neaby intraregion	Kyushu	Domestic	Oversea		Nearby intraregionl	Kyushu	Domestic	Oversea		Nearby intraregionl	Kyushu	Domestic	Oversea	
①Number of firm having business cooperative partners	3	3	7	3	16	6	2	9	1	18	11	7	3	0	21
②Number of business cooperative partners (cumulative total value)	5	6	12	9	31	7	2	11	2	22	38	23	5	0	66
Average (=②/①)	1.50	1.83	1.64	3.00	1.91	1.17	1.00	1.22	2.00	1.22	3.45	3.29	1.67	-	3.14
①Share of number of firm having business cooperative partners (%)	18.75	18.75	43.75	18.75	100.00	33.33	11.11	50.00	5.56	100.00	52.38	33.33	14.29	0.00	100.00
②Share of number of business cooperative partners (%)	14.75	18.03	37.70	29.51	100.00	31.82	9.09	50.00	9.09	100.00	57.58	34.85	7.58	0.00	100.00

(Source) Authors

Industry and Cross Industry, and is performed in narrow space regarding University, Industrial Research Institute and Industrial Support Organization.

5.2. Regression Results

In this section, we explain the methodology of our empirical analysis and show the estimation results. As mentioned in above section, based on the firm list of this, we conducted internet and telephone research to obtain new additional data such as firm's continuation, the number of employment and so on in 2014. About 75 and 82 effective replied firms in Nagano and Kitakyushu respectively, we conducted follow-up investigation through internet and telephone research in order to check the continuity of our samples and to get the number of employment in 2014. We could identify the 68 firms have continued on their business both in regions, and not identify 7 in Nagano and 14 firms in Kitakyushu. About these survived 136 firms, we get the number of employ. Based on these data, as mentioned in above, we estimate the three specifications for the two-cluster sample group using OLS estimations with robust standard errors and probit estimations, respectively. We estimate the three specifications for the two-cluster sample group using the probit estimations and OLS estimations with robust standard errors, respectively.

$$\begin{aligned}\ln Emp_{i+t} = \alpha_0 + \alpha_1 \ln NOF_i \; & + \beta_1 Noc_i 1 + \beta_2 Noc_i 2 + \beta_3 Noc_i 3 \\ & + \beta_4 Noc_i 4 + \beta_5 Noc_i 5 + \beta_6 Noc_i 6 \\ & + \beta_7 Noc_i 7 + \beta_8 Noc_i 8 + \beta_9 Noc_i 9 \\ & + \beta_{10} Noc_i 10 + \beta_{11} Noc_i 11 + \beta_{12} Noc_i 12 + \mu_i \end{aligned} \quad (1)$$

About OLS estimations with robust standard errors, dependent variable is the number of employment in 2008, Emp_{2008} and 2014, Emp_{2014}.

$$\begin{aligned}\Pr(Y_{i+t} = y) = \alpha_0 + \alpha_1 \ln NOF_i \; & + \beta_1 Noc_i 1 + \beta_2 Noc_i 2 + \beta_3 Noc_i 3 \\ & + \beta_4 Noc_i 4 + \beta_5 Noc_i 5 + \beta_6 Noc_i 6 \\ & + \beta_7 Noc_i 7 + \beta_8 Noc_i 8 + \beta_9 Noc_i 9 \\ & + \beta_{10} Noc_i 10 + \beta_{11} Noc_i 11 + \beta_{12} Noc_i 12 + \mu_i \end{aligned} \quad (2)$$

About probit estimation, dependent variable is a dummy variable with which the firm certainly continues in 2014 takes 1, and the firm which is not so takes 0. In both regressions, we investigate the effects of technology cooperation on the number of employment in same time and future time. In this regression, we investigate the effects of past technology cooperation on the continuity of business in future time (2013). In any case, as an independent variable, we set the two type of variable. First type is the nature of firms, *NOF*, for example, firm age, *Age*, the number of researcher, *Res*, R&D expenditure, *R&D*, the number of patent, *Patent*, and so on. Second type is the number of firm having business cooperative partners by location of business cooperative partners and its type ("Same Industry", "Cross-industry" and "University, Industrial Research Institute and Industrial Support Organization"). Location reveals "Nearby Intraregional", "Kanto or Kyushu", "Domestic" and "Oversea". Based on these classification, NOC_{in} (Number of Cooperation) reveals the total number of business connection and technology cooperation. $Coo\text{-}DM_{in}$ reveals the dummy variable according to the type of business cooperative partners and its location. Table 5 reveals the variable list of second type.

In actual regression, we analyzed while changing the combination of these variables. Table 6 and 7 reports a typical estimated result obtained from OLS estimations with robust standard errors. Table 8 and 9 reports a typical estimated result obtained from probit estimations. And, in Table 8 and 9, not a regression coefficient but marginal utility is reported. However, there are few sample sizes and Noc_{12} is excluded from regression.

According to Table 6 and 8, in both case about Nagano, our empirical studies reveal that there is some evidence of technological networks of "Same Industry", NOC_3 and NOC_4, and "Cross-Industry", NOC_7 and "University, Industrial Research Institute and Industrial Support Organization", NOC_{11} having an influence on the number of employment in small and medium-sized firms, but that, at same time, there is opposite evidence of technological networks of "Cross-Industry", NOC_5, and "University, Industrial Research Institute and Industrial Support Organization", NOC_9. The former things reveal that having cooperative network in various domestic regions has positive effects on the number of employment in 2008 and 2014. The latter thing reveals that having cooperative network with "University, Industrial Research Institute and Industrial Support Organization" may harm firm's employment in 2008.

Table 5: Dependent Variable List of Technology Cooperation

ID	Meanings of dummy variables
n=1	cooperative business partners are "Same industry" who locate in nearby intraregion
n=2	cooperative business partners are "Same industry" who locate in Kanto (Kyushu) region
n=3	cooperative business partners are "Same industry" who locate in domestic region
n=4	cooperative business partners are "Same industry" who locate in oversea
n=5	cooperative business partners are "Cross-industry" who locate in nearby intraregion
n=6	cooperative business partners are "Cross-industry" who locate in Kanto (Kyushu) region
n=7	cooperative business partners are "Cross-industry" who locate in domestic region
n=8	cooperative business partners are "Cross-industry" who locate in oversea
n=9	cooperative business partners are "University, Industrial Research Institute and Industrial Support Organization" who locate in nearby intraregion
n=10	cooperative business partners are "University, Industrial Research Institute and Industrial Support Organization" who locate in Kanto (Kyushu) region
n=11	cooperative business partners are "University, Industrial Research Institute and Industrial Support Organization" who locate in domestic region
n=12	cooperative business partners are "University, Industrial Research Institute and Industrial Support Organization" who locate in oversea

According to Tables 7 and 9, in both case about Kitakyushu, our empirical studies reveal that there is some evidence of technological networks of "University, Industrial Research Institute and Industrial Support Organization", NOC_{10} having an influence on the number of employment in small and medium-sized firms, but that, at same time, there is opposite evidence of technological networks of "Same Industry", NOC_4 and "Cross-Industry", NOC_8. These reveal that having cooperative network in various domestic region have positive effects on the number of employment in 2008 and 2014. The former things reveal that having cooperative network in Kyushu regions has positive effects on the number of employment in 2008 and 2014. The latter thing reveals that having cooperative network with oversea regions may harm firm's employment in 2008 and 2014.

Table 6: Regression results of OLS estimations with robust standard errors in Nagano Region

(Dependent variable: the number of employment in 2008 and 2013)

	Same Industry				Cross-Industry			
	2008		2014		2008		2014	
	Coefficient	t-value	Coefficient	t-value	Coefficient	t-value	Coefficient	t-value
ln *Age*	**1.289**	**21.64**	**1.146**	**16.36**	**1.329**	**22.67**	**1.184**	**17.07**
ln *Res* $_{2008}$	**0.394**	**5.85**	**0.241**	**3.49**	**0.322**	**4.33**	**0.168**	**2.15**
ln R&D $_{2008}$	0.023	0.65	**0.062**	**1.65**	0.046	1.30	**0.081**	**2.19**
NOC $_{1, 2008}$	-0.096	-0.98	-0.011	-0.10				
NOC $_{2, 2008}$	-0.020	-0.21	-0.083	-0.66				
NOC $_{3, 2008}$	**0.424**	**3.03**	**0.463**	**3.07**				
NOC $_{4, 2008}$	**0.338**	**2.41**	**0.063**	**0.36**				
NOC $_{5, 2008}$					**-0.197**	**-2.71**	-0.093	-1.21
NOC $_{6, 2008}$					-0.042	-0.48	-0.159	-1.51
NOC $_{7, 2008}$					**0.177**	**1.94**	**0.265**	**2.78**
NOC $_{8, 2008}$					0.231	0.70	0.179	0.58
NOC $_{9, 2008}$								
NOC $_{10, 2008}$								
NOC $_{11, 2008}$								
Constant	**-1.488**	**-6.85**	**-0.992**	**-3.86**	**-1.392**	**-6.15**	**-0.936**	**-3.56**
Adj. R^2	0.613		0.530		0.577		0.507	
Probability > F-statistics	0.000		0.000		0.000		0.000	
Obs.	252		228		252		228	
	University, Industrial Research Institute and Industrial Support Organization							
	2008		2014					
	Coefficient	t-value	Coefficient	t-value				
ln *Age*	**1.346**	**22.2**	**1.197**	**16.77**				
ln *Res* $_{2008}$	**0.317**	**4.02**	**0.169**	**2.11**				
ln R&D $_{2008}$	0.057	1.56	**0.094**	**2.53**				
NOC $_{1, 2008}$								
NOC $_{2, 2008}$								
NOC $_{3, 2008}$								
NOC $_{4, 2008}$								
NOC $_{5, 2008}$								
NOC $_{6, 2008}$								
NOC $_{7, 2008}$								
NOC $_{8, 2008}$								
NOC $_{9, 2008}$	**-0.294**	**-2.43**	-0.057	-0.40				
NOC $_{10, 2008}$	-0.159	-0.65	-0.356	-1.20				
NOC $_{11, 2008}$	**0.321**	**2.03**	**0.396**	**2.29**				
Constant	**-1.431**	**-5.89**	**-0.977**	**-3.49**				
Adj. R^2	0.573		0.498					
Probability > F-statistics	0.000		0.000					
Obs.	252		228					

(Note) Bold characters are significant over the 10% level.

Table 6: Regression results of OLS estimations with robust standard errors in Nagano Region (continued)

(Dependent variable: the number of employment in 2008 and 2013)

	Same Industry				Cross-Industry			
	2008		2014		2008		2014	
	Coefficient	t-value	Coefficient	t-value	Coefficient	t-value	Coefficient	t-value
ln *Age*	**1.076**	**17.04**	**1.077**	**12.91**	**1.089**	**15.73**	**1.062**	**12.07**
ln *Res* $_{2008}$	**0.530**	**4.68**	**0.426**	**3.66**	**0.474**	**3.99**	**0.338**	**2.85**
ln R&D $_{2008}$	**0.173**	**2.67**	**0.140**	**2.07**	**0.217**	**3.05**	**0.184**	**2.57**
Coo-DM $_{1, 2008}$	0.189	1.26	**0.311**	**1.82**				
Coo-DM $_{2, 2008}$	-0.210	-1.20	**-0.570**	**-2.74**				
Coo-DM $_{3, 2008}$	**0.408**	**2.16**	**0.566**	**2.42**				
Coo-DM $_{4, 2008}$	-0.004	-0.02	-0.150	-0.70				
Coo-DM $_{5, 2008}$					0.144	0.88	0.339	1.59
Coo-DM $_{6, 2008}$					-0.052	-0.27	-0.277	-1.17
Coo-DM $_{7, 2008}$					0.024	0.12	0.225	0.89
Coo-DM $_{8, 2008}$					-0.130	-0.75	-0.148	-0.71
Coo-DM $_{9, 2008}$								
Coo-DM $_{10, 2008}$								
Coo-DM $_{11, 2008}$								
Constant	**-1.345**	**-6.23**	**-1.180**	**-4.30**	**-1.378**	**-4.91**	**-1.153**	**-3.45**
Adj. R^2	0.771		0.671		0.758		0.648	
Probability > F-statistics	0.000		0.000		0.000		0.000	
Obs.	144		132		144		132	

	University, Industrial Research Institute and Industrial Support Organization			
	2008		2014	
	Coefficient	t-value	Coefficient	t-value
ln *Age*	**1.110**	**16.78**	**1.050**	**11.21**
ln *Res* $_{2008}$	**0.482**	**4.17**	**0.325**	**2.69**
ln R&D $_{2008}$	**0.220**	**3.22**	**0.215**	**3.01**
Coo-DM $_{1, 2008}$				
Coo-DM $_{2, 2008}$				
Coo-DM $_{3, 2008}$				
Coo-DM $_{4, 2008}$				
Coo-DM $_{5, 2008}$				
Coo-DM $_{6, 2008}$				
Coo-DM $_{7, 2008}$				
Coo-DM $_{8, 2008}$				
Coo-DM $_{9, 2008}$	-0.015	-0.09	0.031	1.11
Coo-DM $_{10, 2008}$	-0.298	-1.21	**0.036**	**-1.67**
Coo-DM $_{11, 2008}$	-0.080	-0.33	0.055	0.80
Constant	**-1.398**	**-5.97**	**-1.124**	**-3.54**
Adj. R^2	0.760		0.645	
Probability > F-statistics	0.000		0.000	
Obs.	144		132	

(Note) Bold characters are significant over the 10% level.

Table 7: Regression results of OLS estimations with robust standard errors in Kitakyushu Region

(Dependent variable: the number of employment in 2008 and 2013)

	Same Industry				Cross-Industry			
	2008		2014		2008		2014	
	Coefficient	t-value	Coefficient	t-value	Coefficient	t-value	Coefficient	t-value
ln *Age*	**0.586**	**8.89**	**0.297**	**4.68**	**0.586**	**8.24**	**0.296**	**4.35**
ln *Res* $_{2008}$	**0.108**	**4.40**	**0.416**	**4.56**	**0.355**	**3.81**	**0.401**	**4.15**
ln R&D $_{2008}$	**-0.095**	**2.05**	**0.141**	**3.20**	**0.098**	**2.25**	**0.153**	**3.35**
NOC $_{1, 2008}$	-0.009	-0.38	-0.066	-0.78				
NOC $_{2, 2008}$	0.013	1.50	0.141	1.45				
NOC $_{3, 2008}$	-0.162	0.97	0.117	1.23				
NOC $_{4, 2008}$	**0.137**	**-3.45**	**-0.417**	**-4.14**				
NOC $_{5, 2008}$					0.064	0.43	0.001	0.01
NOC $_{6, 2008}$					-0.077	-0.53	0.036	0.28
NOC $_{7, 2008}$					0.092	1.04	0.093	1.22
NOC $_{8, 2008}$					-0.089	-0.87	**-0.174**	**-2.26**
NOC $_{9, 2008}$								
NOC $_{10, 2008}$								
NOC $_{11, 2008}$								
Constant	**1.238**	**4.75**	**2.317**	**9.35**	**1.268**	**4.63**	**2.303**	**8.63**
Adj. R^2	0.451		0.521		0.428		0.503	
Probability > F-statistics	0.000		0.000		0.000		0.000	
Obs.	244		204		244		204	
	University, Industrial Research Institute and Industrial Support Organization							
	2008		2014					
	Coefficient	t-value	Coefficient	t-value				
ln *Age*	**0.586**	**8.37**	**0.299**	**4.52**				
ln *Res* $_{2008}$	**0.348**	**3.85**	**0.385**	**4.16**				
ln R&D $_{2008}$	**0.091**	**2.11**	**0.141**	**3.14**				
NOC $_{1, 2008}$								
NOC $_{2, 2008}$								
NOC $_{3, 2008}$								
NOC $_{4, 2008}$								
NOC $_{5, 2008}$								
NOC $_{6, 2008}$								
NOC $_{7, 2008}$								
NOC $_{8, 2008}$								
NOC $_{9, 2008}$	-0.149	-0.81	-0.095	-0.64				
NOC $_{10, 2008}$	**0.413**	**1.80**	**0.370**	**1.83**				
NOC $_{11, 2008}$	0.005	0.02	0.031	0.19				
Constant	**1.301**	**4.83**	**2.343**	**9.27**				
Adj. R^2	0.433		0.507					
Probability > F-statistics	0.000		0.000					
Obs.	244		204					

(Note) Bold characters are significant over the 10% level.

Table 7: Regression results of OLS estimations with robust standard errors in Kitakyushu Region (continued)

(Dependent variable: the number of employment in 2008 and 2013)

	Same Industry				Cross-Industry			
	2008		2014		2008		2014	
	Coefficient	t-value	Coefficient	t-value	Coefficient	t-value	Coefficient	t-value
ln *Age*	**1.037**	**10.09**	**0.575**	**4.86**	0.916	9.11	**0.435**	**4.24**
ln *Res* $_{2008}$	**0.433**	**2.71**	**0.233**	**1.78**	**0.310**	**2.04**	0.140	1.08
ln R&D $_{2008}$	**0.248**	**3.17**	**0.314**	**4.58**	0.286	3.63	**0.342**	**4.63**
Coo-DM $_{1, 2008}$	**0.608**	**2.37**	**0.520**	**2.24**				
Coo-DM $_{2, 2008}$	**-0.629**	**-2.84**	**-0.741**	**-3.36**				
Coo-DM $_{3, 2008}$	**0.554**	**2.53**	**0.681**	**3.97**				
Coo-DM $_{4, 2008}$	**-0.395**	**-1.61**	**-0.419**	**-2.82**				
Coo-DM $_{5, 2008}$					0.480	1.69	0.320	1.30
Coo-DM $_{6, 2008}$					-0.127	-0.35	0.023	0.07
Coo-DM $_{7, 2008}$					0.537	2.00	0.354	1.25
Coo-DM $_{8, 2008}$					-0.304	-0.96	-0.296	-1.05
Coo-DM $_{9, 2008}$								
Coo-DM $_{10, 2008}$								
Coo-DM $_{11, 2008}$								
Constant	**-1.116**	**-2.23**	**0.981**	**1.89**	**-0.831**	**-1.56**	**1.405**	**2.87**
Adj. R^2	0.609		0.563		0.632		0.525	
Probability > F-statistics	0.000		0.000		0.000		0.000	
Obs.	80		76		80		76	
	University, Industrial Research Institute and Industrial Support Organization							
	2008		2014					
	Coefficient	t-value	Coefficient	t-value				
ln *Age*	**0.877**	**9.00**	**0.384**	**3.50**				
ln *Res* $_{2008}$	**0.308**	**1.85**	0.116	0.84				
ln R&D $_{2008}$	**0.261**	**2.72**	**0.324**	**3.76**				
Coo-DM $_{1, 2008}$								
Coo-DM $_{2, 2008}$								
Coo-DM $_{3, 2008}$								
Coo-DM $_{4, 2008}$								
Coo-DM $_{5, 2008}$								
Coo-DM $_{6, 2008}$								
Coo-DM $_{7, 2008}$								
Coo-DM $_{8, 2008}$								
Coo-DM $_{9, 2008}$	0.388	1.19	0.191	0.64				
Coo-DM $_{10, 2008}$	0.141	0.46	0.242	0.81				
Coo-DM $_{11, 2008}$	-0.230	-0.84	-0.133	-0.53				
Constant	-0.334	-0.65	**1.875**	**3.66**				
Adj. R^2	0.569		0.473					
Probability > F-statistics	0.000		0.000					
Obs.	80		76					

(Note) Bold characters are significant over the 10% level.

Table 8: Regression results of probit estimations in Nagano

(Dependent variable: the firm survived in 2014 or not, and the growth rate of firm's employment among 2008 to 2013 over -25% or not)

	Same Industry				Cross-Industry			
	Surv		Iemp		Surv		Iemp	
	dF/dx	z-value	dF/dx	z-value	dF/dx	z-value	dF/dx	z-value
ln *Age*	0.032	1.56	-0.002	-0.07	0.030	1.49	-0.011	-0.33
ln *Res* $_{2008}$	**0.034**	**1.85**	**-0.154**	**-4.01**	**0.037**	**1.82**	**-0.156**	**-4.09**
ln R&D $_{2008}$	**0.023**	**2.12**	**0.050**	**2.71**	**0.031**	**2.39**	**0.052**	**2.87**
NOC $_{1, 2008}$	-0.017	-0.79	-0.002	-0.04				
NOC $_{2, 2008}$	**-0.064**	**-2.00**	**-0.122**	**-2.41**				
NOC $_{3, 2008}$	**0.069**	**1.79**	0.090	1.68				
NOC $_{4, 2008}$	**-0.037**	**-1.12**	**-0.132**	**-2.10**				
NOC $_{5, 2008}$					**0.062**	**2.22**	0.048	1.22
NOC $_{6, 2008}$					**-0.096**	**-2.88**	-0.103	-1.73
NOC $_{7, 2008}$					**0.049**	**1.82**	0.066	1.22
NOC $_{8, 2008}$					**-**	**-**	**0.200**	**1.86**
NOC $_{9, 2008}$								
NOC $_{10, 2008}$								
NOC $_{11, 2008}$								
Log likelihood	-72.746		-124.851		-72.808		-128.344	
Probability > Chi^2	0.000		0.000		0.007		0.001	
Pseudo R^2	0.173		0.097		0.155		0.072	
Obs.	252		252		238		252	
	University, Industrial Research Institute and Industrial Support Organization							
	Surv		Iemp					
	dF/dx	z-value	dF/dx	z-value				
ln *Age*	0.041	1.78	-0.013	-0.37				
ln *Res* $_{2008}$	**0.047**	**2.19**	**-0.149**	**-3.91**				
ln R&D $_{2008}$	**0.029**	**2.28**	**0.049**	**2.80**				
NOC $_{1, 2008}$								
NOC $_{2, 2008}$								
NOC $_{3, 2008}$								
NOC $_{4, 2008}$								
NOC $_{5, 2008}$								
NOC $_{6, 2008}$								
NOC $_{7, 2008}$								
NOC $_{8, 2008}$								
NOC $_{9, 2008}$	0.001	0.02	**0.144**	**1.99**				
NOC $_{10, 2008}$	-	-	-0.107	-0.83				
NOC $_{11, 2008}$	-0.013	-0.13	0.199	1.50				
Log likelihood	-76.518		-127.251					
Probability > Chi^2	0.024		0.004					
Pseudo R^2	0.110		0.080					
Obs.	236		252					

(Note) Bold characters are significant over the 10% level.

Table 8: Regression results of probit estimations in Nagano (continued)
(Dependent variable: the firm survived in 2014 or not, and the growth rate of firm's employment among 2008 to 2013 over -25% or not)

	Same Industry				Cross-Industry			
	Surv		Iemp		Surv		Iemp	
	dF/dx	z-value	dF/dx	z-value	dF/dx	z-value	dF/dx	z-value
ln *Age*	0.031	1.52	-0.002	-0.07	**0.044**	**1.99**	-0.005	-0.14
ln *Res* $_{2008}$	**0.045**	**2.43**	**-0.145**	**-3.82**	0.040	1.74	**-0.154**	**-3.98**
ln R&D $_{2008}$	**0.024**	**2.13**	**0.051**	**2.77**	**0.032**	**2.38**	**0.056**	**3.02**
Coo-DM $_{1, 2008}$	0.003	0.10	-0.006	-0.10				
Coo-DM $_{2, 2008}$	**-0.102**	**-1.99**	-0.139	-1.81				
Coo-DM $_{3, 2008}$	0.033	0.88	0.010	0.13				
Coo-DM $_{4, 2008}$	-0.007	-0.15	-0.084	-1.00				
Coo-DM $_{5, 2008}$					0.049	1.19	0.035	0.52
Coo-DM $_{6, 2008}$					-0.077	-1.37	-0.103	-1.23
Coo-DM $_{7, 2008}$					-0.034	-0.63	0.015	0.18
Coo-DM $_{8, 2008}$					-	-	**0.169**	**2.16**
Coo-DM $_{9, 2008}$								
Coo-DM $_{10, 2008}$								
Coo-DM $_{11, 2008}$								
Log likelihood	-75.158		-127.457		-74.853		-129.706	
Probability > Chi^2	0.000		0.003		0.028		0.002	
Pseudo R^2	0.145		0.079		0.132		0.062	
Obs.	252		252		238		252	
	University, Industrial Research Institute and Industrial Support Organization							
	Surv		Iemp					
	dF/dx	z-value	dF/dx	z-value				
ln *Age*	0.042	1.81	-0.013	-0.38				
ln *Res* $_{2008}$	**0.046**	**2.19**	**-0.146**	**-3.85**				
ln R&D $_{2008}$	**0.028**	**2.28**	**0.048**	**2.68**				
Coo-DM $_{1, 2008}$								
Coo-DM $_{2, 2008}$								
Coo-DM $_{3, 2008}$								
Coo-DM $_{4, 2008}$								
Coo-DM $_{5, 2008}$								
Coo-DM $_{6, 2008}$								
Coo-DM $_{7, 2008}$								
Coo-DM $_{8, 2008}$								
Coo-DM $_{9, 2008}$	0.014	0.34	**0.137**	**1.99**				
Coo-DM $_{10, 2008}$	-	-	-0.007	-0.05				
Coo-DM $_{11, 2008}$	-0.040	-0.39	0.119	0.74				
Log likelihood	-76.452		-128.228					
Probability > Chi^2	0.019		0.004					
Pseudo R^2	0.111		0.073					
Obs.	236		252					

(Note) Bold characters are significant over the 10% level.

Table 9: Regression results of probit estimations in Kitakyushu

(Dependent variable: the firm survived in 2014 or not, and the growth rate of firm's employment among 2008 to 2013 over -25% or not)

	Same Industry				Cross-Industry			
	Surv		Iemp		Surv		Iemp	
	dF/dx	z-value	dF/dx	z-value	dF/dx	z-value	dF/dx	z-value
ln *Age*	**0.137**	**6.34**	**0.110**	**4.43**	**0.136**	**6.42**	**0.115**	**4.61**
ln *Res* $_{2008}$	-0.001	-0.02	0.009	0.28	-0.003	-0.10	0.014	0.44
ln R&D $_{2008}$	0.013	0.81	0.018	0.98	0.014	0.88	0.024	1.35
NOC $_{1, 2008}$	0.047	1.46	0.031	0.85				
NOC $_{2, 2008}$	-0.012	-0.32	-0.009	-0.22				
NOC $_{3, 2008}$	-0.034	-0.97	-0.006	-0.15				
NOC $_{4, 2008}$	**-0.164**	**-3.03**	**-0.178**	**-2.84**				
NOC $_{5, 2008}$					-0.007	-0.16	-0.020	-0.41
NOC $_{6, 2008}$					0.032	0.60	0.051	0.88
NOC $_{7, 2008}$					-0.002	-0.04	-0.033	-0.75
NOC $_{8, 2008}$					-0.031	-0.74	-0.058	-1.05
NOC $_{9, 2008}$								
NOC $_{10, 2008}$								
NOC $_{11, 2008}$								
Log likelihood	-92.615		-107.902		-97.728		-109.693	
Probability > Chi^2	0.000		0.000		0.000		0.000	
Pseudo R^2	0.235		0.140		0.192		0.126	
Obs.	244		240		244		240	
	University, Industrial Research Institute and Industrial Support Organization							
	Surv		Iemp					
	dF/dx	z-value	dF/dx	z-value				
ln *Age*	**0.126**	**6.47**	**0.101**	**4.45**				
ln *Res* $_{2008}$	-0.009	-0.29	-0.004	-0.14				
ln R&D $_{2008}$	0.014	0.94	0.017	1.06				
NOC $_{1, 2008}$								
NOC $_{2, 2008}$								
NOC $_{3, 2008}$								
NOC $_{4, 2008}$								
NOC $_{5, 2008}$								
NOC $_{6, 2008}$								
NOC $_{7, 2008}$								
NOC $_{8, 2008}$								
NOC $_{9, 2008}$	0.094	1.20	0.055	0.72				
NOC $_{10, 2008}$	0.212	1.73	**0.262**	**1.71**				
NOC $_{11, 2008}$	-0.137	-1.91	-0.028	-0.22				
Log likelihood	-94.885		-109.012					
Probability > Chi^2	0.000		0.000					
Pseudo R^2	0.216		0.131					
Obs.	244		240					

(Note) Bold characters are significant over the 10% level.

Table 9: Regression results of probit estimations in Kitakyushu (continued)
(Dependent variable: the firm survived in 2014 or not, and the growth rate of firm's employment among 2008 to 2013 over -25% or not)

	Same Industry				Cross-Industry			
	Surv		Iemp		Surv		Iemp	
	dF/dx	z-value	dF/dx	z-value	dF/dx	z-value	dF/dx	z-value
ln *Age*	**0.137**	**6.44**	**0.117**	**4.72**	**0.146**	**6.66**	**0.127**	**5.00**
ln *Res* $_{2008}$	0.000	0.00	0.011	0.38	0.005	0.17	0.024	0.78
ln R&D $_{2008}$	0.013	0.80	0.015	0.82	0.015	0.93	0.024	1.39
Coo-DM $_{1, 2008}$	0.047	0.79	0.007	0.10				
Coo-DM $_{2, 2008}$	0.001	0.02	-0.044	-0.63				
Coo-DM $_{3, 2008}$	0.007	0.12	**0.117**	**1.97**				
Coo-DM $_{4, 2008}$	**-0.266**	**-2.48**	**-0.295**	**-2.54**				
Coo-DM $_{5, 2008}$					0.042	0.56	-0.007	-0.09
Coo-DM $_{6, 2008}$					0.015	0.18	0.055	0.63
Coo-DM $_{7, 2008}$					-0.091	-1.17	-0.135	-1.54
Coo-DM $_{8, 2008}$					-0.159	-1.42	**-0.291**	**-2.33**
Coo-DM $_{9, 2008}$								
Coo-DM $_{10, 2008}$								
Coo-DM $_{11, 2008}$								
Log likelihood	-94.845		-149.320		-95.081		-105.448	
Probability > Chi^2	0.000		0.000		0.000		0.000	
Pseudo R^2	0.216		0.053		0.208		0.159	
Obs.	244		240		144		240	
	University, Industrial Research Institute and Industrial Support Organization							
	Surv		Iemp					
	dF/dx	z-value	dF/dx	z-value				
ln *Age*	**0.133**	**6.53**	**0.106**	**4.46**				
ln *Res* $_{2008}$	-0.007	-0.22	-0.002	-0.06				
ln R&D $_{2008}$	0.013	0.83	0.017	1.02				
Coo-DM $_{1, 2008}$								
Coo-DM $_{2, 2008}$								
Coo-DM $_{3, 2008}$								
Coo-DM $_{4, 2008}$								
Coo-DM $_{5, 2008}$								
Coo-DM $_{6, 2008}$								
Coo-DM $_{7, 2008}$								
Coo-DM $_{8, 2008}$								
Coo-DM $_{9, 2008}$	0.055	0.73	0.004	0.05				
Coo-DM $_{10, 2008}$	0.135	1.75	**0.173**	**1.86**				
Coo-DM $_{11, 2008}$	-0.111	-1.13	0.008	0.07				
Log likelihood	-95.834		-109.572					
Probability > Chi^2	0.000		0.000					
Pseudo R^2	0.208		0.127					
Obs.	244		240					

(Note) Bold characters are significant over the 10% level.

In this regard, the small and medium-sized firms in Nagano and Kitakyushu Region form a typical industrial accumulation based on small and medium-sized firms that have strong technological networks with domestic business partners, and use as outsourcing networks with overseas business partners. In other hands, although it reveals that having cooperative network with university, research institute and industrial support organization have influenced on the number of employment, we understand that industry-academia-government cooperation have worked well in Nagano and Kitakyushu Region.

6. Concluding Remarks

In this paper, we have used unique survey data obtained from small and medium-sized firms in Japanese local cities, Nagano and Kitakyushu region. The main portion of survey was conducted in 2008, and contains qualitative data on the real communication mode: with whom, where and for what purposes, and some quantitative data on the performance of firms. And, we conducted follow-up investigation through internet and telephone research in order to check the continuity of our samples and to get the number of employment in 2014. We could identify the 68 firms have continued on their business both in regions, and not identify 7 in Nagano and 14 firms in Kitakyushu. Using these original survey data, we investigated the effects of technology cooperation of small and medium-sized firms on its sustainability, one benchmark of industrial cluster formation.

In both cases, our empirical studies reveal that there is some evidence of domestic technological networks having an influence on the number of employment in small and medium-sized firms, but that, at same time, there is opposite evidence of technological networks with overseas regions. It reveals that having cooperative network with oversea regions harm firms employment in Nagano and Kitakyushu regions. In this regard, the small and medium-sized firms in Nagano and Kitakyushu Region form a typical industrial accumulation based on small and medium-sized firms that have strong technological networks with domestic business partners, and use as outsourcing networks with overseas business partners. In other hands, although it reveals that having cooperative network with university, research institute and industrial support organization have influenced on the number of employment, we understand that industry-academia-government cooperation have worked well in Nagano and Kitakyushu Region.

The industrial cluster policy since 2003 has played the fixed role in continuous development of the small and medium-sized enterprises of the area. On the other hand, active research and development of each of a company can also be evaluated.

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Trade and De-industrialisation in 2000-2012 : Some Evidence from Panel Analysis*

Irina Korgun+

Abstract

This paper addresses a problem of de-industrialisation in developing and developed countries. Majority of the previous studies focused on advanced economies. However growing global trade and greater involvement of developing countries into international exchanges necessitates research into the effect of trade onto their economies. One of the main questions is whether in developing countries an observed decline in manufacturing employment is associated with growing trade volumes.

Our analysis with fixed effect model and two-stage least squares method done for twenty developed and developing countries for the period 2000-2012 did not provide enough evidence to conclude about negative effect of trade on manufacturing employment either in developed and developing countries. Instead, results demonstrate that trade in goods has a job-generating effect that extends beyond manufacturing and into the service sector as well. As empirical tests show, when manufacture-related service jobs is accounted for, positive effect of trade in goods on employment increases. Our estimation also shows that during the period of rapid growth of trade in the first decade of 2000s decline in the share of manufacturing jobs across developed and developing countries was mainly due to domestic structural changes. These results are robust across various model specifications and estimating strategies.

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1. Introduction

Negative affect of trade on the manufacturing jobs, widely discussed publicly and theoretically, has received renewed attention during the Financial Crisis of 2008. De-industrialisation, defined as a secular decline in manufacturing as a share of economy-wide employment and GDP, has been a major concern in advanced countries who saw first signs of it in 1970's. Starting from the 1970's, manufacturing employment in advanced economies shrank on average by 10-15% (Nickell, Redding and Swaffield 2008). On average, over more than thirty years from 1973 to 2010 the share of manufacturing in GDP went down from 24.8% to 10.1% in USA, from 28.8% to 13.1% in France, from 36.7% to 21.2% in Germany and from 33% to 16% in Great Britain (USA Bureau of Labor Statistics 2014).

Export-oriented economies like Japan and Germany experienced a decline in manufacturing later. However the pace was more accelerated, and two export-oriented economies needed shorter time to transit to higher shares of service sector comparing to a decades-long process in UK or USA (Uemura and Tahara, 2013). For example, in Germany the biggest decrease in manufacturing employment in the order of 5% occurred just in 10 years during 1999-2008 notwithstanding strong export performance (OECD 2012). In Japan, manufacturing production as a share of GDP declined by about 40% after it signed the Plaza Accord in 1985, which led to yen appreciation followed by relocation of manufacturing facilities by the Japanese firms to Asian countries (Uemura and Tahara, 2013).

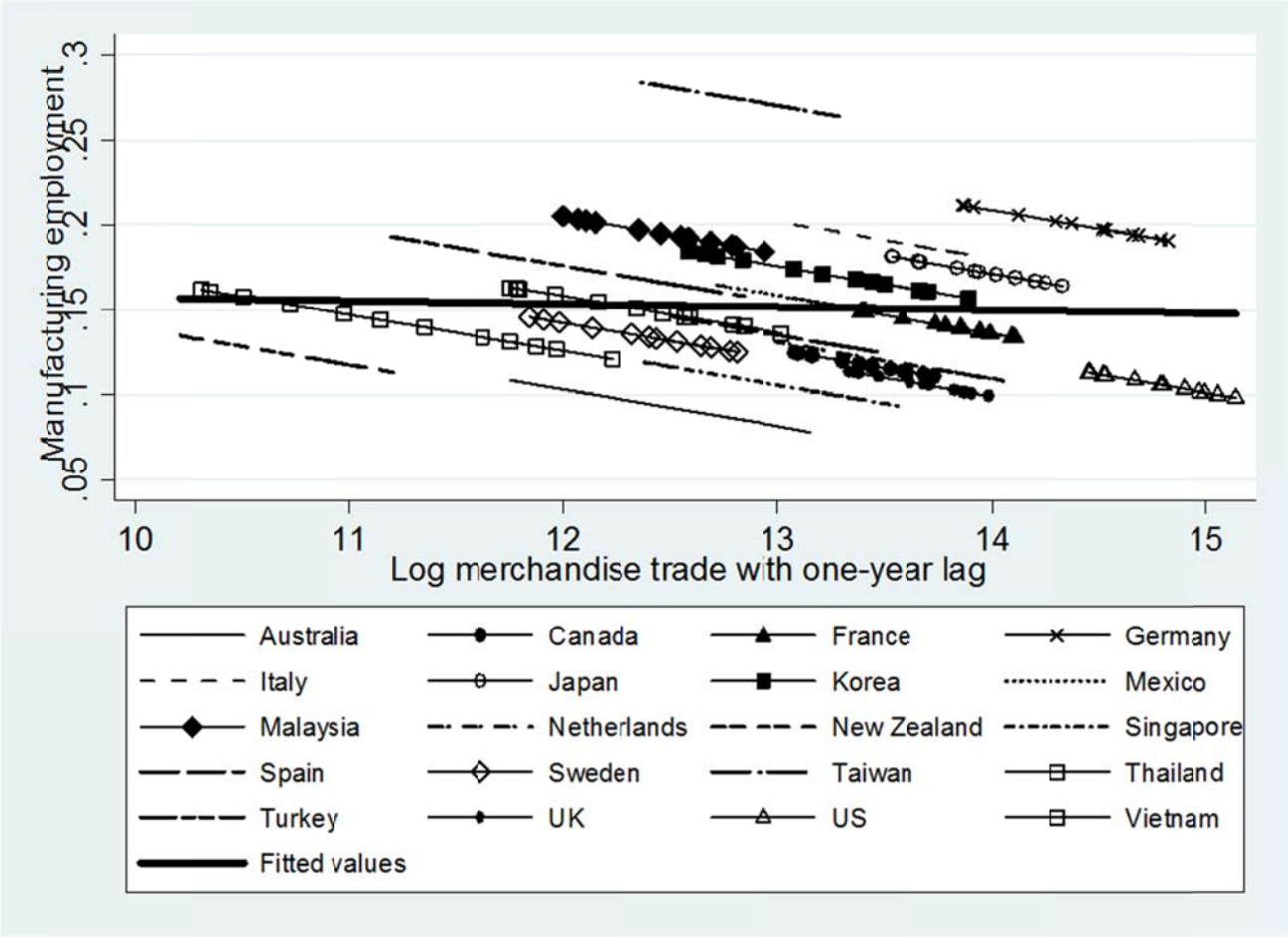
By 2000's countries like Korea and Singapore, who were still industrializing in 1980-1990's, also faced a sharp decline in the share of employed by manufacturing. In Korea, it dropped 3.30% from 2000 to 2012, in Singapore the magnitude was even bigger in the order of 5% (UNCTAD 2015). Shorter time that lapsed between industrialization and de-industrialisation in Korea and other NIEs may imply that the export-oriented strategy of development and high dependence on trade for economic performance induces repaid restructuring of economy and lowers shares of manufacturing in employment.

Interestingly enough, declining share of manufacturing starts to affect countries that are still in the beginning of or half way through their industrialization plans. Figure 1 captures that some of developing countries experienced either a slight decline or zero growth in manufacturing employment in 2000's. This was the case of Thailand or Turkey. Simultaneously, figure 1 shows that trade has continued to expand both in developing as well as developed countries. When taken one a log scale with a one-year

lag trade has negative[22] association with levels of manufacturing employment in all of the countries under consideration.

Having said that, there is still a great room to doubt whether this association is true and trade is, indeed, the main reason of the decline. Because, while in manufacturing employment the trend towards lower shares was synchronized across different countries, manufacturing share of GDP did not. For example, in Germany and Korea, two of the largest trading nations, share of manufacturing in GDP saw a steady increased throughout 2000's backed by strong export performance.

Figure 1. Changes in levels of manufacturing employment in relation to trade in merchandise across different countries, 2000-2012



Source: developed by author; data are from UNCTAD and US National Bureau of Labor Statistics

[22] A few words need to be mentioned about Vietnam here. While on average it saw the share of manufacturing in employment rising 4.40%, the rise was not steady and fluctuated throughout the period.

When analysing relationship between trade and structural changes in various advanced economies in 1980-1990's (Wood 1995), previous studies have supported Clark's view that to a large extent a drop in manufacturing is a result of the natural development process. In their empirical analysis, Rowthorn and Ramaswamy (1997) showed that GDP per capita is the most important factor of structural change while trade has a positive influence on employment.

However, since then the global environment in which countries have to pursue their development strategies underwent significant changes. In recent years, manufacturing became geographically dispersed globally inducing trade in intermediate rather than final goods with developing countries. This change influences national industries that supposedly may abandon production of final goods since more and cheaper imports are available. Here a question about the potential effect of trade on national economies rises.

In connection to the question just mentioned, a point of interest is whether in a different global setting the natural progress of economic development still remains an a major factor of structural change or trade has evolved as major factor of decreasing levels of manufacturing employment appears. This paper addresses some of aspects of this question. By empirical tests we are going to check the following: 1) the association between shares of employment and trade in developed and developing countries during rapid growth of trade in 2000-2012, whether international trade had a similar effect on different countries; and 2) the nature of statistical relationship between trade and manufacturing employment controlling for levels of GDP per capita, service trade and levels of investment. The paper will also look at an example of Korea, how it compares with other countries in the sample with regard to the effect of trade on manufacturing share of employment.

The analysis provides enough evidence to say that in countries included into the sample, internal factors of structural change account for the largest part of the decline in the share of the manufacturing employment in 2000-2012. However, the magnitude of this effect differs from country to country. It turns that trade has strong and statistically significant positive effect on jobs. Moreover, this effect seems to be greater manufacturing-related jobs in the service sector are accounted for.

The rest of the paper is organized as following. Section 1 reviews conceptual arguments about how trade can affect manufacturing. Section 2 explains data and estimation strategy, and section three presents results of the analysis. Discussion of

results is given in section 4, and conclusion sums up the findings and refers to some policy implications of the given study.

2. Some Conceptual Considerations about De-industrialization and its Links to Trade

Trade can influence manufacturing employment in several ways. In the first place, low-cost competing imports could potentially discourage domestic producers that will cease production and lay of labor employed by the industry. In literature this effect is often referred to as North-South trade (Saeger, 1997; Kollmeyer 2009). Another very similar route relates to switch from trade in final goods to trade in intermediate goods. Growing trade in parts and components can induce more specialization on production of certain types of products or just manufacturing-related process. Because demand for other products will be satisfied through imports, their domestic production could be terminated and lead to release of the workforce. Because gains in productivity are slower in service sector, it will absorb the labor.

However, Gonzales *et al.* offer a different view on this issue (Gonzales et al., 2012). New jobs, often trade-related, created in the service sector require greater skills and pay more than manufacturing, even though wage averages across sectors may be lower in services. Higher wages will attract labor from other sectors resulting in overall higher levels of service employment. Simultaneously, imports of intermediate goods can actually further 'induce readjustment of production forces in favour of more high-value activities, efficient use of labor' (Helpman 2011, p. 176). Another way to interpret the effect of trade in intermediaries could be to consider its relations with productivity. Generally, higher trade flows of intermediates are correlated with higher productivity. Miroudot et al. (2009), in his analysis of 11 OECD economies points out two channels through which trade in intermediate goods and services exerts this positive impact. First, foreign inputs embody the foreign technology, and this technology is more productive than the one embodied in domestic inputs; second, trade in intermediates pushes the frontier of a reallocation of resources to greater efficiency. Therefore, countries with higher levels of import of intermediaries will have higher levels of productivity and, consequently, service sector.

Empirical studies, however, do not find compelling evidence that trade has a detrimental effect on manufacturing level as a share of employment and/or GDP. Early studies done in the beginning of 1990's for US and OECD countries did not support the idea that their manufacturing suffered from trade (Lawrence 1991, Dollar and

Wolff 1993, Rowthorn and Ramaswamy 1997). Sager's estimates, done in the second half of the 1990's on the contrary, provide evidence that 'the link between North-South integrations is both economically and statistically significant' (Saeger 1997).

Research done in 2000 could not explain falling manufacturing levels by growing trade. In general those studies agree that lower levels of manufacturing employment are a results of natural growth process as explained by Clark in 1957. According to Irwin (2009)[23] "total employment is not a function of trade but of the total number of people in the labor force." Hoekman and Winters (2007) made a distinction between long-run and short-run labor market effect. In the short-run unemployment may rise due to adjustment costs but in the long-run it will return to equilibrium. They and some other authors (Sachs and Shatz 1994; Feenstra 2010) explain loss of manufacturing jobs by differential technology levels. Therefore, empirical studies for earlier years do not report.

3. Data and Estimation Strategy

To capture the effect of trade on manufacturing employment, following two regressions are estimated:

$$\ln(memp) = \ln(pcgdp) + (\ln(pcgdp2))^2 + \ln(trade) + \ln(strade) + \ln(gcf)$$

where
memp stands for manufacturing employment taken as a share of total employment in economy;
pcgdpsq – GDP per capita in US dollars at current prices;
trade – trade in goods, US dollars at current prices;
strade – trade in services, US dollars at current prices;
gcf – gross capital formation, US dollars at current prices.

All variables are taken in their log levels which allows to smooth variations in data due to country-specific differences.

The data used to estimate this regression is an unbalanced panel for 20 countries over 2000-2012. The countries, included into analysis, are: Australia, Canada,

[23] Cited by Lippold, D. (ed) OECD Policy Priorities for International Trade and Jobs. OECD, Ch.5. http://www.oecd.org/site/tadicite/50258009.pdf

France, Germany, Italy, Japan, Korea, Malaysia, Mexico, Netherlands, New Zealand, Singapore, Spain, Sweden, Taiwan, Thailand, Turkey, UK, US and Vietnam. The choice of countries was influenced by the data availability in the first place. Many countries include construction, mining industries into manufacturing employment statistics. For example, officially published data for manufacturing employment in China include jobs in construction. Such inclusion leads to higher levels of the total manufacturing employment and when used for analysis may distort the results.

To obtain consistent data, we took statistics published by the US department of Labor statistics as a basis and added data from national statistical services for Singapore and Vietnam. Data for the share of manufacturing employment in Singapore were missing for the two periods in 2001-2004 and 2006-2008, they were filled by extrapolating the trend for existing data. In doing so, we followed Nickel, Redding and Swaffield (2008).

Vietnam is evidently an outlier in this sample, because, as mentioned before, it is the only country in the sample that experienced growth in the share of manufacturing employment during the period under consideration. Notwithstanding this, the reason to include Vietnam relates to its important regional role in East Asia as a producer of intermediate inputs for countries like Japan or Korea. Also, it shares many common elements with other regional economies in terms of development strategies. Same applies to Taiwan, where share of manufacturing employment remained high. In preliminary analysis, we tried a re-estimation without Vietnam and Taiwan but results did not change much, so we decided to continue using them.

Data for *trade* in goods and services and *GDP per capita* were obtained from UNCTAD statistical database.

GDP per capita is to show the role of natural development process that leads to higher levels of the service sector in the economy due to structural adjustment in productivity and technology levels in manufacturing. The squared form of GDP per capita shows the marginal effect of the development process. This variable is expected to have a negative sign because as the country progresses to maturity and its GDP per capita grows the share of manufacturing employment decrease.

The role of *trade* variable, which stands for *trade in goods*, is to capture the effect of overall manufacturing trade on adjustments in employment.

The variable *strade* is designed to capture the effects of changes in countries' trade patterns. These effects include increased efficiency in manufacturing sector and shift toward higher value-added, skill-intensive, or capital-intensive activities. As a

result of this shift, lower levels of employment in manufacturing, higher absorption of labor by the service industry and an overall growth in service industry due to demand from the manufacturing can be observed. Disaggregation by types of trade (trade in services and trade in goods) will help us to partial out the effect of the structural shifts in trade towards greater role of services. Also, this will help see how demand for services produced by manufacturing influences employment levels.

By introducing *fixed capital formation* we follow Rowthorn and Ramaswamy (1997). The logic here works in the following way. Capital investment is manufacturing intensive, and a change in investment will therefore have a greater impact on the demand for manufactured goods than on the demand for the output of other sectors. So, gross capital formation is to capture the demand side factors that can influence levels of manufacturing employment.

The summary statistics for the data is given in table 1.

Table 1. Descriptive statistics

	(1)	(2)	(3)	(4)	(5)
VARIABLES	N	mean	sd	min	max
lnmemp	260	-1.922	0.285	-2.530	-1.274
lnpcgdp	260	9.810	1.064	6.174	10.71
lnpcgdpsq	260	97.37	19.00	38.12	114.7
lntrade	260	13.02	1.023	10.20	15.17
lnstrade	260	11.52	1.095	8.692	13.91
lngcf	260	11.97	1.274	9.272	14.93

The strategy for estimation is following. First, we estimate a fixed effect model, in which manufacturing employment is a dependent variable and GDP per capita, GDP per capita squared, trade in goods and trade in services, gross capital formation at current prices are explaining variables. In this estimation, we treat our variables as exogenous. Country fixed effect allows to control for time-invariant unobserved heterogeneity that is specific to individual countries. The fixed effect also means that unobserved factors like market size, population, levels of technology and productivity, etc. are correlated with explanatory variables. The fixed effect captures time-invariant

errors of measurement in prices for goods and services, investment intensity that may be country-specific (Nickell, Redding, Swaffield 2008).

Some specifications of the model include time dummies. The logic to incorporate time dummies is two-fold. First, they will capture the impact of shocks affecting all sample countries. Second, time dummies will help to address multicollinearity problem, which, if untreated, can result in overstatement of statistical significance of the variables (Mankiw 1995).

Heteroskedasticity and serial correlation may be a potential problem in this regression. The presence of heteroskedasticity is confirmed with the Modified Wald statistic[24]. Woolridge test for no first order autocorrelation rejects the null hypothesis at 1% level[25]. Therefore, not adjusted standard errors may be invalid (Cameron and Miller, 2013). To amend for this, we run a fixed effect and OLS regressions with robust standard errors, which controls for heteroskedasticity and, partially, for serial correlation. However, in certain cases effectiveness of fixed effect regression may be challenged due to remaining heteroskedasticity in the error term. In this case, biased-corrected feasible GLS can produce more efficient results (Cameron and Miller 2013, Hansen 2007, Hausman, Kuersteiner, 2007). So, we also check the model with FGLS.

Another important concern that needs to be addressed is endogeniety of trade in goods. Generally, it is not very common to treat trade as an endogenous variable. By doing so, we follow earlier works that drawn attention to endogeneity of trade (Trefler, 1993, Scott L. Baier , Jeffrey H. Bergstrand, 2002 Douglas A. Irwin, Marko Terviö Frankel, Jeffrey A., and David H. Romer. 1999). In doing so, the logic is the following. Trade flows are not exogenous, as they are determined simultaneously with employment and production and ability to increase or curb them in response to exogenous shocks depends on past decisions about investments, labor, etc (Nickell, Redding and Swaffield 2008). Various demand-side and supply-side shocks may influence trade and cause an upward or downward bias. To partially amend for potential endogeniety and supply-side downward bias, we construct an instrument and re-estimate the model with two-stage least square model. The instrument represents a share of imported inputs interacted with logarithm of nominal exchange rate.

The choice of this instrument is motivated by empirical findings from the international macroeconomics literature that fluctuations of nominal exchange rate can influence trade flows (IMF 2006, Ito, Isard, Symansky, Bayoumi 1996). Changes in

[24] The null of homoscedasticity is rejected at 422.20 with p-value = 0.000.
[25] The test yields results of 61.009 with Prob > F = 0.0000.

exchange rate affect the cost of intermediate inputs and, hence, can lead to expansion or reduction in manufacturing employment due to resulting changes in manufacturing output. Additionally, large portion of growth in trade volumes resulted from disaggregation of production and increasing shares of intermediate parts and components[26]. We obtain information on the share of imported intermediate inputs in manufacturing output from OECD STAN database, where imported intermediate share varies across countries over time. Data for nominal exchange rates varying by time and country were obtained UNCTAD statistical service .

Reported results of a Hansen J statistic, a test for overidentification, which examines the correlation between the endogenous variable of the model and the residuals of the manufacturing share of employment, returns the results[27] that model is justly specified which further supports our strategy for the two-stage least square approach.

4. Results

Table 2 summarizes results of the empirical analysis. First specification is a simple fixed effect estimation, the second one includes year dummies and the third incorporates interaction terms between trade and year, fourth and fifth specifications are OLS estimation results with and without interaction term, finally, specification six is for the feasible GLS. In all specifications standard errors were corrected for heterskodasticity, in case of the fifth specification correction for AR1 was also allowed. In all specifications, results on all coefficients are statistically significant and have the expected signs. The only exception is the coefficient on gross capital formation which is not significant under fixed effect estimation. Obtained results are in line with results from other studies and produce evidence that trade in merchandise goods is positively associated with manufacturing employment. The coefficient for trade in goods is positive and statistically significant at 1% level.

Fixed effect for the share of the manufacturing in employment shows the static long-run equilibrium relations between the size of the sector in employment and GDP per capita, trade in goods and services and investments. One important observation is that since we use ln transformation of the nominal levels of GDP, trade and gross capital formation, inclusion of year dummies in specification (2) allows to account for the relative change in price level (Woolridge, 2009). Negative signs, meaning that on

[26] Miroudot S, Rainer L, Ragoussis A (2009) find that they account for as much as 56% of world trade.
[27] The value of the tests is 0.000.

Table 2. Estimation results with fixed effect model, pooled OLS and feasible GLS

	(1)	(2)	(3)	(4)	(5)	(6)
lnmemp	FE	FE with year dummies	FE with interaction term	OLS	OLS with interaction term	FGLS
lnpcgdp	2.294***	2.396***	2.406***	1.491***	1.507***	1.433**
	(0.320)	(0.363)	(0.371)	(0.158)	(0.154)	(0.562)
lnpcgdpsq	-0.0921***	-0.101***	-0.101***	-0.0853***	-0.0874***	-0.0798***
	(0.0200)	(0.0256)	(0.0254)	(0.00888)	(0.00852)	(0.0299)
lntrade	0.155*	0.249***	0.215**	0.240***	0.260***	0.177***
	(0.0774)	(0.0867)	(0.0873)	(0.0509)	(0.0471)	(0.0273)
lnstrade	-0.542***	-0.333***	-0.350***	-0.272***	-0.230***	-0.269***
	(0.0819)	(0.0857)	(0.0835)	(0.0565)	(0.0537)	(0.0324)
lngcf	0.0834	-0.0747	-0.0605	0.0561***	0.0398***	0.102***
	(0.0911)	(0.0693)	(0.0735)	(0.0120)	(0.0108)	(0.0301)
y2001		-0.00251				
		(0.00391)				
y2002		-0.0120***				
		(0.00356)				
y2003		-0.0152***				
		(0.00476)				
y2004		-0.0151**				
		(0.00680)				
y2005		-0.0144				
		(0.00864)				
y2006		-0.0166*				
		(0.00841)				
y2007		-0.0150				
		(0.00894)				
y2008		-0.0172*				
		(0.00891)				
y2009		-0.0214***				
		(0.00544)				
y2010		-0.0233***				
		(0.00577)				
y2011		-0.0224***				
		(0.00615)				
y2012		-0.0216***				
		(0.00553)				

Table 2. Estimation results with fixed effect model, pooled OLS and feasible GLS (continued)

	(1)	(2)	(3)	(4)	(5)	(6)
lnmemp	FE	FE with year dummies	FE with interaction term	OLS	OLS with interaction term	FGLS
tradeyear01			-0.000334		6.16e-05	
			(0.000305)		(0.00230)	
tradeyear02			-0.000981***		-0.000644	
			(0.000291)		(0.00155)	
tradeyear03			-0.00106***		-0.00109	
			(0.000358)		(0.00115)	
tradeyear04			-0.000930*		-0.00119	
			(0.000482)		(0.000915)	
tradeyear05			-0.000867		-0.00113	
			(0.000569)		(0.000786)	
tradeyear06			-0.001000*		-0.00124*	
			(0.000549)		(0.000685)	
tradeyear07			-0.000836		-0.00116*	
			(0.000581)		(0.000616)	
tradeyear08			-0.000971		-0.00139**	
			(0.000583)		(0.000565)	
tradeyear09			-0.00140***		-0.00168***	
			(0.000369)		(0.000520)	
tradeyear10			-0.00148***		-0.00175***	
			(0.000376)		(0.000473)	
tradeyear11			-0.00138***		-0.00169***	
			(0.000400)		(0.000442)	
tradeyear12			-0.00134***		-0.00162***	
			(0.000356)		(0.000412)	
Constant	-12.21***	-14.02***	-13.62***	-8.894***	-9.282***	-8.592***
	(1.140)	(1.133)	(1.233)	(0.692)	(0.683)	(2.647)
Observations	260	260	260	260	260	260
R-squared	0.720	0.825	0.814	0.376	0.472	
Number of id	20	20	20			20

Robust standard errors in parentheses.

*** p<0.01, ** p<0.05, * p<0.1

average all countries in the sample had lower levels of manufacturing employment at the end of the period that in 2000. The rate of decrease in employment shares, an effect same for all countries in the sample, seemed to accelerate in 2002-2004, years immediately after China had joined the WTO. Then the rate of decline seem to accelerate again after 2008, which corresponds to the period of World financial crisis and ensuing recession.

The model estimated under specification (2) assumes that the effect of each explanatory variable, particularly trade in goods, has remained constant. In order to see how impact of trade in goods changed over time, we interact trade with dummies each year (3). Fixed effect estimation (3) with interaction term that included year dummies for years 2000-2012 captures how average level of manufacturing employment changed over time conditioned by the growth of trade. It is interesting to note that, when coefficients for year dummies are compared to coefficients for interaction term from specification (3), the negative effect is considerably smaller in case of statistically significant coefficients. This may imply that trade in good mitigates negative temporal changes in the levels of manufacturing employment and without trade in goods the decline might have had a larger magnitude.

The value of coefficient on trade in goods shows some variation depending on the specification, it reports the highest value in case of OLS, while in case of fixed effect and FGLS values are very close. So, the elasticity of manufacturing employment to trade varies between 0.15-0.26%. For trade in services variation is significantly larger from minus 0.542% obtained by FE to minus 0.230% in OLS with the interaction term. As noted earlier, one way in which trade in services accounts for structural shifts in employment is due to productivity changes in manufacturing. Thus, countries with more efficient and productive manufacturing sector have higher levels of trade in services and higher levels of employments in the service sector. Another way to interpret the results is look from the perspective of intermediate demand from manufacturing for services. Countries, where manufacturing sources more from the services sector tend to have lower level of employment in manufacturing.

As expected, GDP per capita squared has a negative sign, meaning that GDP per capita produces a diminishing effect on levels of manufacturing employment: it rises in the early stages and falls in later stages as a country becomes more advanced. In all specifications GDP per capita has the largest value among coefficients. The coefficient tends to be larger in case of the fixed effect estimation and very close in case of OLS and FGLS. Larger values make it the most important force behind change

in the levels of manufacturing employment across countries in the sample. Therefore, even in a more globalized economy with higher levels of trade natural development process remains the most significant factor of economic restructuring.

As one of our robustness checks, we experiment with lagged variables[28] and find a very similar pattern (table 3). A notable difference when experimenting with lagged control variables is that coefficient for trade in goods becomes statistically significant at 10% level in case of fixed effect estimation.

Table 3. Estimation by FE, OLS and FGLC with lagged variables

	(1)	(2)	(3)
lnmemp	FE	OLS	FGLS
L.lnpcgdp	2.052***	1.396***	1.702***
	(0.288)	(0.169)	(0.458)
L.lnpcgdpsq	-0.0821***	-0.0807***	-0.0948***
	(0.0193)	(0.00948)	(0.0247)
L.lntrade	0.142*	0.243***	0.0724***
	(0.0700)	(0.0528)	(0.0279)
L.lnstrade	-0.509***	-0.274***	-0.209***
	(0.0752)	(0.0587)	(0.0337)
L.lngcf	0.0366	0.0561***	0.0981***
	(0.0811)	(0.0124)	(0.0228)
Constant	-10.49***	-8.442***	-9.085***
	(1.074)	(0.744)	(2.142)
Observations	240	240	240
R-squared	0.712	0.375	
Number of id	20		20

Robust standard errors in parentheses.

*** p<0.01, ** p<0.05, * p<0.1

So far, we have obtained statistical evidence of the positive effect of trade in good on levels of manufacturing employment across countries in the sample when GDP per capita, trade in services and gross capital formation are controlled for. The main reason why levels of manufacturing employment have declined seem to lie in

[28] Estimation gross national income instead of GDP was tried and results obtained were in the same direction. We do not report them here but are ready to present them upon request.

expanding service trade. The magnitude of effect of the service trade is much larger than is the case with trade in merchandise goods. These results however, do not take into account the potential endogeniety of trade. In the next step, a re-estimate of the model with 2-stage least squares method is attempted. When doing so, trade in goods was instrument by the share of imported intermediate goods interacted with year-average exchange rates.

Table 4. Tests for 2SLS

Test	2SLS	2SLS with interactions	2SLS with lagged dependent variable
Angrist-Pischke multivariate F test	51.17	46.9	44.9
	(0.00)	(0.00)	(0.00)
Kleibergen-Paap rk LM statistic	26.58	31.13	25.29
	(0.00)	(0.00)	(0.00)
Cragg-Donald Wald F statistic	26.71	23.85	23.13
Kleibergen-Paap Wald rk F statistic	51.17	46.9	44.9
Anderson-Rubin Wald test	35.78	51.03	35.7
	(0.00)	(0.00)	(0.00)
Anderson-Rubin Wald test	36.7	54.95	36.71
	(0.00)	(0.00)	(0.00)
Stock-Wright LM S statistic	28.33	33.5	27.87
	(0.00)	(0.00)	(0.00)
Endogeneity test of endogenous regressors:	24.89	32.159	26.741
	(0.00)	(0.00)	(0.00)

P-values in parentheses.

Identification statistics (table 4), including tests of both underidentification and weak identification tests by the method described by Angrist and Pischke (2009) and weak-instrument-robust inference. Rejection of the null hypothesis at 1% level for both underidentification and weak identification tests[29] further confirm that the model is

[29] Cragg-Donald Wald F statistic 26.71 Kleibergen-Paap Wald rk F statistic 51.17, Kleibergen-Paap rk LM statistic 26.575 with Chi-sq(1) P-val = 0.0000.

rightly specified. Test for endogeniety[30] of trade rejects the null that trade can be treated as exogenous is rejected at 1% significance level. This supports our hypothesis that trade in goods should be treated as endogenous. Anderson-Rubin Wald overidentification test and Stock-Wright S statistic reject the null hypothesis that the coefficients of the endogenous repressors in the structural equation are jointly equal to zero, and, in addition, that the overidentifying restrictions are valid. Therefore, our choice for IV estimation with 2-stage least is justified.

Table 5 summarizes the results of 2 SLS estimation. R-squared for this regression is negative. But it can be negative because during computation sum of squared IV residuals can be larger than the total sum of squares of the estimated parameter. In IV estimations, R-squared are not very useful in general because it has no natural interpretation (Woolridge 2008, p.516). However this does not influences the robustness of results. Results are robust to heteroskedasticity and AR1 serial correlation.

The obtained values of coefficients are in the same direction as results from the fixed effect, pooled OLS and FGLS estimations. GDP per capita squared and trade in services have statistically significant and negative effect on manufacturing employment, while coefficient for trade in goods have positive signs. The coefficient for gross capital formation is also statistically important at 1% implying that investments are statistically important predictor of the employment share of the manufacturing sector. Economically these results also tend to be intuitively true.

The magnitude of effect of trade in goods has increased substantially but standard errors rose too. The negative impact of trade in services declined. This decline can mean that many jobs associated with manufacturing sector are considered as service jobs (Baldwin 2014 addresses this issue in more detail). When this job-generating effect of trade in goods is accounted, the positive effect of trade on employment seem to grow. Therefore, these results do not provide enough evidence that growing trade in intermediates leads to lower employment.

While the results of the analysis seem to be robust, it has certain limitations. Some other variables, accounting for the important structural shifts need to be accounted for directly. For example, productivity levels and technology change.

[30] Endogeneity test of endogenous regressors defined as the difference of two Sargan-Hansen statistics yields results 24.890 with p-values = 0.000.

Table 5. Estimation results by two-stage least squares

lnmemp	(1) 2SLS	(2) 2SLS with interaction	(3) 2SLS with lagged dependent variable
lntrade	0.856***	1.043***	0.906***
	(0.124)	(0.126)	(0.129)
lnpcgdp	0.798***	0.641**	0.788**
	(0.291)	(0.325)	(0.308)
lnpcgdpsq	-0.0397**	-0.0303	-0.0379**
	(0.0173)	(0.0193)	(0.0183)
lnstrade	-0.922***	-1.046***	-0.964***
	(0.133)	(0.133)	(0.138)
lngcf	0.0822***	0.0722***	0.0789***
	(0.0166)	(0.0182)	(0.0180)
tradeyear01		-0.00123	
		(0.00394)	
tradeyear02		-0.00151	
		(0.00257)	
tradeyear03		-0.00199	
		(0.00189)	
tradeyear04		-0.00216	
		(0.00151)	
tradeyear05		-0.00222*	
		(0.00128)	
tradeyear06		-0.00256**	
		(0.00113)	
tradeyear07		-0.00208**	
		(0.00102)	
tradeyear08		-0.00233**	
		(0.000922)	
tradeyear09		-0.00156**	
		(0.000796)	
tradeyear10		-0.00226***	
		(0.000743)	

Robust standard errors in parentheses.

*** p<0.01, ** p<0.05, * p<0.1

Table 6. Results for OLS estimation by country groups

	(1)	(2)	(3)
lnmemp	Group 0	Group 1	Group 2
L.lnpcgdp	41.49***	6.502***	2.289***
	(12.30)	(2.184)	(0.538)
L.lnpcgdpsq	-2.036***	-0.321***	-0.142***
	(0.590)	(0.118)	(0.0349)
L.lntrade	0.366***	0.741***	0.131**
	(0.0660)	(0.150)	(0.0581)
L.lnstrade	-0.312***	-1.120***	-0.374***
	(0.0735)	(0.167)	(0.0958)
L.lngcf	0.000843	0.285***	0.214***
	(0.0139)	(0.0825)	(0.0510)
kor		-0.283***	
		(0.0900)	
Constant	-214.3***	-34.62***	-10.98***
	(64.08)	(10.58)	(2.183)
Observations	144	48	48
R-squared	0.413	0.928	0.564

Robust standard errors in parentheses.

*** p<0.01, ** p<0.05, * p<0.1

Next, we re-estimate the model by groups of countries with pooled OLS methods using lagged controlling variables, results are given in table 6. A criterion for making groups was arbitrary set to include into group 0 high-income counties like Australia, Canada, France, Germany, Italy, Japan, Netherlands, New Zealand, Spain, Sweden, UK, US, into group 1 - Korea, Malaysia, Taiwan, Thailand, Singapore, and group 2 - Mexico, Turkey, Vietnam.

The switch to estimation by group has a varying impact on the explanatory power of the independent variables. Per capita GDP continues to be statistically significant, providing evidence that per capita income growth is associated with a decline of manufacturing employment once countries attain a sufficiently high level of development. This is especially true for the countries in groups 0 that mostly consist of developed economies. By contrast, the predictive power of trade is the largest for the group 1 consisting of newly industrialized countries. The coefficient larger than in other two cases seem to be intuitively true because this group country developed primarily through trade. R-squared for this group is over 90 implying presence of

multicolinearity. Multicollinearity may result from links that exists between countries through trade and, importantly, through trade in intermediate products. Exchange in intermediate products between countries may also explain comparatively large coefficient of service trade for this group of countries. Predictive power of gross capital formation is very weak for advanced countries and both statistically and economically significant in two other specifications with positive sign. Therefore, internal investment in these countries may induce consumption of manufactured goods resulting in higher levels of employment in the sector.

5. Explaining De-industrialisation

Because all the variables were taken in logarithm form, results should be interpreted as elasticities, or a percentage change in the level of manufacturing employment when a variable changes by 1%. Obtained results are conclusive of the following. There is a strong evidence that trade is associated with manufacturing employment in both developed and developing economies. However, the magnitude of this effect differs across the countries. Analysis provides evidence that Asian countries who industrialised through trade continue to derive more benefits from trade than either developed or developing economies. Coefficient on trade in goods for group 1 that mainly consists of East Asian NIEs is 0.741, which means that per 1% increase in trade in goods, levels of employment should rise 0.741%, and a 10%-increase in the volume of merchandise trade will yield a 7.1% increase on the manufacturing employment, which is economically a significant effect.

Analysis also suggests that trade in services critically affects levels of manufacturing employment in all countries in the sample however its effect is in the opposite direction from that of trade in goods. The negative impact is mitigated when trade in intermediate inputs is taken into account suggesting that some jobs in the service sector are linked to manufacturing sector. These results does not allow ascertain that imports of intermediate goods negatively effects manufacturing employment. Obtained results do not object to those reported in other studies. For example, Wang, Shrestha and Uemura (2012 p.14) show, the increase in overseas production in East Asia created “induced exports” of intermediate goods from Japan to Asian countries, making a positive impact on domestic employment in “the export core manufacturing” industry. Similarly, Timmer (2013) did not find evidence that fragmentation of manufacturing due to global value chains does not necessarily mean to destruction of jobs in the advanced countries. According to him, the decline of

manufacturing jobs was counteracted by a steady increase in the number of jobs in the service sector almost half of which was in non-manufacturing sector.

As it turns out, trade is not the most important predictor of the manufacturing employment levels. As in other studies on the issue (Saeger 1997, Kollmeyer Ch. 2009, Rowthorn and Ramaswamy 1997), this research provides evidence that natural process of development determines structural adjustments in employment. This is captured by variables per capita GDP and per capita GDP squared used in the regression analysis. Positive sign on the former and negative on the latter suggests the inverted-U shape of GDP per capita effect on the employment levels. Manufacturing employment will rise in the early stage of development and fall later. This result does not contain any novelty, rather, it further supports the general development theory that says that the transition from the economic structure of a poor country to that of an advanced society involves changes in the composition of demand, productions, trade and employment (Chenery, 1977 458). In affluent countries, consumers will spend more on services, which will lead to overall lower levels of manufacturing employment. In these countries, gross capital formation, which has a tendency to be biased towards manufacturing, does not affect manufacturing employment significantly. As analysis has shown, the association between the two variable in a group 0 is weak. However, it should be mentioned that gross capital formation has the highest contribution to manufacturing in group one comparing to group zero and group 1. These results are in line with fact that East Asian countries like Korea, Taiwan tend to have higher levels of domestic manufacturing envestment. Moreover sustained high level of domestic investment was among key factors behind their development success. In the already mentioned study by Rowthorn and Ramaswamy (1997) a similar effect was found for Japan.

The variation in the magnitude of trade effect in 2000-2012 on countries at different stages of development should be acknowledged. The strongest effect was produces on East Asian countries that strongly depend on exports for their growth. But GDP per capita seems to be the strongest predictor of the share of manufacturing employment for all groups of countries implying that like during previous decades internal structural changes experienced by countries during their development process accounted for the largest part of the observed change in the levels of manufacturing employment during 2000-2012. Consistent with the Clark's idea, GDP per capita produces a diminishing effect: levels of employment rise in the early stages of development and drop after. Since the progress of development exerts the strongest

influence on levels of manufacturing employment it is possible to assume that internal conditions of a particular country will determine pace of adjustment in response to common international shocks.

The analysis tried to check the effect of trade and GDP per capita in a particular country. A dummy for Korea was introduced and it got a negative and statistically significant coefficient in estimation. Negative sign suggests that in Korea the decline in manufacturing employment was higher than the average for the group one, where it belongs. When estimation for Korea is attempted (results are not reported but could be provided upon request); it turned out that only two variables – logarithm of per capital GDP and its square form – obtain a statistical significance at 1% level and trade in services gets a negative sign and is significant at 10% level. Thus, negative adjustment in employment in Korea was mainly due to domestic causes. Surprisingly, in case of Korea GDP per capita obtain a negative sign and its square form positive. A plausible explanation could be that the country is still in the catch-up stage when manufacturing employment should be rising but due to some specific domestic conditions the real effect of GDP on employment levels showed a downward trend.

6. Conclusion

In this paper, the first objective was to analysis the association between shares of employment and trade holding factors of GDP per capita, trade in services and level of investment fixed in a group of countries who important players of global trade despite being at various stages of development. In doing so, we wanted to check whether declining levels of manufacturing share of employment in different countries could be explained by factors common to all countries like trade and GDP per capita which stands for the natural development process. The analysis provides enough evidence to say that across countries in the sample internal dynamics accounts for the largest part of structural adjustment in employment.

The second objective of the paper was to analyse statistical relations between trade and share of manufacturing in employment. The evidence suggests that trade in goods and trade in services turn out to be important predictors of the levels of manufacturing employment. However, the effects of these two variables are in different directions: trade in services seem produce a negative, and trade in goods positive effect. But, negative effect of trade in services diminishes significantly when imports of intermediate goods is accounted for. Thus, this outcome provides some evidence that service sector absorbs certain part of manufacturing jobs. This could be

due to new types of jobs created by manufacturing or re-categorization of some of the manufacturing process into services. Simultaneously, this could imply that manufacturing-related jobs in the service sector remain un-accounted for by statistics. Therefore, changes in the way structure of employment is reported could be improved to help policy making.

From perspective of policy making, obtain results have certain implications. Since domestic factors are the most important influencers on the level of manufacturing employment, countries should form different approaches to remedy the decline of the manufacturing sector in the structure of employment. Also, In the end, lower employment in the manufacturing industry does not necessarily mean lower levels of welfare. And focusing more on job creation in all sector of economy rather than on dealing with jobs in manufacturing only could lead to a more balanced and sustainable growth.

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