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The Analysis of Russian Economic Performance in the light of Competitiveness and Natural Resource Curse Phenomenon

Doctoral dissertation

Author: Mgr. Elena Kuzmenko

Supervisor: Assoc. prof. Ing. Mansoor Maitah, Ph.D. et Ph.D.

Department of economics

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Abstract

Russia is the largest country in the world that covers more than one-eighth of the Earth's inhabited land area. Being richly endowed with natural resources Russia has a huge potential of economic growth and can take a deserving place in the global arena in terms of international competitiveness. At the same time, in the light of "Natural resource curse" phenomenon, a lot of debates have been taking place around Russia's dependence on natural resources (especially on crude oil and natural gas) and consequent necessity to escape from it through diversification of the Russian economy. Thus, it becomes interesting to investigate whether or not Russia demonstrates any success in this process. The present thesis contributes to this discussion by analyzing the recent dynamics of main macroeconomic parameters in Russia revealing, simultaneously, how the "Natural resource curse" phenomenon manifests itself in the Russian economy. Investigation of Russian producers' competitive position in external markets and their relative position towards foreign rivals in corresponding internal markets is complemented by the analysis of the real effective exchange rate of Russian ruble. The dynamics of the latter serves in the research both as an indicator of domestic producers' price competitiveness and one of the main symptoms of Dutch disease presence.

The conducted analysis of Russian producers' position in internal markets has shown that within the selected commodity groups the vast majority of Russian producers' market shares demonstrated the overall tendency to decline. The best on average results (along with producers of Mineral Products, Metals and Products from them – these producers have the highest market shares in corresponding domestic markets) were shown by Agro-producers and producers of Timber, Pulp, Paper, Precious Metals, Precious Stones and Products from them. It means that producing of raw materials and commodities with low degree of processing is organized in Russia quite effectively and at least in terms of achieving food security Russian economic performance can be characterized positively.

Russian producers' competitiveness in external markets was analyzed by means of revealed comparative advantage indices proposed by Balassa (RCA), Vollrath (VRC) and Lafay (LFI) and estimated in relation to four groups of main Russian foreign trade partners: European Union, BRICS, Commonwealth of Independent States and all selected countries together. The dynamics of calculated indices for Russian foreign trade flows differs significantly depending both on the commodity group and on the trade partner. High values of all three indices (RCA, VRC and LFI)

were recorded for Fuels and Mining Products only. Relatively more competitive Russian producers appeared in relation to BRICS-partners and in the following groups of commodities: Agricultural Products, Iron, Steel and Chemicals. In relation to EU-partners both indices, i.e. RCA and VRC, revealed that Russian producers were competitive in trade in Fuels, Mmining Products, Iron and Steel only. However, in relation to CIS-partners Russian trade in Iron and Steel did not reveal any comparative advantage. The LFI values for all commodity groups, except Fuels, Mining Products, Iron and Steel, appeared negative through the entire analyzed period, pointing to de-specialization of Russia in foreign trade in Agricultural Products, Chemicals, Machinery, Transport Equipment and Textile. It should be noted that Arms industry was not included into the analysis due to issues of data availability and compatibility with the available data for other countries included into the analysis. Nevertheless, the upward dynamics was observed in LFI values of Agricultural Products, implying that the degree of Russia's foreign trade specialization in Agro-products has slightly increased.

The dynamics of the real effective exchange rate of Russian ruble was considered in the present study from two different standpoints: REER - as an indicator of price competitiveness and REER appreciation - as an important symptom of Dutch disease. The conducted analysis revealed that in terms of price competitiveness Russian producers occupy a relatively better position in relation to partners from BRICS, whilst a relatively worse - towards producers from the EU. The decomposition of inflation and nominal exchange rate influences on REER has shown that the greatest impact on REER appreciation was exerted by the difference in inflation rates in Russia and its main foreign trade partners.

Having analyzed the dynamics of REER, which is one of the cornerstones of Dutch disease investigation, in addition two other important Dutch disease symptoms were analyzed: the rate of increase in Russian industrial manufacturing comparing to that in corresponding Russian imports and the dynamics of equipment share in total Russian imports. The obtained results allows us to conclude: despite numerous and long lasted proclamations regarding diversification of the Russian economy away from heavy dependence on oil, Russia is still suffering from Dutch disease, being because of that highly vulnerable. Moreover, the analysis of the most authoritative indexes of institutional development, representing four main pillars of institutional system, has shown that both the institutional transformation and market liberalization in Russia were not successful since they have not allowed Russia to overcome the threshold of the "embezzlement mode". Low institutional quality could not be very effective in nullifying so called "natural resource curse" since rent-seeking behavior still exists in Russia. Thus, more accurately we

would have talking about the "curse of underdeveloped economy" because of low institutional quality in Russia.

In the final stage of the research the existence of a long-run interrelationship was checked among the structure of Russian export basket, GDP growth, price of crude oil and the real effective exchange rate of Russian ruble. The results of the econometric analysis should help to understand how the structure of Russian export basket, expressed as the ratio of Russian "non-oil" export to "oil" export, is influenced by the real effective exchange rate of Russian ruble on the one hand and price of crude oil on the other. Finally, the econometric analysis based on Johansen cointegration technique confirmed the existence of the long-term statistically significant interrelationship among the studied variables.

The obtained results support the idea that Russian government needs to find an optimum ratio between "oil" and "non-oil" exports so that "oil" revenues would have supported "non-oil" exports. At the same time the very specifics of the Russian economy makes the direct copying of foreign experience difficult and hardly applicable. It is necessary to ensure balanced development of both export-oriented and import-substituting industries. The encouraging of export-oriented industries should be focused on those industries and enterprises, which have conquered and retained their niche on foreign markets. By any manner of means, in order to restructure and diversify the Russian economy it is necessary to implement the comprehensive policy, based on a synergic development of all competitiveness determinants that will allow Russia to participate in the world economic activities more successfully.

Thus, the problem of adequate use of Russia's competitive advantages in the light of "Natural resource curse" phenomenon becomes topical as never before. All this predetermined the relevance of the dissertation research topic, its aim and objectives. The results of this research can be used in forming a long-term program upon improving national competitiveness, maximizing benefits of participation in the foreign trade and minimizing the associated with it risks.

Key words:

Russia, Foreign trade, Natural resource curse, Institutional analysis, Dutch disease, Real effective exchange rate, Absolute/Revealed Comparative advantage, Balassa/Vollrath/Lafay index, Competitiveness, HEGY test, Cointegration, VECM

Abstrakt

Téma disertační práce „Analýza výkonnosti Ruské ekonomiky s ohledem na konkurenseschopnost a fenomén proketí přírodních zdrojů“ se jeví už řadu let jako velmi aktuální. Rusko je největší zemí na světě, která pokrývá více než jednu osminu osídleného území světa. Vzhledem k tomu, že uvedená země je bohatě obdařená přírodními zdroji, a proto má obrovský potenciál ekonomického růstu, může mít zasloužené místo na globální aréně z hlediska mezinárodní konkurenceschopnosti. Na druhou stranu, v souvislosti s fenoménem "prokletí přírodních zdrojů" se hodně diskutuje o závislosti ruské ekonomiky na přírodních zdrojích (především ropy a zemního plynu) a následné nutnosti uniknout z ní prostřednictvím diverzifikace ruské ekonomiky. Bylo by zajímavé zjistit, zda Rusko zaznamenalo nějaký úspěch v tomto procesu. Daná práce přispívá k této diskuzi tím, že analyzuje dynamiku hlavních makroekonomických parametrů v Rusku za období 2000–2014 a současně odhaluje, jak se "prokletí přírodních zdrojů" projevuje v ruské ekonomice. Šetření konkurenčního postavení ruských producentů na zahraničních trzích a jejich relativní pozice vůči zahraničním konkurentům na odpovídajících vnitřních trzích je doplněno analýzou reálného efektivního měnového kurzu ruského rublu (REER). Dynamika REER bude sloužit jednak jako ukazatel cenové konkurenceschopnosti domácích výrobců a dál jako jeden z hlavních příznaků přítomnosti holandské nemocí.

Aby došlo k naplnění cílů disertační práce, bylo ke zkoumané problematice přistupováno s použitím těchto teoretických a empirických metod: dedukce, srovnávání, analogie, index analýza, syntéza, korelační vyšetření a vícerozměrná analýza časových řad s kointegračními technikami.

Provedená analýza postavení ruských výrobců na vnitřním trhu ukázala, že v rámci vybraných komoditních skupin drtivá většina tržních podílů domácích výrobců demonstrovala celkovou tendenci k poklesu. V průměru nejlepší výsledky prokázáli výrobci zemědělských produktů, dřeva, buničiny, papíru, drahých kovů, drahokamů a výrobků z nich (stejně tak producenti minerálních výrobků, kovů a výrobků z nich – tito výrobci mají největší podíl na příslušných domácích trzích). To znamená, že výroba surovin a komodit s nízkým stupněm zpracování je organizována v Rusku velmi efektivně, pokud jde o zajišťování potravin – výkonnost ruské ekonomiky lze charakterizovat pozitivně.

Konkurenceschopnost ruských výrobců na zahraničních trzích byla analyzována pomocí indexů zjevné konkurenční výhody navržených Balassou (RCA), Vollrathem (VRC) a Lafayem (LFI). Jejich hodnoty byly odhadovány ve vztahu ke čtyřem skupinám nejvýznamnějších zahraničních obchodních partnerů Ruska: Evropská unie, BRICS, Společenství nezávislých států a všechny uvedené země dohromady. Dynamika vypočtených indexů pro ruské zahraniční obchodní toky se značně liší, a to v závislosti jak na komoditní skupině tak na obchodním partnerovi.

Vysoké hodnoty všech třech indexů (RCA, VRC a LFI) byly zaznamenány pouze pro paliva a produkty těžebního průmyslu. Ruští výrobci se jevily poměrně konkurenceschopnějšími vůči BRICS-partnerům v těchto skupinách komodit: zemědělské produkty, železo, ocel a chemikálie. Ve vztahu k EU-partnerům oba indexy, tj. RCA a VRC, ukázaly, že ruští výrobci jsou konkurenceschopní pouze v obchodu s palivy, důlními produkty, železem a ocelí. Nicméně, vůči partnerům ze Společenství nezávislých států ruský obchod se železem a ocelí neodhalil žádnou komparativní výhodu. Hodnoty LFI indexu pro všechny komoditní skupiny s výjimkou paliv, produktů těžebního průmyslu, železa a oceli se jevily negativní během celého sledovaného období, což poukazuje na to, že ruský zahraniční obchod se nespecializuje ani na zemědělské produkty, chemikálie a textil, ani na strojní zařízení a dopravní prostředky. Je třeba poznamenat, že zbrojní průmysl nebyl zahrnut do analýzy kvůli malé dostupnosti potřebných dat z Ruska na jednu stranu a probleům jejich kompatibility s dostupnými údaji z ostatních zemí, které byly zahrnuty do analýzy. Nicméně, stoupající dynamika LFI indexů byla pozorována u zemědělských produktů, z čehož vyplývá, že specializace ruského zahraničního obchodu na zemědělství se mírně zvýšila. Dynamika REER byla v této studii považována ze dvou různých hledisek: 1) REER jako ukazatel cenové konkurenceschopnosti a 2) zhodnocení REER jako hlavní symptom holandské nemoci.

Analýza odhalila, že z hlediska cenové konkurenceschopnosti ruští výrobci zaujímají relativně lepší pozici ve vztahu k BRICS-partnerům, zatímco relativně horší - ve vztahu k výrobcům z EU. Oddělení vlivu inflace a nominálního kurzu na REER ukázalo, že největší vliv na zhodnocení REER ruského rublu byl vyvolán rozdílem v míře inflace v Rusku a u jejích hlavních zahraničních obchodních partnerů. Po analýze dynamiky REER, která je jedním ze základních pilířů při zjišťování existence holandské nemoci, byly navíc analyzovány další důležité příznaky holandské nemoci, jako jsou míra růstu průmyslové výroby v Rusku ve srovnání s mírou růstu odpovídajícího ruského dovozu a také dynamika podílu strojního zařízení v celkovém ruském dovozu. Výsledky získané v rámci provedené analýzy umožňují dojít k závěru, že i přes četné dlouhotrvající proklamace týkající se diverzifikace ruského hospodářství založeného na exportu nerostných surovin, zejména zdrojů energie, ruská ekonomika stále trpí holandskou nemocí a je kvůli tomu velmi zranitelná. Analýza nejuznávanějších indexů institucionálního rozvoje, které představují čtyři hlavní pilíře institucionálního systému, ukázala, že institucionální transformace a liberalizace trhu v Rusku de

facto nebyly úspěšné, jelikož stavající kvalita institucionálního systému v Rusku mu nedovoluje překonat hranici režimu "zpronevěry". Nízká kvalita institucí nemůže být efektivní při odstraňování tzv. prokletí přírodních zdrojů, neboť v Rusku existuje "rent-seeking" chování. Problém ještě zhoršuje pošramocená politika, poněvadž soupeření o přístup k rentám ze zdrojů plodí zkorumpované a nedemokratické vlády. Přesněji bychom tedy měli hovořit o "prokletí zaostalé ekonomiky" z důvodu nízké institucionální kvality v Rusku.

V konečné fázi výzkumu bylo provedeno šetření, zda existuje dlouhodobý vzájemný vztah mezi strukturou ruského vývozního koše (vyjádřenou jako poměr ruského "neropného" vývozu ku "ropnému" vývozu), růstem HDP, cenou ropy a reálným efektivním měnovým kurzem ruského rublu. Výsledky ekonometrické analýzy by měly pomoci porozumět, jak je struktura ruského vývozního koše ovlivněna reálným efektivním měnovým kurzem na jedné straně a cenou ropy na druhé. Konečně pak ekonometrická analýza založená na kointegrační technice potvrdila existenci dlouhodobých statisticky významných vzájemných vztahů mezi jednotlivými sledovanými veličinami.

Ze získaných výsledků vyplývá, že ruská vláda musí najít optimální poměr mezi "ropným" a "neropným" vývozem tak, aby "ropné" výnosy podporovaly "neropný" vývoz. Současně zvláštnosti ruské ekonomiky dělají přímé kopírování zahraničních zkušeností v praxi obtížným a těžko použitelným. Je nezbytné zajistit vyvážený rozvoj jak odvětví zaměřených na vývoz, tak i odvětví nahrazujících dovoz. Podpora odvětví orientovaných na vývoz by měla být zaměřena na ta odvětví a podniky, které mohou vyplnit mezeru na trhu a zachovávat své místo na zahraničních trzích. V každém případě, za účelem restrukturalizace a diverzifikace ruské ekonomiky je třeba zavést komplexní politiku, založenou na synergickém rozvoji všech determinantů konkurenceschopnosti, což eventuálně umožní Rusku podílet se na světové ekonomické spolupáce úspěšněji.

To znamená, že problém adekvátního využívání konkurenčních výhod s ohledem na fenomén "prokletí přírodních zdrojů " se stává aktuální jako nikdy předtím. To vše předem určilo význam výzkumného tématu disertační práce a její hlavní a dílčí cíle. Výsledky doktorské práci mohou sloužit především jako základ při navrhování scénářů pro komplexní hospodářskou obnovu Ruska, mohou se stát výchozím bodem k debatě se státními zástupci o možnostech vylepšování zákonodárství v rámci ekonomického rozvoje, a také mohou být zajímavé z hlediska investic a dalších činností vedoucích k vylepšování současné ekonomické situace v Rusku.

Klícová slova:

Rusko, Mezinárodní obchod, Prokletí přírodních zdrojů, Institucionální analýza, Holandská nemoc, Reální efektivní měnový kurz, Absolutní/Zjevná Komparativní výhoda, Balassa/Vollrath/Lafay index, Konkurenceschopnost, HEGY test, Kointegrace, VECM.

TABLE OF CONTENT

1. INTRODUCTION

Among all the turmoil that the Russian economic system has survived at the end of XX century the strongest one was associated with its almost momentary transition from a closed mode to a relatively high degree of openness. For the Russian economy, which in the closed mode was producing the whole range of industrial products, was virtually self-sufficient in terms of insuring the national economy with raw materials, energy and labor, this shock was more devastating than for industrially backward or single-industry based foreign economies. The erupted crisis in demand and supply, the subsequent economic downturn, low competitiveness of domestic goods and services on the world market has led to a formation of an economic equilibrium in Russia, which is not consistent with neither accumulated volume of fixed assets, nor the number and quality of human resources, nor the challenges of the development objectives.

The heavy reliance of Russian producers on commodity exports and even increasing exports of unprocessed primary products took place against the backdrop of major changes in the sphere of international economic, monetary and financial relations. Their multiple expansion and deepening have predetermined emergence of a new quality of cross-border economic ties: unilateral dependence of all participants in various forms of international cooperation and division of labor has transformed into a functional interdependence, abruption of which is impossible due to the acquisition of significant competitive advantages of the involved parties and the growing share of value added redistributed in their favor as a result of transnational production. Under these circumstances the majority of acute economic problems in Russia, including low living standards, shadow economy, external debt, budget imbalances, currency volatility and others have derived from the low competitiveness of domestic enterprises and their products, as well as the Russian economy as a whole.

In modern realities of increased competition among countries national economic competitiveness is becoming one of the most important indicators both in the evaluation of how successful a country is in its economic performance and relative position of the latter in the global economy. With intensification of economic ties, their complexity and dissemination of the globalization processes the demands on favorable economic environment, providing by a State, has significantly increased. As a result, an interest in research of national competitiveness and shaping it factors has grown recently. The comprehensive approach to the analysis of interaction between such economic categories as international economic competitiveness and trade policy

has to create an analytical framework for making effective management decisions and/or for formation a reasonable trade policy in the future. At the same time, for such a country as Russia the very roots of this interaction may be connected to a so called Natural Resource Curse (NRC) phenomenon or "paradox of plenty". Currently, there are categorical differences in views on the state of Russian economic performance in the light of both competitiveness and NRC phenomenon. On the one hand, the observed Russian economic boom in early 2000 and accompanied by significant financial profits and reforms in some areas of business environment, on the other – huge unresolved problems in institutional sphere, as well as increasing government intervention in market operations, especially in energy sector. These manifestations are interpreted quite differently. The main reason behind this is the attitude to the natural resource endowments. That is why when analyzing Russian economic competitiveness the phenomenon of NRC should not be overlooked, the strongest interpretation of which is represented by institutional theory. Appropriate analysis will help us to come to a conclusion whether main Russian energy resources are in fact blessing or brake for economic development and associated with it perspective growth of Russian competitiveness.

Recent years a lot of debates have been taking place around Russia's dependence on natural resources and consequent necessity to escape from it through diversification of the Russian economy. Diversification policy in Russia should be based on a systematic approach, the success of which primarily depends on the accurate assessment of the real situation.

Thus, first of all, there is a need to analyze the current state and recent dynamics of main Russian macroeconomic indicators along with overall perception of Russian competitiveness represented by WEF and IMD reports. Revealed Comparative Advantage Index may serve as another helpful indicator for understanding Russian actual position both in external and internal commodity markets. After that, investigation of the Russian economy for the presence of Natural resource curse and Dutch disease symptoms is seen as worth pursuing since competitiveness includes several levels and develops under a complex of factors, among which institutional quality indicators and monetary parameters play not the last role.

Having analyzed Russian economic performance in its dynamics along with main determinants of Russian economic competitiveness and surrounding circumstances, the analysis of interrelations among selected endogenous and exogenous factors influencing the state of both, that is the structure of Russian export basket (expressed as the ratio of Russian "non-oil" export to "oil" export), real effective exchange rate, GDP growth and price of crude oil correspondingly, will be conducted with the use of the Johansen cointegration technique.

The present study consists of 6 sections and organized a way that each section is divided into several subsections focused on a specific aspect of the investigated issue.

The plan of the thesis

Section 3 opens the Doctoral dissertation providing theoretical foundations of the research. *Subsection 3.1* retrospectively reviews economic literature on comparative advantage (the starting point of competitiveness) emergence, its development and contemporary state within the various foreign trade theories. Different modern interpretations of the concept of national economic competitiveness are also provided in the same subsection. *Subsection 3.2* provides readers with modern definitions of national economic competitiveness in the global economy along with a number of existing approaches to measuring competitiveness. Approaches to analysis of economic performance in the light of natural resource curse and Dutch disease phenomenon are given in *subsection 3.3*, which outlines the importance for resource abundant countries, while investigating their national economic competitiveness, to take into account influence of their endowments on economic performance. Since both concepts (competitiveness and Dutch disease) are closely related to exchange rate issues, the next *subsection 3.4* sheds some light on the existing theories of exchange rate and factors affecting the latter.

Being based on the literature review, ***Section 4*** deals with methodological foundations of the study, where the main benchmarks of the consequent empirical research are listed and step by step the very procedures of their implementation are explained.

Section 5 provides readers with the detailed results of the conducted analysis: Russian economic performance brief overview (*subsection 5.1*); competitiveness of the Russian economy and its sectors (*subsection 5.2*); investigation of the Russian economy for the presence of natural resource curse and Dutch disease symptoms (*subsection 5.3*); multivariate time-series analysis: the investigation of interrelations among the structure of Russian export basket (expressed as the ratio of Russian “non-oil” export to “oil” export), GDP growth, crude oil price and real effective exchange rate (*subsection 5.4*). Discussion of the research findings is given in *subsection 5.5*.

Section 6 reports main conclusions based on the research findings and provides some recommendations.

2. OBJECTIVES

Recent years a lot of debates have been taking place around Russia's dependence on natural resources and consequent necessity to escape from it through diversification of the Russian economy. In this light it becomes interesting to investigate whether or not Russia demonstrates any success in this process. The present study contributes to this discussion by analyzing the recent dynamics of main macroeconomic parameters in Russia revealing simultaneously whether natural resource curse symptoms take place in the Russian economy. The investigation of Russian producers' position towards their foreign rivals in external and internal markets is complemented by the analysis of the real effective exchange rate of Russian ruble. The dynamics of the latter serves as an indicator of both domestic producers' price competitiveness and Dutch disease presence.

Thus, the main goal of this thesis is to analyze Russian economic performance along with Russian producers' (representing corresponding sectors) relative position in external and internal markets and via investigation of the real effective exchange rate of ruble and quality of Russian institutions shed some light on the presence of natural resource curse phenomenon in the Russian economy. The analysis of Russian economic performance in the light of competitiveness was seen as justified since the results of that analysis may reveal the existence of perspective "points of growth" in the economy.

To achieve this goal the following research questions were posed and answered:

- What are the main determinants of Russian economic competitiveness and factors impeding its growth?
- What is the position of Russian producers towards their foreign rivals in internal markets?
- Which sectors of the Russian economy have revealed comparative advantage in external markets?
- What factors have the strongest impact on the real effective exchange rate of Russian ruble?
- Does natural resource curse phenomenon take place in the Russian economy?
- Does an interrelation/long-run causality exist among the structure of Russian export basket, the real effective exchange rate of Russian ruble, gross domestic product growth and price of crude oil?

The results of the analysis will help to determine main directions of improving the position of the Russian Federation in the global economy, as well as to create an analytical framework for promoting a long-term policy planning in Russia.

3. THEORETICAL FRAMEWORKS OF THE RESEARCH

3.1. The concept of national economic competitiveness within the foreign trade theory: genesis, evolution and modern development trends

3.1.1. The emergence of comparative advantage and welfare

Every economy is connected with other economies through different channels, among which trade relationships are basic. Foreign trade is a path, how an economy can implement into practice its comparative advantages i.e. to manufacture certain goods with relatively less production costs than other countries (Spěváček et al, 2012). Existing economic knowledge counts a number of foreign trade theories both earlier and modern, which logically describe gains from foreign trade upon different points of view. These theories reveal principles of different states' participation in international division of labor, explain how one or another directionality of export forms and help to identify problems potentially arising due to one-sided specialization of production and export.

Mercantilism

Mercantilists, representing interests of the commercial bourgeoisie during the period of feudalism weakening and capitalism emergence (XV-XVIII), highly appreciate the role of foreign trade in achieving a nation's wealth. However, money was considered as the only wealth and exchange of goods for money was considered as the only way to increase wealth. At the same time imports of goods, i.e. money payoff, according to mercantilists' view were equivalent to decreasing of wealth. As a result, mercantilists' recommendations were reduced to the following idea: a nation should stimulate export and limit imports via government intervention (Blaug, 1994). The most famous representatives of the mercantilism were English economists William Stafford (1554-1612), Thomas Mun (1571-1641) and French economist Antoine de Montchrestien (1575-1621), who introduced the term of "political economy". Implementation of import restrictions complicated foreign trade and contradicted the logic of capitalist production development. The protectionists' doctrine of mercantilism was forthrightly countered by ideas of free trade, adherents of which considered the role of foreign trade along with a state's role in it from a different standpoint (Lobacheva, 2009).

Late mercantilism had been developing in the second half of the XVI century until the middle of the XVIII century. The central point of the late mercantilism was an idea of keeping a trade balance surplus. To provide favorable balance of trade and capture foreign markets governments

limited imports by levying taxes on foreign goods and encouraged export via paying premiums for organizing production of commodities that were in great demand on foreign markets (Fomichev, 2001). Nevertheless, the first mature theory that was able to explain the very principles of foreign trade and its benefits for all involved parties, was the Adam Smith's absolute advantage theory.

The absolute advantage theory

A Scottish economist, philosopher and pioneer of political economy Adam Smith in his famous work "An Inquiry into the Nature and Causes of the Wealth of Nations", dedicated to the critique of mercantilism, suggested that a nation can gain an advantage not only from sales, but also from purchasing goods from abroad. According to Smith (1776) any nation gets richer thanks to the labor of its citizens, but no country is able to produce all goods alone in an amount that is needed for its citizens. He tried to determine which goods are profitable for export, and which - for import. His analysis was a starting point of the classical theory, which served as a basis of a free trade policy. Adam Smith formulated the idea of the existence of absolute advantage in the cost of goods and services production in one country comparing to another. Adam Smith believed that a nation can achieve greater benefits from foreign trade if it specializes in the production of those goods and services in the production of which it has exclusive and absolute advantage. The very term of "competitive advantage" was used for the first time exactly in his famous publication mentioned above: "If a foreign country can supply us with a commodity cheaper than we ourselves can make it, better buy it of them with some part of the produce of our own industry employed in a way in which we have some [competative] advantage" (Smith, 1776). However, the classical explanation of the fact that countries compete with each other belongs to David Ricardo, who, recognizing the existence of absolute advantage, developed the Adam Smith's idea and formulated, in turn, the law or principle of comparative advantage in production of goods in different countries (Ricardo, 1817).

The comparative advantage theory

David Ricardo showed that potential gains from foreign trade can be far greater than his predecessor envisioned. Ricardo asserted that the necessary condition for the existence of foreign trade is a difference in manufacturing costs of the same product in different countries (Afanas'ev, 1988). Ricardo showed that specialization in production is profitable even for a country, which has no absolute advantage, provided that it has a comparative advantage in production of a given commodity. Each country should specialize in production of goods with the maximum relative efficiency. Ricardo discovered the law of comparative advantage, according to which each

country specializes in production of those goods and services manufacturing of which requires relatively lower labor costs, although they may be sometimes absolutely slightly higher than abroad (Kireev, 1997). Ricardo's theory of comparative advantage assumes the existence of trade policy at a national level. Using a simple numerical example, he tried to prove that international trade is always beneficial (Afanas'ev, 1988).

According to the comparative advantage theory technological differences in competitive advantages between countries determine international division of labor, as well patterns of consumption and trade.

A model of foreign trade, regarded by Ricardo, was based on the following several assumptions:

- only two countries and two goods are considered;
- a perfect mobility of production factors, such as labor, within the country and the absence of their mobility between countries;
- the presence of free trade, i.e. no import or export duties and other restrictions on foreign trade flows;
- constant opportunity costs in production of two products;
- lack of transport costs;
- the immutability of technology in production of goods;
- a complete interchangeability of resources.

The most important prerequisite in explanation of foreign trade was a prerequisite of the absence of transport costs. Transport costs are one of the most important factors determining price of so-called tradable goods. The smaller the proportion of transport costs in the amount of the production costs of a product, the more likely this product would be traded, i.e. can be sold successfully outside the country.

An Austrian-American economist Gottfried von Haberler (1900–1995) tried to develop Ricardo's theory. One of his major contributions was that he reformulated the Ricardian idea of comparative advantage into a neoclassical framework, replacing the outdated labor theory of value (LTV) with the modern concept of opportunity cost (Baldwin, 1982).

3.1.2. The effect of resource endowments and specific factors of production on international specialization and competitiveness

The Heckscher–Ohlin model

At the end of the XIX century - beginning of the XX century some structural changes in international trade occurred due to the industrial revolution. The role of differences in labor productivity has declined substantially giving the way to a new technological order. Nevertheless, trade between countries with similar levels of development, such as, for instance the United States and Europe, was quite active and intensive. At that time Swedish economists Eli Heckscher and Bertil Ohlin tried to explain causes of international trade between similarly technologically equipped countries and detect their comparative advantages (Ohlin, 1933).

In fact, there are two main theories of international trade based on comparative advantages – the Ricardo's theory of comparative advantage and the Heckscher-Ohlin factor-proportions theory (H–O theory). The Ricardo's theory suggests that a comparative advantage is manifested by differences in levels of technological maturity and can be determined via comparing relative factors prices and average production costs of the same goods in two countries. The H-O theory explains the presence of comparative advantage because of differences in the availability of production factors and in their proportions necessary to produce certain goods. A country will have a comparative advantage in the production of such goods that require relatively more factors of production, which it has in abundance (Blaug, 1992).

Using the classification of production factors Heckscher and Ohlin denoted the following product groups: labor-intensive, capital-intensive and land-intensive. Accordingly, it was possible to distinguish labor-surplus (labor-saturated), capital-surplus (capital-saturated) and land-surplus (land-saturated) countries. Applying this classification to modern conditions, China can be referred to as a labor-surplus country; The United States, England, Switzerland are capital-surplus countries; Russian Federation is a land-surplus one. Different countries in varying degrees are endowed with labor, capital and land. Therefore, in a country where labor is plentiful, but there is not enough capital, labor is relatively cheap and capital is expensive, and vice versa. A country will specialize in production of those goods the cost structure of which will mainly constitute relatively cheaper factors. According to Ohlin “international exchange is the exchange of abundant factors for scarce ones”. A country exports those goods, production of which requires more factors that are present in excess and imports those goods production of which requires scarce (for this country) resources (Maneschi, 1998).

However, not all effects of international trade fit in in the scheme proposed by Heckscher and Ohlin. The structure of production factors available in industrialized countries was getting gradually aligned. The center of gravity in the global trade gradually shifted to mutual trade with "similar" goods between "similar" countries. The H-O theory had been dominating in the literature up to 1960, but then it was repeatedly subjected to a numerous empirical tests and as a result the theory has been partly amended by Stolper, Samuelson, Johns and Leontief.

Stolper–Samuelson theorem

In 1948 American economists Paul Samuelson and Wolfgang Stolper improved the H-O model through presenting a new theorem: if the price of a certain product increases (for example, due to the fact that this product began being exported abroad or a customs duties were introduced on its import) it leads to an increase in the price of the factor that was intensively used for its production. The price of another factor, used in the production of that product less intensively, will fall. In the long-run perspective in case of homogeneity of production factors, technological identity, perfect competition and full mobility of goods, international exchange aligns the price of production factors between countries (Fomichev, 2001).

The Stolper–Samuelson theorem is a basic theorem in H–O trade theory. It describes the relationship between relative prices of final products and relative prices of production factors, along with real wages and real return on capital. In the concepts of trade, based on the model of David Ricardo with the additions suggested by Heckscher, Ohlin, Samuelson and Stolper, international trade has started to be considered not just as a mutually beneficial exchange, but also as a mean that allows reducing a gap in levels of development among participating in it countries.

Jones magnification effect

In accordance with the Samuelson-Stolper theorem, which states that under specific economic assumptions (mainly associated with perfect competition) an increase in relative price of a certain product within international trade will lead to an increase in the return to that factor which is used in the production of this product most intensively, and conversely, to a fall in the return to other factors (Stolper & Samuelson, 1941). However, there still is a question whether the increase (or decrease) in the price of production factors is proportional to the increase (or decrease) in the price of goods produced with the use of them.

The economic analysis, conducted by American economists Ronald W. Jones, shown that an increase or decrease in the prices of production factors appears higher than an increase or decrease in the price of goods produced with the use of them. This effect, known as the Jones

magnification effect, in fact reveals that changes in exogenous economic factors lead to disproportionate changes in endogenous economic factors (Mikhailushkin & Shimko, 2002).

Leontief paradox

In 1954 American economist Wassily Leontief published an article, in which he made an attempt to test the H-O theory on the basis of calculations of total labor and capital costs of the United States' exports and imports. The U.S. at that time was considered as the capital-overabundant country. According to the H-O theory, it was assumed that the U.S. should export capital-intensive goods and import labor-intensive ones. This assumption stemmed from the fact that after the Second World War countries in Europe faced with a shortage of capital and were relatively good endowed with labor, while the U.S. had managed to achieve growth of capital at the end of the War. The result of the Leontief's test was paradoxically reversed and it became known as the "Leontief paradox". It was found that the relative abundance of capital in the U.S. was not reflected in the U.S. foreign trade. The U.S. exported more labor-intensive products and less capital-intensive products than imported. Leontief suggested that 1 man-year of American labor (with any combination of a given amount of capital) equivalents to 3 man-years of foreign labor because of high labor productivity in U.S., which can be explained by higher qualification of American workers (Duchin, 2000).

In fact Leontief discovered that in the production process are involved not three, but four production factors: skilled labor, unskilled labor, capital and land. This finding served later on as the basis for the emergence of new models that take into account qualification of labor or the predominant importance of skilled labor (Duchin, 2000).

Analysis of foreign trade from the standpoint of demand – Linder hypothesis

The overwhelming majority of trade theories explain trends and patterns of international trade from the supply side: a country with relatively low production costs will export goods and enjoy a comparative advantage in trade. The difference between these theories is in question of which factors make possible a production with lower costs in one country compared to another. However, international trade can be viewed from the demand side as well. Great contribution to understanding how demand factors can affect trade was made by Swedish economist Staffan Burenstam Linder in 1961.

Linder argued that while the availability of production factors plays an important role in determining the structure of commodity trade, tastes and preferences of consumers are more important for trade in differentiated industrial goods (Linder, 1961).

Putting forward his hypothesis Linder relied on the empirical evidence that the greater percentage of global trade in manufactured goods is conducted among countries with similar relative factors endowment. Linder tried to prove that the structure of demand determines the pattern of trade. The pattern of demand itself primarily depends on the level of income per capita in a country. The higher per capita income the greater is the demand for sophisticated industrial products of high quality. And vice versa, the demand in low-income countries leans toward simple or low-quality goods (Bohman & Désirée, 2006).

Therefore, according to Linder and contrary to predictions based on the neoclassical models, countries with similar preferences will trade with each other rather more, than less. This happens because domestic products will be more exported initially to countries with similar pattern of demand since the structure of a demand is a function of per capita income and countries with similar levels of per capita income will be trading with each other more actively (Linder, 1961).

In a neoclassical model it is assumed that the range of goods produced by a country is chosen randomly and entirely by chance, that does not always sound convincing. Ceteris paribus, local manufacturers always have a competitive advantage in the domestic market because there are no transport costs and tariffs. For that reason they will try to maximize these benefits producing the range of goods, which are most demanded by local markets. Thus, assuming that production conditions are identical everywhere, a country will primarily produce those goods that meet local demand and have a large share of the domestic market. Partly it happens due to the lack of information about foreign demand, partly because of manufacturers' desire to maintain close contacts with customers, adapting when necessary their goods to customers' needs. When local markets are saturated, manufacturers look for new markets. Namely here export begins. Immediately the following question arises - where (which markets) should they export first? Some key considerations here are to find markets with a similar demand structure. A similar demand structure exists in countries with similar levels of per capita income. To illustrate this point Linder introduced the notion of "overlapping demand" that is a demand for products of a certain quality or degree of complexity in both countries involved in the trade. These nations would then trade with each other in similar, but differentiated goods (Shelburne, 1987).

Linder also pointed to other factors that can determine the structure of trade. Since culture has a significant impact on trade flows, Linder assumed that trade can become very active among countries with similar cultural values and traditions. As distance increases transport costs, we can assume that trade will mainly develop among geographically close partners. In principle the converse is also true: the farther trade partners' positions are away from each other, the less likely

they will trade with each other. Reduction in transport costs and introduction of new communication technologies reduces geographical distance or separation between distant countries stimulating trade between the parties (Arad & Hirsch, 1981).

From the standpoint of the Linder's theory it follows that a significant part of a country's trade (in finished goods) turnover will be connected with countries that have a similar level of socioeconomic development (McPherson, 2001).

3.1.3. Neo-technology theories of foreign trade

The Neo-technology theories of foreign trade emerged in the second part of the XX century in the light of the World scientific and technological progress. If in neoclassical theories, such as the H-O theory, main variables are factors endowments and intensity of their use, the main variables in neo-technology theory are represented by research and development costs (as a percentage of sales), labor income per person employed and the percentage of qualified workforce. The proponents of neo-technology theories try to explain the structure and the nature of the international division of labor through technological factors. Among these theories the theory of a product's life cycle should be mentioned first of all (Dussel & Fornazzari, 2002; Wallerstein, 1979).

The concept of product life cycle (PLC)

In the mid-60's American economist Theodore Levitt invented the concept of product life cycle (PLC) and showed how to use it in order to boost competitiveness. This theory advocates the point of view according to which the world trade development depends directly on the stages of a product's life cycle (Levitt, 1965). The key stages in the life cycle of any product are:

- designing a product and launching its production,
- growth of output,
- maturity and
- decline.

At the first stage the elaboration of a product is taking place as a response to a growing demand for it. A small-scale production is usually observed at this stage. At the second stage the following events take place: growth in the demand for this type of product, appearing of competitors and exports expanding. The third stage is characterized by a large-scale production under the strong competition, where the price of becomes a dominant factor. At the fourth stage a significant reduction in a demand for the product occurs. This leads to a situation when the country initiated innovation becomes a private importer because both production and markets

with high demand for this product tend to be concentrated in developing countries (Levitt, Th., 1965). Thus, according to PLC theory the production of a product gradually moves from one country to another depending on a stage of the lifecycle.

A particular case of the life cycle theory is a dynamic conception explaining changes in trade patterns presented by American economist R. Vernon. In his paper he suggested to use the concept of a product's life cycle to explain such a macroeconomic phenomenon as trading activity of American companies after the World War II (Vernon, 1966). Vernon on the contrary distinguished three phases instead of four in a product's life cycle:

1. The phase of a new product. During this stage the entire production is situated in the country-innovator, because of uncertainty regarding the specifics of abroad demand.

During this stage a price elasticity of demand is small or equals to zero that reflects very low or even lack of competition. Patent laws protect innovator from coping his product by competitors. Export starts to develop also at this stage.

2. The mature stage of a product. The duration of patent protection expires and competitors from other countries start to imitate the product. The demand will become more elastic upon price, which will force the producer-innovator to find ways of decreasing manufacturing costs. At the same time due to saturation of the domestic market a part of the production aimed for export will increase. This will lead to a relocation of the production to these countries that are mainly developed ones (due to a high demand for a given product and ability/readiness to pay for it).

3. The standardization phase. At this stage the demand upon price becomes highly elastic, which implies very tough and intensive competition between producers. Finally, those producers will win who will manage to locate theirs manufactures in countries with the cheapest production costs. The technology dissemination and standardization finalize the product's life cycle. The country-innovator focuses on the development a new product and bringing it to the market.

Vernon predicted that a predominant amount of commodity innovations will appear in reach countries with high level of wages, since namely in such countries an enabling for that environment is created. Besides, fast-growing demand for new goods stimulates highly favorable conditions for innovations. The presence of a huge number of highly-qualified scientists and engineers also contributes to dissemination of innovative processes. Having analyzed the situation in the post-war world economy, the leader's role Vernon attributed to the U.S., which had a strong industrial and financial potential along with skilled labor, in addition it was one of the very few developed countries that had not undergone destruction during the Second World

War. The role of imitators was assigned for other developed and developing countries. As far as a new technology is becoming widespread, and products made with it come to the stage of standardization, it is often easy to relocate production to countries with lower labor costs.
According to this model, it is expected that the most industrialized countries will export non-standardized goods produced with the latest and the most advanced technologies and will import goods produced with the use of outdated or less advanced ones (Vernon, 1979).

The similar idea of moving production to third countries is represented also in ***the theory of economy from scale***. In accordance with this theory countries specializing in production of a certain product after satisfying the internal market demand expand the production of this product to external markets. Some markets turn into oligopolistic due to some companies' enlargement. For instance, the crude oil market became oligopolistic still in the beginning of the XX century (Silberston, 1972; Silvestre, 1987).
Neo-technology theories change principally the attitude to a state's role in foreign trade. In neo-classical theories, like H-O theory, the structure of foreign trade is predetermined by a proportion of abundant and scarce factors in a given country and a state's role is limited only to controlling the market processes regarding perfect competition conditions and using the abundant factor in production maximally. On the contrary, the proponents of the neo-technology stream believe that government can and ought to support both production and exporting of advanced technology products, as well as to contribute to clotting of outdated enterprisers. Thus, dynamic comparative advantages can be created and consequently they appear and disappeared over time. So we can infer that the orientation of one or another country's economy on, for example, raw materials is not once-and-for-all given one. It can be overcome through an active industrial policy conducted by a state with the aim of developing technologically advanced productions (Silberston, 1972; Silvestre, 1987).

Posner's model

The Posner's model is considered as one of the neo-technology theories' modifications. Its author explains the role of technological gaps in the development of foreign trade. Posner was the first who raised a question: "how can technological changes affect mutual trade between countries?" (Posner, 1961) According to Posner the modern structure of foreign trade is formed the following way. Due to implementation of new technologies certain goods have relatively low production costs, which eventually help to sell them on the world market more effectively. It means that a firm which delivered this product on the market first receives quasi-monopolistic profit. This quasi-monopolistic profit (because of competitive advantage in the production) can

be received until competitors manage to imitate this product or process successfully. However, this imitation requires some time, so called time-lag, during which the technology can be transferred to other countries (Barclay, 1997).

Posner distinguished two types of time-lags in dissemination of knowledge and technologies. The first one is a lag of the demand side, i.e. the time that consumers need to realize to what extent and what they need this product for. The quicker the reaction of consumers is the quicker exports of that product grow and the higher amount of producers are forced to react on the competition steamed from a given innovation (Posner, 1961).

The second type is an imitation lag, i.e. the time period needed to imitate activity of a firm-innovator by foreign producers-competitors. The success in this process partly depends on a degree of innovation protection via patent in the home country and abroad. The existence of such time-lags leads to an increase in trade. Time-lags in turn appear due to existence of a delay in the process of technological knowledge dissemination from a producer-innovator to producers in other countries.

The Posner's theory can be seen as a further development of the idea of a country's comparative advantages, which it possesses and uses for a beneficial trade. However, in contrast to the H-O theory, in which comparative advantages depend on the availability of production factors and the effectiveness of theirs use in production, M. Posner believed that not just available advantages serve as a basis for trade, but also gained advantages appearing due to accelerated development of science, its preferred financing and import of skilled labor force from abroad etc. (Lindert, 1992).

Hafbauer's model

Subsequently, the Posner's ideas were developed by Hafbauer (1966) through deepening the belief that temporary technological superiority gives an opportunity to use this comparative advantage in production of high-tech products in international trade for a limited period of time, which is called imitation lag. Hafbauer introduced another element into the model - the dynamic economies of scale, which is used to extend the imitation lag. In many industries significant cost savings originate from "learning-by-doing", i.e. training during the production process itself (Hufbauer, 1966). According to Hafbauer, the experience of workforce grows by constant repetition of the same operations. As a result, average production costs are falling while the total volume of production is increasing. Consequently, an innovator is able to maintain its comparative advantage over a longer period of time, even after these new production methods will be copied by manufacturers from abroad. In this case, experience gained through constant

conducting the same operations becomes one of the factors of technical progress, which is understood as a reduction of labor share per unit of a finished product.

In the same manner as Posner, Hafbauer attached a great importance to such factors that determine the innovation climate in different countries. Hafbauer hypothesized that technological breakthrough more likely occurs in countries with high wages, because high wages create incentives for producers and consumers to find means to save on labor costs. An inescapable conclusion can be drawn from the Hafbauer's model that almost completely confirms the results of Posner and Vernon findings: outpacing export of technologically new products will come from countries with high wages towards to countries with low wages (Gilpin & Gilpin, 1987).

As a result, international trade has historically formed as a three-tiered hierarchy of the center (core), semi-periphery and periphery (see Figure A-1 in Appendices). From the viewpoint of Andre Gunder Frank (1929-2005), stable economic growth of developed nations is caused by the process of unequal exchange with underdeveloped and developing countries, when for a long time resources and capital of periphery-states are appropriated by more developed countries. In the long run, this leads to the development of economic underdevelopment of the periphery and to repetition of such relations at the domestic level, when cities often formed as centers of colonial exploitation, backwardness and dependency of rural areas. Frank believed that suitable conditions for the development of the periphery are possible with detachment from the world trade and economic progress (Chase-Dunn et al, 2000; Dussel, 2002).

3.1.4. Distribution of income from foreign trade

Samuelson-Johnson model (theory) of specific factors

Among the theories of foreign trade there are those which give the answer to the question of how a country's participation in international trade affects the welfare of different groups of populations or development of different sectors in an economy. The Ricardo's trade model, being a base for many other foreign trade models, revealed the potential benefits from foreign trade. According to the Ricardo's model foreign trade leads to an international specialization, in which each country sends their resources to sectors where their use is relatively more efficient. Ultimately, the Ricardo's model argued that trade is beneficial not only to all countries, but also to all their inhabitants, while the impact on domestic income distribution was virtually ignored (West, 2000). However, assumption of constant income growth in different population groups during the expansion of international trade is obviously not correct, because:

- the movement of labor from one industry to another, due to changes in the demand for labor, requires additional time and expenses to move resources;
- change in a mix of producing products has a different effect on the demand for different factors of production – an increase in the demand for some factors of production leads to reducing the demand for other factors.

Because of this, it is not clear whether international trade is beneficial to all citizens equally, as it was described in the Ricardo's model. International trade is usually beneficial for a nation as a whole, but may be unfavorable for certain groups of population and sectors of the economy. The answer to this question, that is how a pattern of foreign trade affects incomes of different groups of population employed in various industries, was given by the model developed by Paul Samuelson and Ronald Jones in 1971. Their model is also known as the theory of specific factors (Bliss, 2003). Besides the idea that labor-factor can move from one industry to another, this theory admits the existence of other factors of production, which have specific nature allowing using them in particular industries only. Thus, international trade is mainly beneficial for owners of surplus specific factors of production used mainly by export-oriented industries.

The law of diminishing marginal utility, taken from the general economic theory, is considered as the initial premise for this model, according to which each additional unit of labor invested in production provides a smaller increase in its volume. Differences in factor endowments determine differences in the relative prices of appropriate products and stimulate mutual trade. When the process of foreign trade is active, production of export-oriented industries increases, which stimulates the development of factors, associated with thus process and attracts more labor in it. This consequently promotes the outflow of labor from import substituting industries. Thus, the redistribution of income takes place, the nature of which is expressed by Samuelson-Jones's theorem: revenues of owners of immobile factors specific to export-oriented sectors increase, while incomes of owners of immobile factors specific to industries that compete with imports decline; revenues of mobile factors that can be used in all areas may either increase or decrease (Frolova, 2010).

Simultaneously, the winners are usually those who are engaged in export-oriented industries, the losers are those who employed import-substituting industries. The Samuelson-John's theory implies the following practical conclusion: not all owners of relatively abundant factors of production will be the proponents of free international trade as claimed by Heckscher and Olin, but only those who own factors *specific* to export-oriented industries. On the other hand, not all

owners of relatively scarce factors of production will insist on protectionist measures, but only those who own factors specific to sectors competing with imports.

Rybczynski theorem

English economist of Polish origin T. M. Rybczynski (1955) in turn tried to reveal the impact of supply factors on income from production. Uneven growth in supply of production factors has another important consequence reflected in the Rybczynski theorem: rising supply of one production factor, while others variables held constant, leads to an increase in output of commodity produced with intensive use of that factor, and to a reduction of other goods output. Rybczynski theorem allows to see more clearly and even to exacerbate the problem of specialization on any field of activity's impact on economic development. In particular, the consequences of exports oriented on raw materials became apparent (Feenstra & Taylor, 2010).

In 1955 Rybczynski exploring the effect of economic growth on foreign trade paid attention to the fact that rapid development of some manufacturing industries imposes very often a depressing effect on the development of other sectors. According to the Rybczynski theorem, increasing offer of one of the production factors leads to a disproportionately greater increase in production and incomes of industry, for which this factor is used relatively more intensively, and to a reduce in the production and incomes in industry, in which this factor is used less intensively. Thus, the rapid expansion of production and exports in some industries may lead to a stagnation or even decline in output of others. In some cases such drop in production can be devastating (can exceed the benefits of expansion and growth in export industries) and lead to a de-industrialization (Rybczynski, 1955).

Rybczynski theorem has been repeatedly confirmed in real life. So, the example of Holland deindustrialization has already become a paradigmatic "Dutch disease". Problem was associated with active development of the Netherlands natural gas fields in the North Sea. The impression in Holland was that as natural gas and oil production grows manufacturing exports declines, and rising prices for all types of fuel in the world market even strengthened this trend. Rybczynski noticed and explained this situation in his theorem: new sector causes an outflow of resources from other sectors due to higher wages and higher profits in this sector. As a result, output in the manufacturing sector declines (Rybalkin et al, 2008).

Thus, international trade may be associated not only with positive but also with negative effects (comparative disadvantages), which explains the presence of two main trends in foreign trade policy - free trade and protectionism.

3.1.5. Trade policy and its influence on economic growth and competitiveness

Arguments for protectionism, its pros and cons

Historically, the two opposite types of foreign trade policy have formed: free trade and protectionism. Their "pure" forms could be distinguished only during the pre-capitalist era with little development of foreign trade and international economic relations. In modern realities any foreign trade policy is a combination of these two opposites, optimized depending on the concrete circumstances (Mikhailushkin & Shimko, 2002).

Debates between protectionists and free-traders have been ongoing as long as an economic theory exists. The gain from foreign trade is indeed indisputable; however, it is far from obvious that free trade (i. e. elimination of all trade barriers) will lead to an increase in international trade's participation. Practice has shown that the quickest increase in the share of foreign trade in GDP was demonstrated by those countries, which had managed to achieve the highest rates of economic growth and had had a higher share of investment in GDP, in contrast to countries that had been practicing free trade (Popov, 2006). Thus, in the context of foreign trade policy, state should regulate the rules of foreign trade, which are the subject to both parties (exporters and importers) and related non-resident partners.

The concept of List

The necessity of government intervention to foreign trade regulation was substantiated by German economist Daniel Friedrich List (1789-1846). In contrast to proponents of neoclassical theories, who advocated free trade policy, List proved advisability of periodical realization of protectionism policy aimed at supporting the development of domestic (not yet mature) manufacturing.

F. List in his principal work "The National System of Political Economy" (1981) argues that free trade can be mutually beneficial only for states that are on the equal level of economic and technological development. Reflecting on the economic hegemony of England List concluded that British had created their commercial and industrial greatness because of strict protectionism, however they deliberately misled other nations by the doctrine of free trade, since under free trade conditions implying exchange between manufacture-agricultural and purely agricultural economics the latter dooms itself to economic backwardness and political bankruptcy (Avtonomov, 2010).

In this regard List suggested:

1. The idea of "educational protectionism", i.e. customs protection of young national industries, until they reach the level of international competitiveness.

2. In contrast to the principle of comparative advantage, List proposed the concept of "National association of productive forces", emphasizing the priority of internal market over external one.

According to List a nation achieves much greater utility through developing and retaining domestic producers' position on the national markets in contrast to searching the wealth outside the country. More successful in foreign trade will occur that country, which will be able to achieve the highest degree of development for its industrial sector. At the same time List argued that protectionism is justified only as an "educational" mean used for equalizing the levels of economic development. A nation, which has reached the first-rate level of industrial and trading power, must move to a free trade policy. The methodology developed by this school created the basis for formulation strategies upon choosing one or another way of development (Cardoso et al, 2015, Gurevich, 1990).

Table 3.1.1: Pros and cons of the protectionist policy

Pros	Cons
Protects young sectors and industries	Creates favorable conditions for emergence of domestic monopolies in commerce, industry, financial services, due to the restriction of competition
Customs fees are an important source of income for government budget	Protectionism slows economic growth
Protectionism struggles with structural unemployment caused by cheaper and more effectively organized imports	Often leads to trade wars and undermine foreign trade relations
Provides national security	Protectionism does not contribute to lower prices
Provides time for adopting to external markets' conditions	Protectionism indirectly undermines a country's exporting possibilities

Source: Author's representation based on Carrère & Melo (2011); Curtiss, (1954); Handbook on International Trade Policy / edited by Kerr & Gaisford (2007); UNCTAD: Non-tariff measures to trade: Economic and Policy Issues for Developing Countries. Available on-line at http://unctad.org/en/PublicationsLibrary/ditctab20121_en.pdf

There are two concepts of foreign "openness" that are very often confused in modern literature: the "openness" as a high share of exports and foreign trade in GDP and "openness" as a liberal trade policy. F. Rodriguez and D. Rodrik provided a number of evidences that the second "openness" does not necessarily lead to the first one (Rodriguez & Rodrik, 1999).

To sum up the following pros and cons of protectionist policy can be distinguished: see Table 3.1.1 given above.

Tariff trade policy tools

Protectionist trade policy is carried out with a use of the following main tools: tariff or customs duties and import quotas. *Tariff or customs duties* are the most commonly used tools within protectionist trade policy, which is an excise tax on the imported product. If a tariff is introduced only with the aim to obtain extra money for state, it is referred to as fiscal one. If a tariff is introduced to reduce or eliminate imports, such a tariff is called protectionist. Import tax may be applied in different ways. In this context the cost tariffs and specific duties are distinguished. *Cost tariff* is a tax expressed as a percentage of the purchase price. *Specific duty* is a tax levied in accordance with the physical quantity of imports. *Import quota* is a tool of protectionism that imposes the maximum possible volume of imports for specific items or for a certain period of time. Import quotas are regarded as more effective (compared with specific duties) containment tool of foreign trade, because it absolutely prohibits the import of goods over a certain amount (Curtiss, 1954).

Non-tariff instruments of trade policy regulation

Among non-tariff tools of foreign trade policy the following measures can be distinguished: voluntary export restraints, export subsidies and countervailing duties, dumping, anti-dumping. Restrictions on foreign trade through the "licensing" system, i.e. the acquisition licenses to trade in certain goods (raising the price of licenses and limiting their number, a state can effectively restrict imports of a product), instruments related to rigid bureaucratic control, or so-called "administrative slingshots" in customs procedures. Unwarranted quality and safety standards of goods create great difficulties for imports (under non-tariff barriers) (Kerr & Gaisford, 2007). *A Voluntary export restraint* is an instrument of export restricting on the voluntary basis. The aim is to avoid more rigid barriers. *Export subsidies and countervailing duties* are instruments with a use of which governments stimulate promotion of domestic goods abroad. *Dumping* is a tool of protectionist policies implemented through international price discrimination. Violation of the principles of a free trade by dumping occurs when with the aim of the displacement of a competitor from the market the temporary setting of low prices takes place. Afterwards, the price level is recovered or increased. This should be contrasted with dumping tariff in the importing country. However, a long-term dumping exists. It occurs when low prices are achieved as a result of the principle of comparative advantage. But in this case, anti-dumping duties can be administered. They bring the benefits to the importing country, forcing the importer to reduce the

price even more. The so-called long-term dumping can withstand an economic restructuring based on the principle of comparative advantage (Carrère & Melo, 2011).

Industrialization policy of Import substitution (ISI)

According to a Comprehensive Dictionary of Economics one of the known protectionism strategies is import substitution industrialization (ISI), which is referred to as a trade and economic policy that advocates replacing foreign imports with domestic production (Brian, 2009).

Generally this strategy assumes considerable weight of the public sector in the economy and significant government intervention in the domestic and foreign economic processes. It is based on two postulates. The first postulate assumes in the long-term a decline in the world prices of primary commodities (which is considered as inevitable) as compared to the prices of manufactured goods (so called Prebisch-Singer hypothesis (Singer, 1998). It consequently emphasizes the necessity to create and develop processing industries in these countries. The second postulate argued the need for temporary custody of a nascent manufacturing industry until its maturity and competitiveness of its products on global markets (Ocampo. & Parra, 2003).

As a rule, on the early stages of ISI countries try to develop output of products manufactured from available surplus production factors not related to the potential of their natural resources. As a result, on the early stages of ISI many developing countries began to specialize in production of labor-intensive products of mass consumption. This stage was characterized by a rigid tariff and non-tariff protection of infant industries. Subsequently, capitals accumulated in labor-intensive sectors allowed to move to the next stage of import substitution, i.e. creation of capital-intensive industries producing durable goods and semi-finished products. Finally, at a certain level of economic development production of the most complex investment products began (Baer, 1972). At this stage of the ISI, many states face difficulties due to the narrowness of the domestic market not allowing the use the effect of economies of scale, which significantly increases the cost of manufactured products compared to foreign analogues. Moreover, at this stage a new problem appears - high cost of imported materials and components. As a result, new industries often turned into unprofitable, stagnated and heavily dependent on a state budget. Under such conditions the rate of economic development is usually decreases (Bruton, 1998).

However, many states have been able to find a way out of this situation. Today thanks to the progress in economic science appeared much clearer understanding of why protectionist measures and other tools of industrial policy can be successful and under which conditions this

success is achieved. The first requirement for a successful industrial policy is that it should be *export-oriented.* Customs or other protections of domestic producers have to be complemented by promotion of exports, while it is called export-oriented industrial policy. And without export promotion protectionism leads only to a pure import substitution, which is inefficient in the long run perspective (Popov, 2006).

While import substitution policies might create jobs in the short run, as domestic producers replace foreign producers, economic theories suggest that in the long run output and economic growth will be lower than it would otherwise have been. This happens because import substitution denies a country's benefits gained from specialization. The theory of comparative advantage shows how countries will gain from trade. Moreover, protectionism leads to a dynamic inefficiency since domestic producers have no incentives from foreign competitors to reduce costs or improve products. Import substitution can impede economic growth through poor allocation of resources along with its effect on exchange rates that harms exports (Baer, 1972).

Export-oriented industrialization (EOI) policy

Thus, the subsequent strategy should be based on the support of export-oriented growth, which mainly focuses on advanced technology products. EOI aims to enhance the industrialization process of a country by exporting goods which have a comparative advantage. Priority support is primarily provided to export-oriented industries involved in producing finished goods with high added value. As domestic producers reinforce their position on the world markets, government stops supporting and overall reduction of government involvement into the economy is observed, along with liberalization of trade and financial policies. Such approach contributes to cost minimization for national companies, which eventually contributes to increasing the competitiveness of national production (Bruton, 1998).

The export-oriented part of industrialization strategy itself is usually divided into two stages. At the first stage labor-intensive products dominate in export; on the second stage - emphasis is done on exports of technology-intensive and capital-intensive products. Raw materials are another export option. However, this strategy is risky in contrast to strategy of exporting manufactured goods. If terms of trade deteriorate, a country is obliged to export more and more raw materials in order to import the same amount of commodities, which makes very difficult to get trade profits (Goldstein & Jon, 2008). Many newly industrialized countries of East Asia have been able to carry out successively in their development both import substituting and export-oriented stages.

It is important to emphasize that import-substitution policy separately from export encouragement is nothing but an attempt to be self-sufficient and economically independent from the rest of the World. In this regard governments though subsidies give priority quite often to weak and uncompetitive industries. While export-orientation policy, in contrast, supports industries and enterprises, which either have a niche on foreign markets or have a good chance to increase their production for exports (Liebler & Ward, 1992).

Thus, the implementation of an efficient in the long perspective strategy aiming at increasing a country's competitiveness has to include measures that selectively protect on the early stages domestic market from foreign competition (by tariffs) and then has to rest basically on export encouraging and support. In both cases the protectionist policy of domestic market is used, the only difference is that protection, which is without export stimulating, leads to conservation of inefficient production, while protection along with export encouraging keeps inefficient production only for a while, and then turns it into effective one. The import substitution in its extreme form is a strategy of self-reliance that seeks to produce all domestically. Export-orientation, in turn, is the policy that in addition to supporting domestic industries starts them from scratch, but only those that certainly must be competitive not only on national level, but necessarily on the global markets (Popov, 2006). The retrospective overview of import substitution strategies that were popular in the 60s and 70s of the XX century and their impacts, as well as the transition to more open and export-oriented economic policy in 80s years is given by Jagdish Bhagwati in the book titled as "Protectionism" (Bhagwati, 1988).

The ways to support exporting industries and prospectively successful ones

From the standpoint of immediate prospects it is always better to produce and export what you already have and know how. However, most countries, if not all, are not willing to accept defeat without a fight and try to diversify exports. Which industries should be supported in the first place? Namely here different options appear.

When subsiding of weak sectors comes at the expense of strong ones the development invariably comes to a standstill: the strong industries, from which the funds transferred out, will finally decay, at the same time weak ones that are not working for export will not become viable. Thus, a government should create incentives of resource relocation to those industries, which have a perspective to capture own niche on the world markets. If these industries cannot export their products after n-years of subsiding, then this support ceases. Such a policy was initially implemented in Japan, then in South Korea, Taiwan, Hong Kong and Singapore, and later - in Southeast Asian countries and China, which led to the impressive results. Precisely export was

the engine of economic growth in China, where the share of exports in GDP rose from 5% in 1978 to today's 30% (Rodrik, 2006).

Among a number of mechanisms supporting exports the main one is the national currency devaluation which is achieved through the accumulation by the central bank of foreign exchange reserves. When Central Bank buys currency in amounts that excess market supply it creates an excess demand for foreign currency and the exchange rate of the national currency falls. Artificially, low exchange rate creates benefits for all producers of tradable goods at the expense of producers of non-tradable goods, which allow stimulating exports, production and savings by limiting imports and consumption (Polterovich & Popov, 2003).

The same effect can be achieved by manipulating with taxes, for example, through introduction of import duties and export subsidies. Under conditions of high corruption, national currency devaluation through the accumulation of reserves is a non-selective industrial policy tool that has obvious advantages as compared to the selective ones, i.e. taxes and subsidies differentiated by industry and businesses (Rodrik, 2007).

As for industries that have to be supported in the first place, according to recent studies promotion of exports of high-tech and scientific products is more beneficial than supporting of exports of natural resources, raw materials and low-tech products. This is not because resources can be depleted, or become cheaper, but because social return on the development of high-tech production is more than return to specific firms that are engaged in such activities. This phenomenon is known as "externality" – an external benefit that market cannot properly take into account, for that reason namely government support is needed to bring the development of such industries to the optimum level (Hwang & Rodrik, 2007). It is generally accepted, for example, that significant external effects can be observed in education, health and basic science development.

Thus, a policy that encourages national entrepreneurs to focus not just on exports, but on constant sophistication of exports explains the economic success of the East Asian countries. This is precisely the second principle of successful industrial policy: not all exports worth supporting, but only those that give the biggest externality, external benefit that occurs when the public return on investments in a specific activity is greater than the returns to the concrete firms, directly involved in such activities (Rodrik, 2006).

The phenomenon of "economic miracle" – a fast growth within a couple of decades or a bit more – after the World War II was practically always associated with an increasing share of investments and exports in GDP, and practically never with a low level of tariff protection.

Contrary to common sense, namely protectionist states managed to increase the share of exports in GDP quicker than others and have come “dragons” and “tigers”, whilst countries that had been practicing free trade have not astonished the World by neither fast growing exports, nor high rates of economic growth (Maddison, 1998; Bliss, 2003). Positive relationship between protectionism and economic growth retained only if initial level of GDP per capita and institutional quality indicator from database POLITY were used as control variables (Irwin, 2002). Obviously, various development strategies of newly emerging industries as well as highly competitive ones have their theoretical justification. The specific features of such strategies most adequately are explained by modern neo-technology theories which describe the principles of technological leadership.

3.2. Approaches to defining and measuring competitiveness

3.2.1. Modern definitions of competitiveness in the global economy

Studies of international competitiveness have a long history, but the strongest interest in this issue has escalated recently, after the majority of countries from all over the world were involved in an extremely fierce competition. At the present time the most famous economists and the biggest international institutions from more than 100 countries are engaged in investigation of national competitiveness issues. The list of countries, whose competitiveness is evaluated, includes the majority of countries from all over the world that produce more than 90% of the global gross domestic product (World Economic Outlook, October 2009/IMF). Modern investigation of national competitiveness is nothing but another attempt to understand why some countries are more successful, while others - poorer and less successful, which was still in 1776 formulated by Adam Smith. In the 20-30-ies of the XX century the principle of comparative advantage was transformed into the concept of relative abundance of factors of production. Later on with the development of globalization and integration processes the mentioned concept was not always able to explain the structure of countries' export and import. Economists didn't leave the attempts to understand roots of international economic competitiveness on the basis of existing and emerging trade relations.

The widest popularity in the scientific community was got by a definition given in the Report of the President's Commission on Competitiveness (1984): "A nation's competitiveness is the degree to which it can, under free and fair market conditions, produce goods and services that meet the test of international markets while simultaneously expanding the real incomes of its citizens. Competitiveness at the national level is based on superior productivity performance and the economy's ability to shift output to high productivity activities which in turn can generate high levels of real wages. Competitiveness is associated with rising living standards, expanding employment opportunities, and the ability of a nation to maintain its international obligations. It's not just a characteristic of a nation's ability to sell abroad and keep trade equilibrium" (Young, 1985). This definition has not lost its relevance till now, since it includes the basic fundamentals belonging to the theory of competitiveness - the success of a country's competition on international markets and improvements in living standards of its population. It is considered as a basic one, and it mostly anticipated further transformation of theories investigating international competitiveness of the national economy.

Approximately a decade later the concept of national competitiveness moved on to the next stage of its development towards understanding the growing influence of political decisions on economic competitiveness along with influence of empowering of state authorities on all levels of a country's economic development. One of the pithiest definitions was given by the International Institute for Management Development (IMD), according to which the national economic competitiveness is "the ability of a nation to create and maintain an environment that sustains more value creation for its enterprises and more prosperity for its people." According to IMD, "some nations support competitiveness more than others by creating an environment that facilitates the competitiveness of enterprises and encourages long-term sustainability." (IMD's World Competitiveness Yearbook, 2008). Creation of a new model of international competitiveness was caused by the modern world economic development that changed external factors of competitiveness. Among the most significant factors, in terms of impact on the theory of competitiveness, the following ones can be distinguished: globalization of the world economy, development of new information society closely connected with a development of scientific and technological progress and new possibilities opened by it, an enhanced influence of state control and management in changing conditions, as well as a new role of international organizations and TNC. The world financial crisis has also notably influenced the transformation of the competitiveness theory, which caused the reassessment of the role and value of production factors availability and change in approaches to evaluation of economic competitiveness. This eventually led to the evolution of assessment methods applied to this indicator (Kuts, 2011).

Development of external factors of competitiveness has predetermined the development of internal factors, change of their significance in the development of competitive advantages. Factor of innovation is the newest one in the theory of competitiveness. External factors have a significant transformative impact on such important factor such as level of national institutions' development and their ability to create and maintain competitive environment for domestic producers. Furthermore, stable macroeconomic environment is considered as an important condition for national business the development, and, consequently, competitiveness of the whole country. Another important determinant of national competitiveness is the state of infrastructure. The importance of high quality infrastructure needed for successful economic development has significantly increased in the modern economy (Kuts, 2011).

The evolution of the comparative advantage concept within the foreign trade theory and influenced by scientific-technological progress has led to fundamental changes in the requirements to human capital. In order to improve the level of national competitiveness it is

necessary to have human capital with higher level of education and with skills that are adequate to modern economic structure (Spěváček, 2012).

The cumulative effect of new factors and conditions, improved approaches, acquired technical skills and tools has led to a significant transformation of both competitiveness theory and methodology of its determining.

The simplest quantitative perception of competitiveness on macro level is associated with the amount of goods sold on markets. It can be defined though such an indicator as a country's share on the world markets in terms of supplied products. However, this definition is not enough for a full understanding of the national competitiveness, where the starting point is a concept of a nation's welfare source.

National standards of living are defined through the economy's performance (productivity), which is measured as an amount of goods and services produced per capita, per unit of national capital and per unit of natural resources. Productivity depends on both the cost of national goods and services, measured in the prices of open international markets, and on effectiveness they can be produced with. The productivity also depends on an economy's ability to mobilize available human resources. Productivity allows nation to maintain a high level of wages, strong currency and attractive level of return on invested capital and, consequently, high standard of living (Mikhailushkin & Shimko, 2002).

Thereby, national economic competitiveness — is a polysemantic term, which means:

- The ability of a country to achieve high rates of economic growth, which will be stable in the middle term;
- The level of production factors' productivity in a given country;
- The capability of a country's products to compete on the world markets successfully.

Within the frameworks of the first two definitions an increase in the national economic competitiveness is identified with a growth of living standards and acceleration of economic growth. Therefore, the notion of the national economic competitiveness is closely connected with such areas of economic theory as theory of economic development and theory of economic growth, as well as with integrating both of these theories – theory of capital. For that reason, specific approaches to enhancing national competitiveness depend on a commitment to one or another scientific school, which gives different answers to the question "what works, and what not" (Lobacheva, 2009).

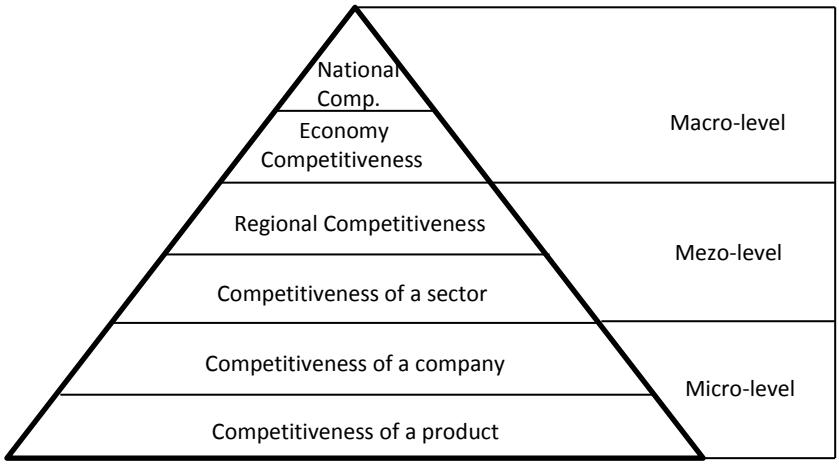
According to the third definition, growth of national competitiveness is closely connected with adherence to a traditional industrial policy of supporting concrete companies–"national

champions" or exporters and through the policy of maintaining low exchange rate of national currency. Between growth of national competitiveness according to first two definitions and the third one a serious difference exists. National competitiveness according to first two definitions doesn't imply the necessity to participate in international trade – business in a country may be very productive even without trading with companies from other countries. Competitiveness according to the third definition can be manifested exclusively on the international market.

At the same time to reduce the notion of international competitiveness to a success in foreign trade operations or by productivity of national companies is not possible. The definition of national competitiveness should incorporate both a set of preconditions as well as targeted characteristics of higher level of national competitiveness. In this light, the national competitiveness should be defined the following way: competitiveness is a kit of factors, institutions and policy directions, which determine not just a level of productivity in a country, but allow the real incomes of a given country's population to grow.

Thus, national competitiveness is composed of at least three levels (see Figure 3.2.1). For each level the specific conditions of competition, goals and time horizons are formed. Assessing the importance of each level of competitiveness formation, it is important to note that a leading role among them belongs to a macro level, since namely at this level the very conditions of prospective competitiveness are formed. Thus, the entire process of competitiveness formation evolves from macro to micro level (Filisofova, 2007).

Figure 3.2.1: Pyramid of competitiveness



Source: Own elaboration based on Filisofova (2007).

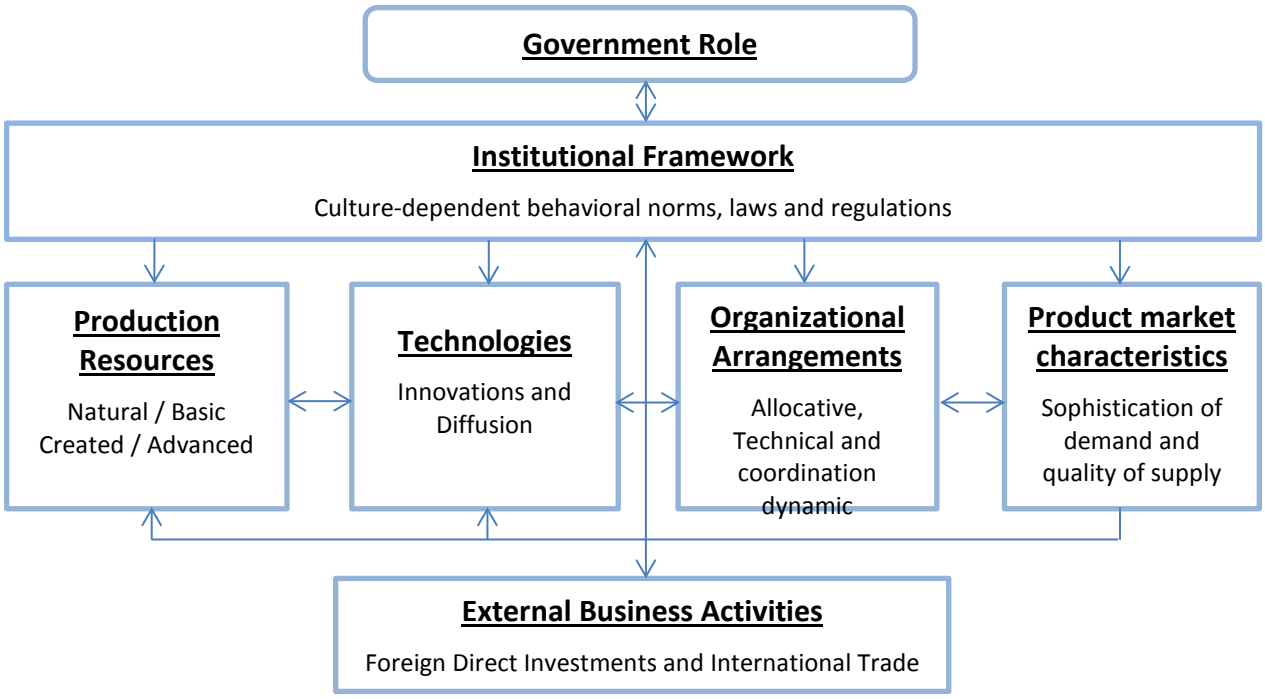
The dynamism of competition is the most important property of competitiveness, i.e. its changes over time. The flexibility with which the national economy is able to anticipate structural

changes and adapt to them is another determinant of competitiveness. According to Timo J. Hamalainen (2003) the main determinants of national competitiveness and economic growth are reflected and embodied by the following pillars: productive resources, technologies, organizational arrangements, product market characteristics, external business activities, institutional framework and role of government in the economy (see Figure 3.2.2).

Summing up all mentioned above definitions and main characteristics of any country competitiveness we can emphasize the importance of high living standards and high efficiency in the use of available production factors.

Thus, a leading competitive position does not depend on the size of the territory and the availability of natural resources. Competitiveness depends not only on economic potential of the country, but on the ability to meet the specific needs of the market and the ability to react quickly and flexibly to external and internal changes.

Figure 3.2.2: Determinants of economic competitiveness and growth



NOTE: arrows point to feedback information, financial resources flows and incentives.

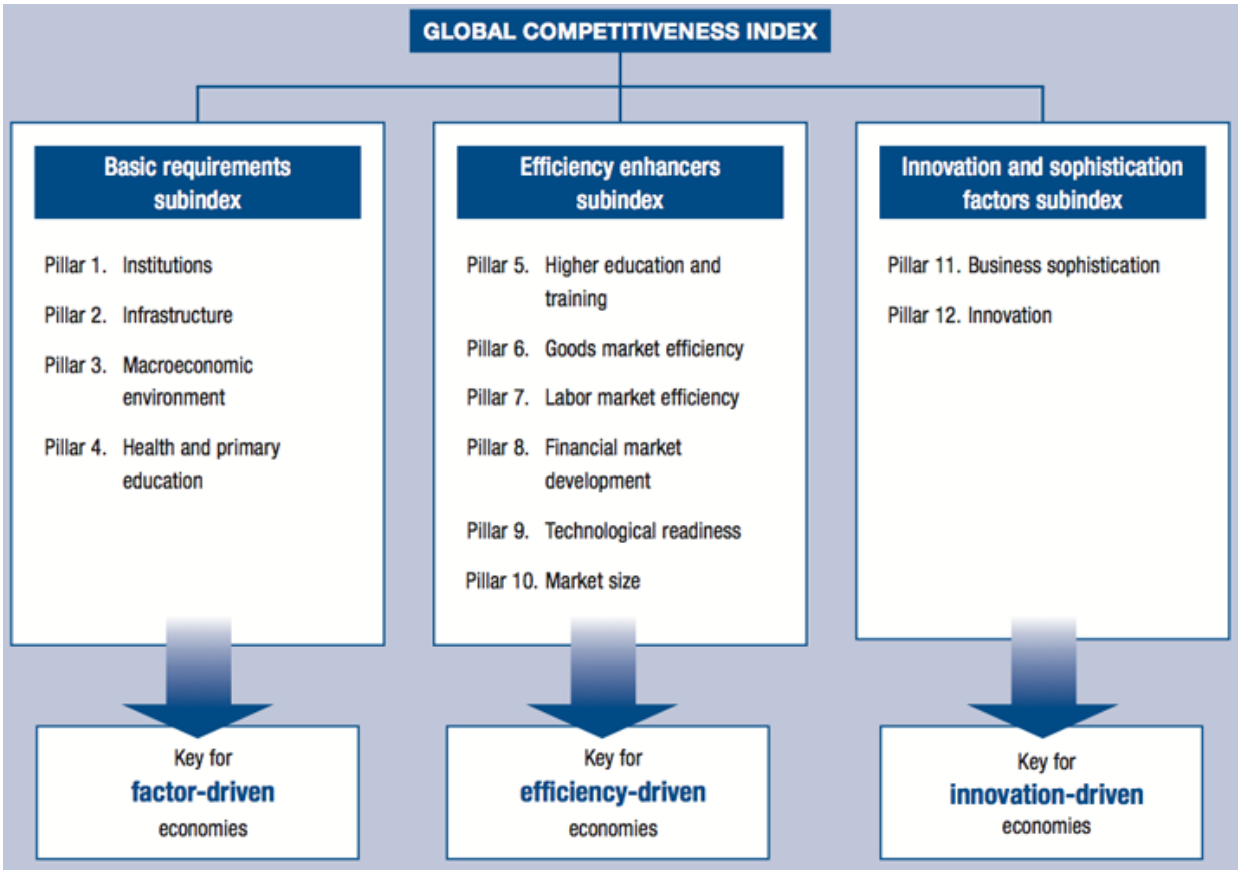
Source: Own elaboration based on Hamalainen (2003).

Determinants of economic competitiveness and growth are specific for each particular country due to inimitability of each historic-economic-socio-cultural path of development. That is why namely gradual and cumulative manner of change is observed (Hamalainen, 2003).

3.2.2. The World Economic Forum approach

The World Economic Forum (WEF) is a Swiss nonprofit organization founded in 1971. The headquarter is located in the suburb of Geneva, Cologny. Members of WEF are nearly 1000 large companies and organizations from all over the world, including Russia. Business leaders, political leaders, prominent thinkers and journalists are invited to annual meetings in Davos. The subject of discussion is the most acute world problems. The WEF is not only the platform for discussions, it initiates economic and political research: since 1979 WEF experts have been producing annual reports on global competitiveness - The Global Competitiveness Report (GCR), which assesses the competitiveness "landscape" of 148 economies, providing insight into the drivers of their productivity and prosperity.

Figure 3.2.3: WEF: Pillars of national economic competitiveness and stages of economic development



Source: WEF methodology. Available online at: http://reports.weforum.org/global-competitiveness-report-2014-2015/methodology/

The GCRs are referred to as the most comprehensive assessment of national competitiveness worldwide (World Economic Forum, 2003). Since 2004 the GCR have been ranking countries

with the use of the Global Competitiveness Index. It combines macroeconomic and micro/business aspects of competitiveness into a single index, which in turn includes two main indicators: index of potential growth and competitiveness index.

The WEF report "defines competitiveness as the set of institutions, policies, and factors that determine the level of productivity of a country. The level of productivity, in turn, sets the level of prosperity that can be earned by an economy. The productivity level also determines the rates of return obtained by investments in an economy, which in turn are the fundamental drivers of its growth rates. In other words, a more competitive economy is one that is likely to sustain growth" (World Economic Forum, 2013).

The WEF approach includes the following aggregate variables: Institutions, Infrastructure, Macroeconomic stability, Health and primary education, Higher education and training, Market of goods efficiency, Labor markets efficiency, sophisticated business environment, Technological readiness and market size financial markets and Innovations. Both "hard" and "soft" data are used. Hard data are statistically-based data from national or international statistics. The second group, or soft data, are not precisely quantified and theirs evaluation is conducted through surveys. The target group of respondents is senior leaders operating in the country. The world economic Forum divides the integrated factors of competitiveness into 3 main groups: basic standards, efficiency factors, innovative and perfection factors as it shown on the Figure 2.3.2 given above.

3.2.3. International Institute's for Management Development approach

The World Competitiveness Center was founded in 1989 by Professor Stéphane Garelli at International Institute of Management Development (IMD). The World Competitiveness Center was a pioneer in the field of competitiveness of nations and world economy ranking (IMD, 2013). Since that time the IMD World Competitiveness Center (WCC) annually publishes "The World Competitiveness Yearbook". The report initially covered 32 countries that were divided into two groups: 22 OECD countries and 10 newly industrialized economies. The IMD interprets the country's competitiveness as "the ability of a nation to create and maintain an environment that sustains more value creation for its enterprises and more prosperity for its people." According to IMD, "some nations support competitiveness more than others by creating an environment that facilitates the competitiveness of enterprises and encourages long-term sustainability." It means that IMD's approach assumes that wealth creation takes place primarily at enterprise level, whether publicly or privately owned. Thus, it is all about competitiveness of

enterprises. At the same time, enterprises operate in the national environment, which enhances or hinders their ability to compete either domestically or internationally. This field of research is called "competitiveness of nations" and it is covered in the research too (IMD, 2014).

At the present time the IMD's research compares competitiveness of 60 nations on the basis of over than 300 different criteria and sub-criteria. The World Competitiveness Yearbook ranks and analyzes the ability of nations to create and maintain the environment in which enterprises can compete. The rankings are based on two types of data: hard data (2/3) and a business executives' opinion survey (1/3). Hard data statistics are taken from international organizations (IMF, World Bank, OECD, ILO, etc.), private institutions (CB Richard Ellis, Mercer HR Consulting, PriceWaterhouseCoopers, etc.) and national sources through the network of Partner Institutes. As for surveys, business executives in top or middle management are asked to assess the situation in their own country in responding to a questionnaire. The World Competitiveness Yearbook ranks and analyzes the ability of nations to create and maintain an environment in which enterprises can compete. It considers four key factors: Economic Performance, Government Efficiency, Business Efficiency, Infrastructure (IMD, 2014). In turn, each of these factors is divided into 5 sub-factors, which highlight every facet of the analyzed areas:

- economic performance (78 criteria) – macroeconomic assessment of the national economy: macro-indicators; foreign trade; foreign investments; employment and unemployment; price level.
- government effectiveness (71 criteria) – the extent to which the government policy facilitates competitiveness: state financing; financial policy; institutional structure; legislation on business activity; social structure.
- business effectiveness (68 criteria) – the degree of the nation's conditions to stimulate enterprises to perform innovatively, responsibly and facilitate income receiving; productivity and efficiency; labor market; finance; management practice; relations and values.
- infrastructure (114 criteria) – the degree of basic, technological, scientific and human resources meet the needs of business: basic infrastructure; technological infrastructure; scientific infrastructure; health and environmental protection; education.

Altogether, the World Competitiveness Yearbook features 20 such sub-factors. These 20 sub-factors comprise more than 340 criteria, although each sub-factor does not necessarily have the same number of criteria (for example, to assess Education more criteria are used than to evaluate Prices). Each sub-factor, independently of the number of criteria it contains, has the same weight

in the overall consolidation of results, which is 5% (20x5 =100). Criteria can be based either on hard data, or soft data. Hard data reflect objective reality measured by means of different indicators, as, for example GDP, soft data analyze competitiveness from the standpoint of competent managers' subjective perception. Hard criteria represent a weight of 2/3 in the overall ranking, whereas the survey data represent a weight of 1/3. In addition, some criteria are for background information only, which means that they are not used in calculating the overall competitiveness ranking. Finally, aggregating the results of the 20 sub-factors makes the total consolidation, which leads to the overall ranking of the World Competitiveness Yearbook (IMD, 2014).

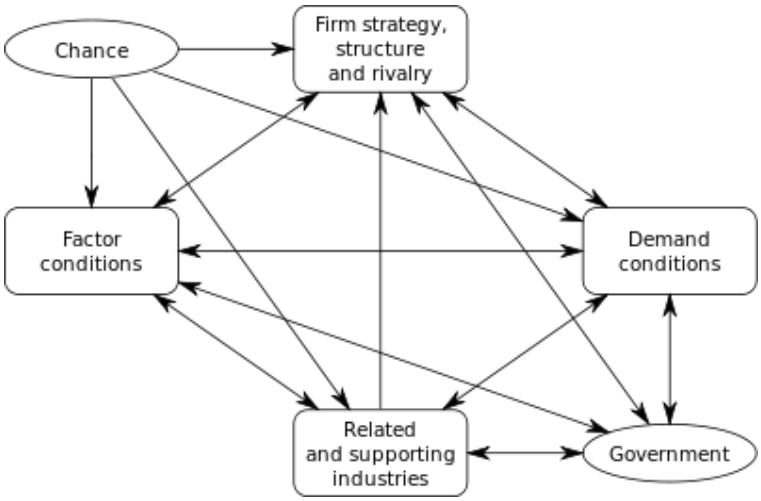
3.2.4. Porter's Diamond of National Advantage

In contrast to WEF's and IMD's statistical approaches reflecting a static state of a country's national competitiveness, the author of the most modern "diamond model" of the national competitiveness. Michel Porter (1990) developed the entire theory based on strategies and recommendations how to increase national competitiveness depending on initial factors and local circumstances. Michel Porter shows that in spite of constantly increasing significance of globalization, national competitiveness is eventually determined by a set of factors, which depend on concrete local conditions. Michel Porter being one of the most prominent researches of national competitiveness distinguishes four types of competitive strategies: on the basis of production factors (natural resources, cheap labor force etc.), investments, innovations and wealth (accumulated resources). According to Porter's theory the real advantage is gained by those countries that mainly compete on the basis of innovations (Porter, 1990). The Porter's theory is based on the so called determinants or factors that form national competitiveness. A country's competitive advantage is determined by a "national diamond", which includes four components (see Figure 3.2.4).

The first one is *factor conditions*. Porter asserts that "key" factors of production are created, not inherited. These factors are skilled labor, capital and infrastructure. "Non-key" factors or factors of general use, such as unskilled labor and raw materials, can be purchased by any company and, therefore, do not create a sustainable competitive advantage. At the same time specialized factors imply serious, sustained investment. They are difficult to duplicate. Namely this creates a competitive advantage, because if other firms cannot easily duplicate these factors, they are valuable. The second component is *demand conditions*. If clients are very demanding, then a firm or sector constantly experience pressure to improve their products through innovative

decisions and high quality. The third one is *related and supporting industries*. Spatial proximity of these industries facilitates the exchange of information and promotes a continuous exchange of ideas and innovation. *Firm strategy, structure and rivalry* constitute the fourth determinant of competitiveness. The way in which companies are created, managed and set goals is important for success. But the presence of intense rivalry at domestic level is also important; it creates pressure to innovate in order to upgrade competitiveness (Grant, 1991).

Figure 3.2.4: Porter's National Diamond model



Source: Traill & Pitts (1998).

There are two additional variables that to a large extent influence the situation in the country - random events (i.e. those that the firm's management cannot control), and government policy. According to Michael Porter these events include: inventions, major technological achievements, rapid changes in resource prices, significant changes in the global financial markets and exchange rates, a sharp rise in global or local demand, political decisions of foreign governments, wars (Porter, 1985).

According to Porter *government* should play the role of a catalyst of competitiveness. Through its policies, it can have an impact on all four components of the "national diamond", however, both positively and negatively. It is, therefore, extremely important to articulate government policy priorities. General recommendations are: to encourage the ideology of development, intensification competition on the domestic market, to stimulate production of innovations. The role of government in the formation of national advantages is that it affects all four determinants. Factor conditions can be influenced through subsidies, competent political decisions regarding factor markets and currency markets; parameters of the demand - by establishing different

standards and public procurement; conditions for the development of related and supporting industries - through control of the means of advertising or regulation of infrastructure development; strategy of firms, their structure and competition - through tax policy, antitrust law, by regulating activities on investment and securities market (Howard & Ellis, 2000). Thus, according to Porter (1998), the national economy competitiveness is determined by an ability to maintain productivity at a higher level than its competitors through the use of a continuous process of innovation. The author notes that high competitiveness of any country cannot be achieved by all sectors of the economy, but only by some of them, where this country has got a competitive advantage.

3.2.5. Indicators of foreign trade performance

One of the strongest propositions of classical trade theory is that the pattern of international trade, which reflects a country's external position, is determined by comparative advantage. In other words, a country with the comparative advantage in a given commodity exports, and the other with the comparative disadvantage - imports (Sanidas, 2010). "The determinants of comparative advantage, however, differed among various schools of trade theories. The Ricardian theory, for example, explained comparative advantage from costs and technological differences, the Heckscher-Ohlin-Samuelson theory considered factor's price differences. The Neo-technology theory the product cycle theory looked at factor efficiency, but examined technological innovation and such soft technological change as learning-by-doing as the cause of comparative advantage differences" (Aziz & Dahalan, 2015). "The empirical trade literature suggests several methods to evaluate the trade specialization of a given country, most of them aiming at identifying the comparative advantages revealed ex-post by international trade" (Amador, 2011). Currently, there are several options in the competitiveness assessment of a country in the world trade, based on its comparative advantages. The methods solely based on trade flows can be divided in two broad groups. The first group only uses export data and the second uses both export and import data. The most widely used indicator in the first group is the Balassa index, as suggested in Balassa (1965), while the most popular in the second is the Lafay index, as suggested in Lafay (1992). Traditionally, RCA indices have been used as measures, which can be interpreted in three ways. "First, they can provide a demarcation regarding whether or not a given country enjoys a comparative advantage on a given commodity (dichotomous measure); second, they can provide rankings of sectors within a given country in cross-sector analysis, and rankings of countries with respect to a given commodity in cross-country analysis

(ordinal measure); lastly, they can quantify the degree of comparative advantage enjoyed by a given country with respect to a given commodity (cardinal measure)" (Ballance et al, 1987). Accordingly, a few ways of using the RCA indices exist in order to analyse a country's trade performance. The most common way is to "make a comparison across sectors within a given country or across countries with respect to a given sectors by using rankings in order of the calculated index values or to examine how much of comparative advantage or disadvantage a given country gained during the period of interest by directly comparing the calculated index values" (Sanidas, 2010). "The main aim of competitiveness strategy is to help countries to realize or build dynamic comparative advantage <…> what assumes that static advantages based on existing factor endowments are already fully realized" (Lall, 2001). The important question that then arises is what the conditions are under in which such strategies can be established successfully. In order to try to answer this question one needs, first, to analyze the current state of affairs in that field in a country reflected by the following (among others) macroeconomic indicators: real effective exchange rate of local currency unit (LCU) and revealed comparative advantage indices (RCA), that take into account both export and import flows of different commodity groups.

The revealed comparative advantage (RCA) approach, pioneered by Balassa (1965), assumes that the true pattern of comparative advantage can be observed from post-trade data only. Balassa RCA compares the export share of a given sector in a country with the export share of that sector in the world market. RCA index is based on export performance and existing trade patterns. It measures a country's exports of a commodity relative to its total exports. Thus, if RCA>1, then a comparative advantage is revealed. The theoretical foundation of the Balassa index has long been debated in the literature since it does not really match the original Ricardian idea of comparative advantage (Bowen, 1983; Vollrath, 1991). Ricardian comparative advantage, indeed, is based on the intrinsic (ex-ante) nature of the country in being relatively more efficient in the production of a certain good. Unfortunately, Balassa index fails in fitting this idea since it is based on the actual (ex-post) realization of bilateral sector's trade flows, mixing up exporter with importer and sector specific factors affecting trade (Leromain & Orefice, 2013). Several attempts have been made in the literature to overcome the former empirical weakness of the pure Balassa index.

Overcoming the shortcomings of Balassa index, the index developed by Vollrath (1991) allows evaluation of trade flows not only in terms of export values, but also taking into account values of import. Vollrath suggested that the revealed competitiveness (RC) index is more preferable

since supply and demand balances are embodied in the index. RC is calculated as the difference between relative export advantage (RXA), which is the equivalent to the original Balassa index (RCA), and its counterpart, relative import advantage (RMA). Positive values of the Vollrath index reveal competitiveness, while negative figures disclose compatitive disadvantage (Vollrath, 1991). It's important to note, that Balassa and Volltarh approaches rest on different concepts ahd therefore are not strictly comparable (Utkulu & Seymen, 2004).

The next Lafay index (1992) combines together trade and production variables. Using this index we consider the difference between each item's normalized trade balance and overall normalized trade balance. Thereby, the Lafay index (LFI) is used to eliminate the influence of cyclical factors, which can affect the magnitude of trade flows in the short run and to focus on the bilateral trade relations between the countries and the regions (Zaghini, 2003). It is considered that the level of specialization of the export basket depends on a number of parameters associated with the factor endowments, their performance, the specific advantages of the selected industries and firms. Therefore, the advanced economies tend to have more diversified (less specialized) export basket. Moreover, it is empirically proved that the profile of export specialization of a country may serve as a source of a long-term growth resulting in national economic competitiveness growth.

Referring to the importance of national competitiveness preconditions, especially for the county that is richly endowed with natural resources, its ability to achieve high rates of economic growth should necessarily be considered through the prism of the natural resource curse phenomenon. Despite the fact of obvious advantage of possessing abundant endowments of primary factors, in practice countries often reveal the results that are opposite to expected. Therefore, the focus will be done on this aspect in what follows.

3.3. Economic performance in the light of natural resource curse phenomenon

In the previous chapter we considered natural resources as one of the factors contributing to national competitiveness growth. Consequently, we suppose natural resource-rich countries to enjoy better economic performance if compared to those countries that are less fortunate. However, everyday experiences and empirical studies show the reverse (Freinkman et al, 2009). It seems that abundance of natural resources is detrimental to economic growth (Sarmidi et al, 2012). Sachs and Warner (1995) in their seminal paper "Natural resource abundance and economic growth" on the bases of a large cross-country study showed, that high level of natural resource endowments is closely related to slow pace of economic growth. This puzzling phenomenon was called "natural resource curse" hypothesis (NRC) or "paradox of plenty". The economic literature provides at least three theories explaining NRC: Rent seeking models, Dutch disease models and institutional explanation.

3.3.1. Institutional explanation

The NRC concept itself has been subjected to a serious doubt recently. Study of Norwegian scientist Christa Brunnschweiler (2006) for the period 1970-2000 has revealed positive influence of natural resource endowments on economic performance in general and economic growth in particular. These relatively new data show that initial treatment of negative relation between export of raw materials and rate of economic development, known as the "resource curse", was largely misleading. More accurately it should have been talking about the "curse of underdeveloped economy". Indeed significant volumes of raw material exports indicate that corresponding national economy is simply unable to transform these raw materials into finished products. However, these consequences are not strictly determined, but appear only under the certain conditions (Brunnschweiler, 2008).

"It is found that economies with abundant natural resources and at the same time better institutional quality and governance such as strong democratic accountability, high law and order, lower corruption, or higher integration among government institutions are evident to have better economic growth and higher human welfare" (Sarmidi et al, 2013). This is because superior institutional quality could be very effective in nullifying the so called NRC through avoidance of rent-seeking behavior (Auty, 2001), reducing corruption (Isham et al, 2005; Robinson et al, 2006), lowering the risk of violent civil conflict (Collier & Hoeffler, 2005) and

accelerating efficient resource allocation (Atkinson. & Hamilton, 2003; Damania & Bulte, 2003; Mehlum et al, 2006). Thus, "the quality of institutions is a mediating link between the level of a country's natural resources provision and a wide range of social, political and economic consequences" (Brunnschweiler, 2008). In this respect mentioned authors raised accurate questions: how high should institutional quality be to allow natural resources to have a favorable effect on economic performance? At what level of institutional quality is the NRC annulled? (Mehlum et al, 2006).

Works devoted to institutional analysis take a considerable place in economic literature recent years. From their standpoint the relationships between society and economy are determined by a kit of institutional restrictions, which in turn determine the mode of economic systems functioning.

Institutions are the key to understanding relationships between society and economy and influence of these relationships on economic growth (or stagnation and downswing). Ultimately, institutions serve as fundamental factors of economic systems' functioning in the long-term perspective (North, 1997).

Theoretical approaches to an institutional analysis

Institutional analysis implies studying of institutions (rules) that form, structure and regulate the development of a system of socio-economic interactions as a result of endogenous and exogenous factors influence. Institutions can be seen in a broad sense as a set of mechanisms and rules ensuring resource redistribution in the economy, attraction of new investments, workforce training and forming a system of incentives to increase the efficiency in the economy (Freinkman & Dashkeyev, 2011).

Thus, institutions can be roughly classified into the following main groups: Legal institutions, Regulatory institutions, Institutions of Economic Coordination and Risk-sharing and Institutions of Human Capital Development (Freinkman et al, 2009). The major institutional factors that can be counted on the quantitative level are: political regime (democracy), economic and political freedom, protection of property rights, the judicial system, government effectiveness, rule of law, social and political stability, social inequality, shadow economy, education system and financial system. The system also includes other factors, such as bureaucracy, business coalitions, civil society, perception of corruption and informational transparency in society.

Today nobody casts doubt on the existence of robust and statistically significant correlation between quality of national institutions and level of economic growth. The main attention now is aimed to clarifying the very nature of a cause-effect (causal) relationship or solving the so called

problem of endogeneity, namely - are institutions the primary cause of economic growth or their development and influence are the result of some other underlying factors? (Freinkman et al, 2009)

Classical and neoclassical economic theories traditionally consider investments in fixed and human capital, as well as development of knowledge and innovations, as main factors of growth; whereas institutional approach considers investments as a consequence of effectively formed and functioning institutions. Investments here are actually one of the transmission mechanisms linking institutional factors and economic growth. The theory of economic growth refers the factors of growth either to a group of proximate, or to a group of fundamental or deep ones (Rodrik, 2005). The neoclassical determinants of growth are usually referred to as proximate ones, they are: labor, capital, land, as well as productivity, caused not just by a technical efficiency of a production, but also the rational allocation of resources.

The seminal paper written by Rodrik, Subrmanian and Trebbi "Institutions rule:…" (2004) is extremely authoritative in this topic. In the cross-country regressions covering long time intervals the authors shown, that factor of institutional quality, primarily the quality of property rights protection and legal system, much better explains the differences in long-term economic growth rates than other fundamental factors. Herewith it is important to emphasize, that institutional factors are essential primarily for explaining the long-term growth rates, i. e. cross-country differences in the current levels of per capita income. The attempts to explain differences in growth rates for short intervals, using institutional variables, give results that are statistically less significant and less stable (Hausmann et al, 2005).

Different mechanisms of interaction among fundamental factors in the process of economic growth are also itemized in the following works: La Porta, Lopez-de-Silanes, Shleifer, Vishny, (1999) and Glaeser, La Porta, Lopez-de-Silanes, Shleifer (2004) investigated differences in economic growth and revealed their dependence on the quality of human capital and the degree of development of financial system; in the empirical research of Barro (1998) the level of property rights protection and the quality of legal order act as key determinants of economic development; Acemoglu and Johnson (2005) analyzed the influence of legal institutions; Beck, Demirguc-Kunt and Levine (2001) added, that type of legal system influences on economic growth not directly, but through the degree of financial markets' development, actually proving that the role of the services provided by the financial system is critical to the successful implementation of investments and sustainable economic growth; Beck and Laeven (2005) had

studied the dynamics of institutional development in transition economies determined that this dynamics caused by the presence of natural resources and singularities of historical experience.

To measure the quality of institutional factors the following statistical indicators are used (Tambovcev & Valitova, 2007):

- Natural quantitative parameters (e.g. indicators that enshrined in legislation, macroeconomic indicators);
- Expert estimation;
- Binary variable (based, for example, on surveys of enterprises and households as users of public services):

$$d_i = \begin{cases} 1, & \text{if institution operates} \\ 0, & \text{otherwise;} \end{cases} \quad (1)$$

- A proportion of agents. Herewith one of the approaches is to consider institutional change as a process:

$$P = \frac{e^{f(x_t, x_{t-1})}}{e^{f(x_t, x_{t-1})+1}}, \quad (2)$$

where P – the proportion of agents, who are using new institute,

x – a set of factors influencing the share, considering training;

- Indices of institutional development.

In this thesis we will use the last one from the listed above statistical indicators, because indices themselves, being the composite indicators, in fact compile all existing approaches.

Institutional quality indicators

At the present time a number of regularly updated international indices and ratings exist, reflecting certain national institutional aspects, including the level of investment's and business' risks, the degree of economic and political freedoms, corruption level, etc. These estimates are published as by major international organizations such as, for example, OECD, World Bank, UNCTAD and independent research centers and public organizations, such as Fraser Institute, Transparency International, the Heritage Foundation, Freedom House and others, as well as private consulting firms and rating agencies, for example, AT Kearney, Standard & Poor's, Global Insight, Goldman Sachs. The set of the most authoritative indices of institutional development, encompassing all earlier listed classification groups, is represented below in the Table 3.3.1, as well as publishing them corresponding organizations.

Legal and Regulatory institutions

Family of Worldwide Governance Indicators (WGI), based on the researches of the World Bank Institute and The Research Department of the World Bank, covers six basic aspects of a state management and is reflected by the six aggregate indicators:

1. Rights of citizens and public accountability (*Voice and accountability)* – reflects perceptions of the extent to which a country's citizens are able to participate in selecting their government, as well as freedom of expression, freedom of association, and a free media (WGI, 2015),

2. Political stability and absence of violence (*Political Stability)* – reflects perceptions of the likelihood that the government will be destabilized or overthrown by unconstitutional or violent means, including politically-motivated violence and terrorism (WGI, 2015),

3. Government effectiveness – Reflects perceptions of the quality of public services, the quality of the civil service and the degree of its independence from political pressures, the quality of policy formulation and implementation, and the credibility of the government's commitment to such policies (WGI, 2015),

4. Quality of regulatory institutions (*Regulatory Quality)* – reflects perceptions of the ability of the government to formulate and implement sound policies and regulations that permit and promote private sector development (WGI, 2015),

5. Quality of legal institutions (*Rule of Law)* – reflects perceptions of the extent to which agents have confidence in and abide by the rules of society, and in particular the quality of contract enforcement, property rights, the police, and the courts, as well as the likelihood of crime and violence (WGI, 2015),

6. Anti-corruption monitoring (*Control of Corruption)* – reflects perceptions of the extent to which public power is exercised for private gain, including both petty and grand forms of corruption, as well as "capture" of the state by elites and private interests (WGI, 2015).

Institutions of Economic Coordination and Risk-sharing

One of the examples for this group is an indicator developed by the World Bank, which is represented as a Domestic credit to private sector (% of GDP). Domestic credit to private sector refers to financial resources provided to the private sector, such as through loans, purchases of non-equity securities, and trade credits and other accounts receivable, that establish a claim for repayment. For some countries these claims include credit to public enterprises (The World Bank, 2013).

Institutions of Human Capital Development

Quality of Institutions from that group can be accessed along with others by a Human Development Index (HDI), which is elaborated by UN's specialists. The HDI is a composite statistic of life expectancy, education, and income indices used to rank countries into four tiers of human development (low, medium, high and very high) (UN, 2013).

Table 3.3.1: Indices of Institutional Development and elaborating them organizations

Legal institutions	Freedom House's Political Rights Index, Fraser Institute's Economic Freedom of the World, Index of political structure (Polity IV) Transparency International's Corruptions Perceptions Index, PRSG's (Political Risk Services Group) International Country Risk Guide
Regulatory institutions	World Bank's Costs of doing business, EBRD's Transition Indicators Heritage Foundation's Index of Economic Freedom, World Bank's Worldwide Governance Indicators Environment Quality for economic growth (GS GES) Index of restrictions on foreign direct investment (OECD) The Public Integrity Index and most of the Indexes from above
Institutions of Economic Coordination and Risk-sharing	Index of liberalization World Bank's Domestic credit to private sector (% of GDP) Credit and banking system, stock market, pension funds, insurance companies and insurance state institutions (institutions of deposit insurance), investment funds, public and private venture capital firms and agencies
Institutions of Human Capital Development	UN's Human Development Index, OECD's PISA, World Bank's Knowledge Economy Index

Source: Own elaboration.

3.3.2. Rent-seeking models

The expression "rent-seeking" was introduced in 1974 by Anne Krueger. The word "rent" does not refer here to payment on a lease but stems instead from Adam Smith's division of incomes into profit, wage, and rent (Ross, 2010). The origin of the term refers to gaining control of land or other natural resources.

In public choice theory rent-seeking is spending wealth on political lobbying to increase one's share of existing wealth without creating wealth. The main effects of rent-seeking are manifest in reduced economic efficiency through poor allocation of resources, reduced wealth creation, lost government revenue and increased income inequality. Rent-seeking is an attempt to obtain economic rent, i.e., the portion of income paid to a factor of production in excess, which is needed to keep it employed in its current level of use, by manipulating the social or political environment, in which economic activities occur, rather than by creating new wealth. Rent-seeking implies extraction of uncompensated value from others without making any contribution to productivity. In many market-driven economies much of the competition for rents is legal, regardless of harm it may do to an economy. However, some rent-seeking competition is illegal – such as bribery, corruption, smuggling and even black market deals (Henderson, 2008). Rent-seeking is distinguished in theory from profit-seeking, according to which entities seek to extract value by engaging in mutually beneficial transactions. Profit-seeking in this sense is the creation of wealth, while rent-seeking is the use of social institutions and power of government to redistribute wealth among different groups without creating new wealth (Conybeare, 1982). In practical context, income obtained through rent-seeking may of course contribute to gain of profits in common, accounting sense of the word.

Current studies of rent-seeking focus on the manipulation of regulatory agencies to gain monopolistic advantages in the market imposing, thus, disadvantages on competitors.

3.3.3. Dutch disease

The term “Dutch disease” appeared after a crisis in the Netherlands in the 1960’s that happened due to discoveries of vast natural gas deposits in the North Sea. The newfound wealth caused the Dutch guilder to rise, making exports of all non-oil products less competitive on the world market (Conybeare, 1982). The “Dutch disease” term itself was coined by “The Economist” (1977) to describe the decline of the manufacturing sector in the Netherlands after the discovery of a large natural gas field in 1959.

Economic model of the “Dutch disease” was developed in 1982 by Australian economist (German origin) Warner Max Corden and his Irish colleague Peter Neary. According to this model any economy is divided into three sectors: sector of non-tradable goods and services, i.e. goods and services that could not be moved between countries; rapidly growing sector of tradable goods (usually various types of raw materials); non-growing sector of tradable goods (manufactured goods available for export and import). In case of a sharp rise in the commodity

sector the latter starts to pick up labor resources from the industrial sector, in which so-called "direct de-industrialization" takes place. In addition, higher incomes of people working in the primary sector increase consumption and, hence, the demand for non-tradable goods and services that drives up their prices and flow of labor force from industry to services. In industry at the same time appears the effect of "indirect de-industrialization".

In economics Dutch disease is the apparent relationship between the increase in exploitation of natural resources and a decline in manufacturing sectors (or agriculture). The mechanism is the following: an increase in revenues steamed from natural resources exports (or inflows of foreign aid) will make a given nation's currency stronger compared to currency of other nations (national currency appreciation), which results in the nation's other exports becoming more expensive for other countries to buy, making the manufacturing sector less competitive. Although Dutch disease is generally associated with a discovery of new natural resources, it can occur as a result of a large inflow of foreign currency associated mainly with a sharp growth of natural resource prices, foreign assistance or foreign direct investment (Ebrahim-Zadeh, 2003). Dutch disease has two main effects:

1. A decrease in price competitiveness and consequent decrease in export of manufactured goods in the affected country,
2. An increase in imports of products of mainly high added value.

In the long run, both these factors can contribute to moving manufacturing jobs to lower-cost countries. The result would be that non-resource industries are negatively affected by the increase in wealth generated by the resource-based industries, unemployment increases and GDP growth stops and even declines. All mentioned consequences lead to a sharp fall in a country's competitiveness as a whole (Ebrahim-Zadeh, 2003).

3.3.4. The role of crude oil and natural gas in the Russian economy

As the prominent American specialist on the Russian economy Clifford Gaddy points out, every investigation of the Russian economy should start with an analysis of Russia's oil and gas sector, which according to him "will continue, for the predictable future, to be the key to the country's economic development" (Gaddy, 2004).

According to the research done by Bordoff and Houser in 2014, the share of mineral products in total exports of Russia accounted for 68%, and more than a half of Russian export revenues in 2013 (54.1%) were received from oil and petroleum products. Table 3.3.2 and Figure 3.3.1 given

below illustrate the corresponding figures. Machinery, electronics and other high-tech industries' output share accounted for just 7-8% of national GDP in 2013.

Table 3.3.2: The significance of oil and gas exports to the Russian economy, in 2013

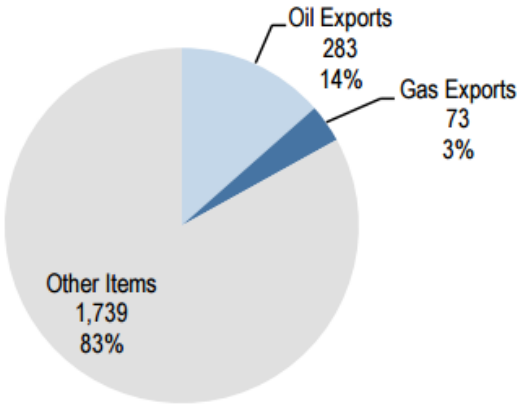
Export Revenues	billion of USD	% of GDP	% of Export Revenues
Crude Oil Export	174	8%	33%
Oil Products Export	109	5%	21%
Total Oil Export	283	14%	54%
Total Natural Gas Exports	73	3%	14%
Total Oil & Natural Gas Export	**356**	**17%**	**68%**

Source: BOFIT, Central Bank of Russia, metals & mining export revenues from Goldman Sachs.

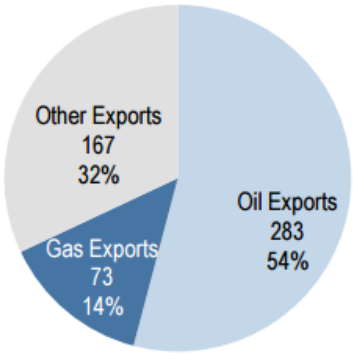
Figure 3.3.2 given below depicts some key indicators of that sector in dynamics.

Figure 3.3.1: Export of mineral products' contribution to Russian GDP and government revenues in 2013

Russian GDP: 2,095 billion USD



Russian export revenues: 523 billion USD



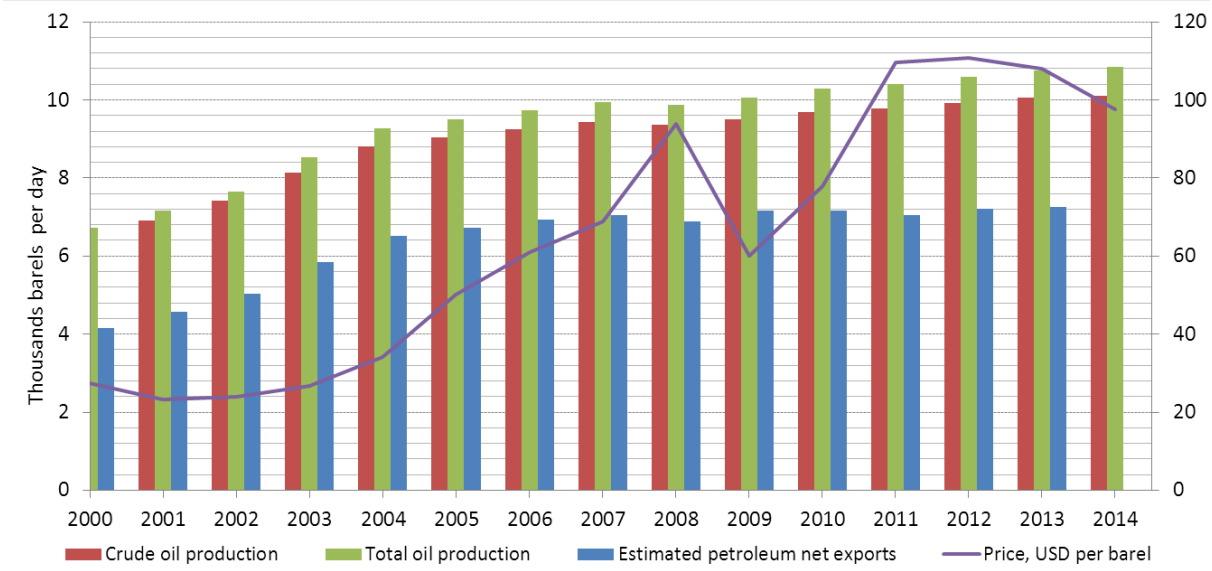
Source: BOFIT, Central Bank of Russia, metals & mining export revenues from Goldman Sachs.

Some other important indicators reflecting the role of crude oil in the Russian economy are given as Appendices (see Figure A-2: Russia's crude oil and condensate exports by destination in 2014; Figure A-3: Estimated proved natural gas reserves, as of December 1, 2014; Figure A-4: Russian GDP and the oil price; Figure A-5: Break-even point for national budgets; Figure A-6: Russian government debt to GDP).

Any resource abundant country seeks to find ways of diminishing theirs dependence on mineral raw materials, as well as corresponding negative consequences of this dependence, which can manifest, among others, in the development of Dutch disease. For that reason, Russian government's activity aimed at regulation and support of, for example, agriculture has increased recently. The necessity of receiving by agriculture a state support, including financial support, aimed at stimulation of its efficiency growth, is determined by the characteristics of the agrarian sector. Among these characteristics can be listed the following ones: the impact of climatic factors that determine the creation and development of the insurance system with the direct participation of the state; price volatility, which depends on market conditions and is characterized by low elasticity of demand for agricultural products; a low degree of monopolization of agricultural production compared with other sectors of the economy; lack of capital inflows into intensive agriculture, which cannot have a return on investment greater than in other areas (Shkarupa, 2010; Batmanova et al, 2014). Nevertheless, despite Gaddy's belief (2004), the recent policy direction for reforming Russia's industrial structure should also be noted. As it is known, the Russian government has adopted a policy to target economic development away from heavy dependence on oil and gas (Kuboniwa, M., 2011). The most important events in agricultural policy during the years selected for the analysis in the present paper (from 2000 to 2014) were the national project "The Development of Agricultural Complex" (2006-2007), the Food Security Doctrine of the Russian Federation (2010), and Russia's accession to the World Trade Organization (in 2012). The adoption of these documents has established a new formal framework for agricultural business, created a space for emerging possibilities to change the situation in the country's agriculture (Barsukova, 2013). Within the frameworks of these directives, a number of development projects were launched to support agrarian producers, what emphasizes the fact of increasing potential and perspective significance of the Agrarian sector in the Russian economy (Shkarupa, 2010).

Among the tool preventing development of Dutch disease a monetary policy can be mentioned. Also it serves as one of the effective tools that enable governments to counteract adverse macroeconomic influences of Dutch disease (Taiebnia & Shakeri, 2012).

Figure 3.3.2: Production and Exports of oil in Russia in relation to price of ctude oil



Source: Own elaboration based on EIA "Energy Information Administration" official webpage: http://www.eia.gov/beta/international/country.cfm?iso=RUS

For that reason the exchange rate policy as a part of monetary policy and consequent dynamics of the real effective exchange rate of Russian ruble will be investigated in more detail in one of the next subsections.

3.4. Theories of exchange rate and factors affecting exchange rate

All the variety of exchange rate theories can be reduced to the following main approaches: normative and positive. The positive approach considers the exchange rate as an objective fact by analyzing its dynamics along with forecasting its future values. The normative approach explores the question of what an exchange rate should be in terms of optimal economic policy (Meltzer, 2005). So, in order to improve the effectiveness of a government policy, it is necessary to know both advantages and disadvantages of all existing normative exchange rate theories. At the same time, under the floating exchange rate regime the effectiveness of any member of the foreign exchange market depends on how successfully a forecast of the exchange rate produced, which in turn depends on justified choice of appropriate positive exchange rate theory.

3.4.1. Normative theories of exchange rate

The evolution of normative theories took place in parallel with the development of the International Monetary and Financial System. The following five areas in the development of normative theories can be highlighted: classical, nominalistic, neoclassical, Keynesian and theory of optimum currency areas (see Table 3.4.1).

Table 3.4.1: Development of the World Monetary System and normative theories of exchange rate

World Monetary System's phase of development, the regime of currency exchange rate	Normative exchange rate theories emerging in corresponding period
The Gold Standard (1820 – 1922). Fluctuating exchange rate within the gold points.	Classical theory
The Genoese Monetary System (1922 – 1944). Floating exchange rate without gold points (after 1930).	Keynesian theories (theory of regulated exchange rate; hypothesis of neutral exchange rate; theory of elastic parities; theory of elasticity; profit absorption approach). Nominalist theory of exchange rate.
The Bretton Woods system of fixed exchange rate (1944 – 1977). Fixed parities and exchange rate (±0.75; ±1 %).	Neoclassical theories: normative theory of exchange rate; theory of floating exchange rate. Theory of key currencies. Theory of fixed exchange rate.
The Jamaica's monetary system of floating exchange rates or the present international monetary system (1977 – up to present time). Free choice of exchange rate regime.	Hypothesis of market efficiency and further development of the floating exchange rate theory. Theory of optimum currency areas.

Source: Own elaboration based on Panilov (2009).

Each of these areas is characterized by own exchange rate regime, the process of establishing macroeconomic equilibrium, the presence of effects on the exchange rate from governments and use it as a tool of public policy. The criteria determining main directions of normative theories' evolution are listed in the Table 3.4.2.

Table 3.4.2: Demarcating criteria of main normative exchange rate theories

Direction	Regime	Exchange rate is influenced by governments and used as a tool of government policy	Establishing of macroeconomic equilibrium
Classical	Fixed	Yes	Balance of payments' automatic regulation via Mint parity
Nominalistic	Fixed	No	Balance of payments' automatic alignment occurs on the basis of price levels in each country
Neoclassical	Floating	Pure normative direction – Yes Theory of floating ER - No	Floating exchange rate contributes to balance of payments' automatic alignment
Keynesianism	Regulated exchange rate (either fixed or floating)	Yes	Exchange rate serves as a main tool with a use of which an internal and external equilibrium is achieved
Theory of optimum currency areas	Fixed	Yes	In countries that are part of a currency area an internal and external equilibrium is maintained by means of monetary, fiscal and foreign exchange policies

Source: Own elaboration based on Panilov (2009).

3.4.2. Positive theories of exchange rate

In accord with literature, there are three main stages in the development of positive exchange rate theories. In the first stage, covering the time period from the XVIII century to the 1970s, an exchange rate was determined on the basis of the commercial approach, which assumes that the demand for the national currency occurs mainly in the commodities markets. In the second phase, from 1970 until 1990, exchange rates are determined on the basis of sales and purchases of assets.

Table 3.4.3: Classification of positive exchange rate theories according to stages of their development

Stages	Positive exchange rate theories emerging in corresponding period	
I Stage (from XVIII – 1970): Merchandise trade approach to determination of exchange rate. Flow Models	Purchasing Power Parity (PPP)	
	Mundell-Fleming Model	
II Stage (1970 – 1990): Active approach to exchange rate analysis. Stock-Flow models.	Hypotheses of covered and uncovered interest rate parity (CIP and UIP)	
	International Fisher Effect	
	The efficient market hypothesis (EMH).	
	Monetary approach	Monetary model with rigid prices
		Monetary model with flexible prices
	Portfolio approach	Model of homogeneous preferences
		Model of small economy
		Model of local preferences
	Balance of payments theory	
III Stage (1990 – up to present):	Microeconomic foundations	
	New macroeconomic theory	
	Exchange trading systems	
	Untheoretical modeling	
	Synthetic models	

Source: Own elaboration based on Panilov (2009).

During the third stage theories based on microeconomic and microstructure foundations are developed, at the same time synthetic models emerged, which consider many factors. The evolution of positive theories is reflected in Table 3.4.3.

The most common emphasis here, in contrast to the monetary-approach of the 1970s, is to consider foreign trade flows as the primary determinant of exchange rates. It is connected to some governments' tendencies to keep tight restrictions on international flows of financial capital. "The role of exchange rate changes in eliminating international trade imbalances suggests that we should expect countries with current trade surpluse to have an appreciating

currency, whereas countries with trade deficits should have depreciating currencies. Such changes in exchange rate will lead to changes in international relative prices, which will evelnually eliminate the trade imbalance" (Crowder, 2011).

Some of the most popular positive theories and hypotheses are described in more details below.

Theory of Purchasing Power Parity

Purchasing Power Parity (PPP) is the economic theory in accordance to which the price levels between two countries must hold the same after exchange-rate adjustment. The law of one price serves as a base for this theory, implying that a cost of an identical commodity should be the same everywhere. Consequently, if a big difference in price between two countries exists for the identical product after exchange rate adjustment, an arbitrage opportunity is appeared, since this product can be bought from the country that vends it for the lowest price. The ratio that mathematically describes PPP is the following (Taylor & Taylor, 2004):

$$e = (P_A - P_B)/(1 + P_B), \tag{3}$$

where e – is the exchange rate; P_A and P_B – are the inflation rates for country A and B respectively.

For instance, if the inflation rate in country A is 5% and the inflation rate in country B is 3%, then B's currency is supposed to appreciate 4.76% against currency of A.

$$Expected\ Currency\_A\ appretiation = (P_A - P_B)/(1 + P_B) = \frac{0.05-0.03}{1+0.03} = 0.19\ \%.$$

Theory of Interest Rate Parity

The conception of Interest Rate Parity (IRP) resembles PPP theory. It asserts if two assets in two different countries have similar interest rates and simultaneously if the risk for each of them is the same, then there is no arbitrage opportunities. The foundation for IRP is the law of one price too, which in this case implies that purchasing of one investment asset in one country as expected will yield the same return as the same asset in another country; otherwise exchange rates should have to adjust to eliminate the difference. The ratio that formalizes IRP is as follows (Childs, 2002):

$$i_A - i_B = \frac{F-S}{S}(1 - i_B), \tag{4}$$

where F – is the forward exchange rate; S – the spot exchange rate; i_A and i_B – are the interest rates in country A and B respectively.

Theory of International Fisher Effect

The theory of International Fisher Effect (IFE) asserts that the exchange rate between two countries' currencies should adjust by an amount similar to the difference between nominal interest rates in these countries. If the nominal rate in A_country is lower than in B_country, the currency of the country with the lower nominal rate as expected will appreciate against the higher rate country by equal amount. The formalization of IFE is the following (Ortiz & Monge, 2015):

$$e = (i_A - i_B)/(1 + i_B), \tag{5}$$

where e – is the exchange rate; i_A and i_B – are nominal interest rates for country A and B respectively.

Balance of Payments Theory

Any country's balance of payments consists of two main parts: current account and capital account. In this statement a country's goods and capital inflows and outflows are reflected. The balance of payments theory considers namely the current account, which deals with trade of tangible commodities. If a country is running a significant current account deficit or surplus it is a sign of country's exchange rate disequilibrium. In order to bring the current account back into equilibrium, the exchange rate will undergo changes correspondingly. If a country is running a current account deficit implying prevailing imports, the domestic currency will depreciate. In contrast, if a country is running a current account surplus, which means that exports exceed imports, the domestic currency will appreciate. The Balance of Payments Theory is formalized by the following identity (Krueger, 1969):

$$BCA + BKA + BRA = 0, \tag{6}$$

where BCA – is the current account balance; BKA – is the capital account balance; BRA – is the reserves account balance.

Real Interest Rate Differentiation Model

According to this model countries with higher real interest rates will face their currencies appreciation against currencies of countries providing lower interest rates. The explanation for that is that investors from all over the world in order to earn higher returns tend to move their monetary funds to those countries which provide higher real interest rates. This process leads to

an increasing demand for local currency and eventually real exchange rate of the latter appreciation (Arghyrou et al, 2005).

Asset Market Model

This model considers the monetary funds' inflow into a country steaming from foreign investors in order to buy various financial instruments (stocks, bonds and others). If considerable inflows by foreign investors are observed in a country, the price of its currency is supposed to increase. The reason for that is that this country's currency needs to be purchased by the foreign investors. The Asset Market Model looks at the capital account of the balance of trade and compares it with the current account in the prior theory (Merton, 1973).

Monetary Model

The Monetary approach makes an emphasis on a country's monetary policy and considers the latter as a main determinant of a corresponding country's exchange rate. Monetary policy of any country copes with money supply. The latter is defined by both the interest rate which is in turn determined by a central bank and the amount of money in circulation. Countries that follow a monetary policy based on rapid increase in the money supply will face inflationary pressure. This eventually brings this country's currency to devaluation (Dornbusch, 1979).

All mentioned above theories, hypothesis and approaches are based on assumptions of perfect situations and designed to exemplify main fundamentals affecting currencies. At the same time, in reality there is no single theory that is capable to predict future currency fluctuations with a maximum accuracy. The significance of each of these theories depends on an every market's specific environment. Conflicts among the theories may arise due to existence and influence of the other factors that are described in the next subsection.

3.4.3. Factors influencing exchange rate

As a rule, existing economic theories described above may predict a potential change in currencies' exchange rates on the long term, but on a shorter-term, day-to-day or week-to-week basis, the factors that listed below have a more significant impact. To have a possibility to predict changes in the exchange rate, as well as to develop theoretical and empirical models determining its dynamics, one needs to have a clear understanding of the factors that may influence the behavior of the exchange rate. That is why the review and classification of factors affecting the exchange rate behavior becomes very important (George et al, 1999).

In the modern realities economic data of a country such as, gross domestic product (GDP), gross national product (GNP), data on employment, interest and inflation rates are very often considered in the international financial markets as data analogous to a company's latest earnings data. Similarly to the way that financial news and latest events are capable to influence a company's stock price, news and information about a country's economic situation may have a significant effect on the fluctuations and trends of development of that country's currency. Alterations in unemployment, interest and inflation rates, as well as consumer's confidence, GDP level and political stability may result in enormous earnings or losses depending on the nature of the announcement and the current state of the country. The economic indicators that are listed below are commonly considered as factors which have the supreme impact on exchange rate of a currency regardless of which country the announcement comes from.

Data on Employment rate

Almost all countries all over the World publish data about the number of residents that are employed within that economy at the moment. Usually, employment growth signalizes about a country's economic prosperous, while unemployment growth is a sign of potential contraction of a country's economy. Strong employment data may contribute to a currency appreciation, since high employment rate it is a sign of economic health and recovery. On the other hand, high employment can also lead to inflation growth, which in turn could induce the currency depreciation.

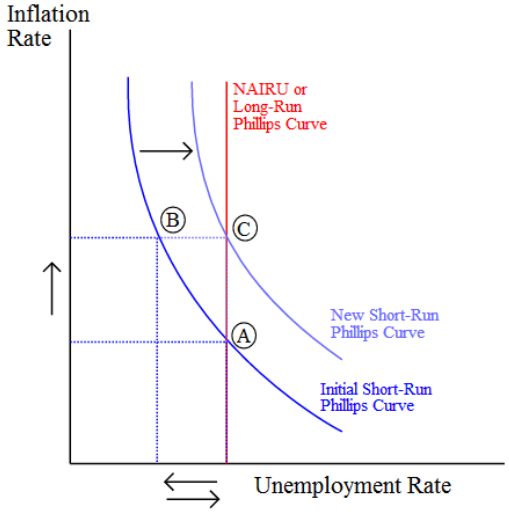
Data on Inflation rate

Inflation rate data, reflecting the increases and decreases of price levels over a certain period of time in a country, affect this country's exchange rate the following way. Price increases, which imply inflation growth, lead to currency depreciation. One of the indicators expressing inflation rate is the Consumer Price Index, which is usually published released on a monthly basis.

Inflation and unemployment rates are interconnected by a Phillips curve - a graphical representation of the expected inverse relationship between inflation and unemployment. This curve was proposed in 1958 by the English economist William Phillips, who based on empirical data for England for years 1861-1957 brought the correlation between unemployment and the change in growth rate of salaries (Blaug, 1994). This dependence initially showed the relationship of unemployment and changes in wages: the higher the unemployment rate is, the smaller is the change in salaries' growth rate, the lower is consequently the price increases; and vice versa – the lower unemployment (which implies higher employment) is, the greater is the growth rate of salaries, the higher thus is the growth rate of prices. It was subsequently

transformed into the relationship between prices and unemployment. In the long run, according to Friedman this relationship is a vertical straight line, showing thus no relationship between inflation and unemployment (Brechling, 1968).

Figure 3.4.3: Short-Run Phillips Curve before and after Expansionary Policy along with Long-Run Phillips Curve



Source: Blaug (1994).

However, the stagflation that struck the developed countries' economies in the 1970s discredited the idea of the Phillips curve. Followers of the Keynesianism, who in fact shared the basic premise of this theory, were forced to admit that there is no clear inverse relationship between inflation and unemployment rate, and other options may exist.

Interest Rates

According to a number of economic theories interest rates are considered as a main indicator influencing exchange rates. A country's Central Bank aiming at regulation monetary supply within a country focuses on interest rate, which is employed to adjust the country's monetary policy. Interest rate is determined by the bank rate, or the rate at which commercial banks can borrow and lend to the Treasury (Cox, Ingersoll, & Ross, 1985).

Gross Domestic Product

The gross domestic product of a country is a measure of all the finished goods and services that a country produced during a given period, commonly one year. The GDP value can be split into four categories: private consumption, government spending, business spending and total net exports. GDP is usually considered as the best overall measure of a country's economic success.

When GDP growth is recorded it means that economy starts to grow. The healthier a country's economy is, the more attractive it is to foreign investors, who become more willing to invest their monetary funds into this economy. This, in turn, can often lead to a growth of the given country's currency value that is a currency appreciation. In opposite case the situation will be reverse; currency will tend to depreciate (Investopedia, No date).

Data on Retail Sales and Amount of Manufactured Durable Goods

Retail sales data reflects volumes of sales made during the analyzed period. Thus indicator in fact provides one with information regarding consumer spending. Statistical offices when measuring retail sales do not take into consideration all stores, but, similarly to approach used in GDP measuring, use just a group of stores that deal with a specified variety of goods to get an idea of consumer spending in average. Retail Sales indicator provides one with an idea of how a given country's economy is strong, since growth in consumers' spending points to an increasing strength of an economy (Investopedia, No date).

The data on the amount of durable goods (those with a lifespan of more than three years) manufactured in the economy measures the amount of these goods that were ordered, shipped and unfilled for the analyzed period of time. These goods are, for example, planes, machines, cars, equipment and appliances. The number of such goods manufactured in the economy provides indirectly economists with an idea of whether consumers are ready to pay much, which reflects their solvency. It, thus, means that individual spending on these longer-term goods is high, emphasizing simultaneously good production possibilities of the manufacturing sector. This measure again gives an insight into the economy's health (Investopedia, No date).

Data on Trade and Capital Flows

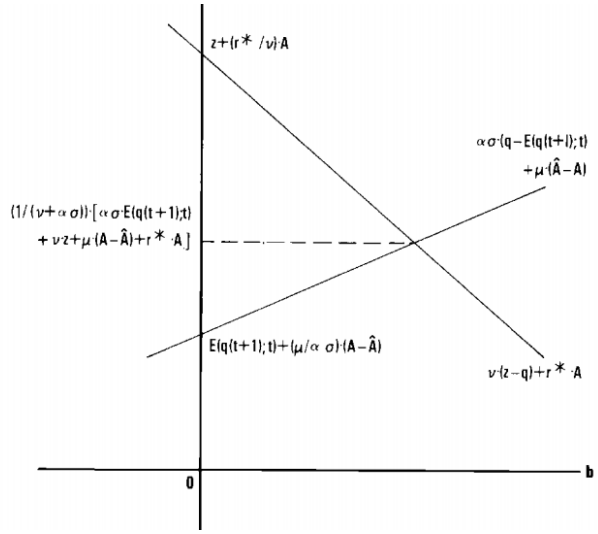
Exchange of goods and services within the frameworks of foreign trade among countries create enormous monetary flows. The latter to a significant extent can influence the value of corresponding participants' currencies. According to foreign trade theories, a country that imports much more than it exports may face its currency depreciation (its value decrease) since in order to buy foreign goods and/or services a given country needs in advance to buy currency of exporting country on financial markets via selling its own currency, which creates downward pressure on the value of domestic currency. On the contrary, increased demand for exporting's country goods can result in to substantial increases in the value of this country's currency (Auboin & Ruta, 2011).

Trade flow data considers the distinction between a country's imports and exports. A trade deficit appears when imports are higher than exports. Capital flow data considers the distinction

between the amount of currency being brought in through investment and/or exports and currency being sold for foreign investments and/or imports. When a country faces increased monetary flows steaming from foreign investors, who purchase domestic assets such as stocks or real estate, it usually leads to a capital flow surplus (Investopedia, No date).

The financial document that combines in total a country's trade and capital flow over a period of time is called Balance of payments. The balance of payments can be semantically divided into three main parts: the current account, the capital account and the financial account. The current account deals with the flow of goods and services among countries. The capital account considers the exchange of money among countries that arises due to mutual purchasing of capital assets. The financial account deals with the monetary flow among appearing with the aim of investments (Sutherland, 2002).

Figure 3.4.4: Balance of payments equilibrium and the equilibrium real exchange rate

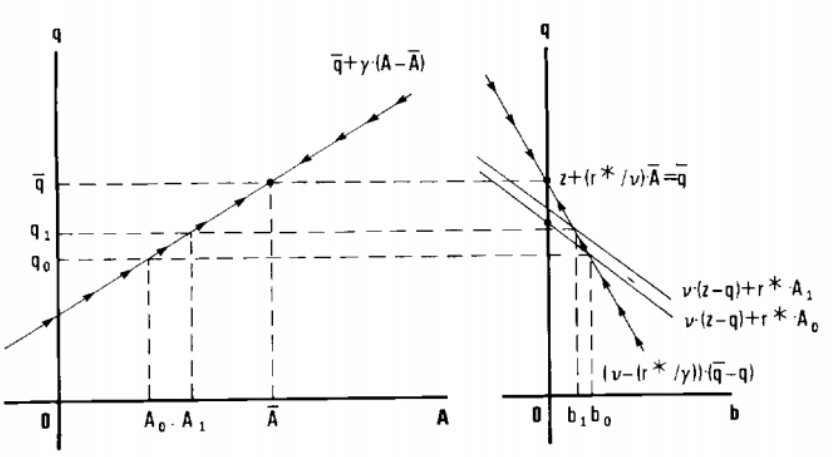


Source: Mussa (1984), available on-line at: http://www.nber.org/chapters/c6829.pdf

Figure 3.4.4 may be interpreted in the following manner: "q(t) represents the "long-run equilibrium exchange rate" that is expected to be consistent with the current account balance (b = 0) on average in the present and in future periods, with an appropriate rate of discount, A, for future current account imbalances, and assuming that net foreign assets are currently at their long-run desired level. The long-run desired level of net foreign assets, x(t), is a discounted sum of the expected target levels of net foreign assets in the present and in future periods. The discount rate that is applied to expected future A's in determining x(t) and to expected future z's in determining q(t) depends, in an economically appropriate manner, on the sensitivity of the trade balance of changes in q and on the sensitivity of capital flows to changes in the domestic

real interest rate and to changes in the net stock of foreign assets held by domestic residents. Finally, the current real exchange rate, q(t), reflects both the current estimate of the long-run equilibrium exchange rate, q(t), and the current divergence of A(t) from its long-run desired level, x(t)" (Bilson & Marston, 1984).

Figure 3.4.5: Dynamic interaction among the exchange rate, asset stocks, and current account



Source: Mussa (1984), available on-line at: http://www.nber.org/chapters/c6829.pdf

"Given the exogenous factors affecting trade balance, the higher is 4 the smaller is the trade balance surplus (or the greater is the trade balance deficit) and hence the slower is the rate of accumulation of foreign assets by domestic residents. These relationships imply a dynamic process, which is illustrated in figure given above, in which an initial divergence of net foreign assets from their long-run equilibrium level, A, implies a divergence of the momentary equilibrium level of q from the level that would yield a zero current account balance, and a subsequent sequence of current account imbalances and corresponding changes in net foreign assets that ultimately drive net foreign assets to their long-run equilibrium and q to the level that yields a zero current account balance" (Mussa, 1984).

Macroeconomic and Geopolitical Events

The most significant factors influencing the exchange rates of currencies are macroeconomic and geopolitical events. Among them the following ones can be listed: various wars, political elections, announced changes in monetary policy and financial crises. The mentioned events are able to change or restructure a country's political and/or economic fundamentals. Consequently, increased volatility in corresponding region spread further to other parameters and indicators in

this country. As a result, the value of its currency demonstrates a tendency to decline (Investopedia, No date).

In general, the majority of economic theories that consider foreign currencies exchange deal with parity conditions. A parity condition is an economic interpretation of the price at which two currencies can be exchanged, being based on such factors as inflation and interest rates. Other theories emphasize the importance of such economic factors as foreign trade, capital flows and the way a country runs its operations (Investopedia, No date). Thus, we can conclude that the dominant influence on the behavior of the exchange is exerted by the following economic factors: trade deficit and balance of payments, inflation indices, interest rate, the dynamics of GDP and foreign exchange reserves, data on the money supply. In addition to economic factors, exchange rate fluctuations influenced by political factors as well. It is worth noting that economic and political factors are closely related. The political party with the most seats in parliament, representing the interests of a certain group of people who, in turn, determine the development of the economy. As a result, performance of the policy is determined by the dynamics of economic factors. For example, the main indicator of ongoing monetary policy is the interest rate, and fiscal policy - the amount of income tax. As it is known, taxes and interest rates - are the main levers of influence of the state on business. These two factors have a direct impact on business activity, as an excess or deficit of both goods and money. To predict changes in the exchange rate must also take into account the nature of the foreign policy pursued by the state. This policy is the establishment of customs procedures, tariffs and other levies, prohibitions on import and export, import quotas etc. Foreign economic policy change affects the trade deficit and balance of payments (Acemoglu, Johnson & Robinson, 2005).

3.4.4. Exchange rate policy in Russia: recent changes

Both fundamental characteristics of the Russian economy and external environment play a leading role in shaping the real effective exchange rate in Russia. The observed changes in the real effective exchange rate are largely caused by fluctuations in world commodity prices, and mainly crude oil prices. At the same time the monetary authorities may to a certain extent influence the exchange rate. The former Minister of Finance in the Russian Federation Aleksey Kudrin (2006) asserts that a high growth rate of national currency appreciation is dangerous for any economy, and generally governments avoid the policy of “strong” national currencies. The strongest negative impact of the rapid appreciation of the rouble is perceived by business, since the internal costs start to exceed the costs of similar products’ producing in other countries. The

influence of the external environment on the exchange rate of the Russian rouble was mitigated by appropriate measures of the Russian Federation's Central Bank. The main tool for solving this problem is the Bank of Russia's intervention in the currency market. When the terms of trade improve such interventions lead to an increase in foreign exchange reserves, while during the periods of declining export prices the Bank of Russia's interventions result in decline in foreign exchange reserves. In conducting the exchange rate policy, The Bank of Russia takes into account its impact on the competitiveness of Russian goods in the domestic and foreign markets. Adhering to the policy of maintaining an undervalued currency, governments thereby seek to protect their economies from foreign competition. "The impact of the world financial crisis made the Russian monetary authorities to pass new "Basic directions of general state monetary and credit policy for 2009 and for the period of 2010-2011" in late October 2008. The policy of smooth lowering rouble exchange rate ended in March 2009 with achieving the corridor at RUR 38-41 per the USD/EUR basket compared to RUR 29-30 per the basket in September 2008. The mentioned basket consists of USD 0.55 and EUR 0.45. In early 2010 the Russian Federation monetary authorities made the corridor floating and it reached RUR 33.7-36.7 per the basket in April 2010 due to the rise in world prices of Russian major export commodities" (according to the Report of The All-Russian Market Research Institute). With regard to the latest situation, a floating exchange rate regime is currently underway in Russia. "Effective from 10 November 2014, the Bank of Russia abolished the exchange rate policy mechanism through cancelling the permissible range of the dual-currency basket ruble values (operational band) and regular interventions on and outside the borders of this band. However, the new approach of the Bank of Russia to operations in the domestic market does not provide for complete abandonment of foreign exchange interventions, which can be implemented in case of financial stability threats. <…> As a result of the implementation of this decision, the ruble exchange rate will be determined by the market factors, that should enhance the efficiency of the Bank of Russia monetary policy and ensure price stability. Besides, the new approach to operations in the domestic Foreign Exchange market will contribute to faster adjustment of the economy to changes of external conditions and enhance its resistance to negative shocks" (The Central Bank of the Russian Federation, 2014). This implies that the exchange rate of ruble is not fixed and there are no targets set either for the exchange rate corridor or its fluctuations. Under normal conditions, the Bank of Russia does not intervene to affect the exchange rate of ruble. Nevertheless, in case of necessity and in order to maintain financial stability the Bank of Russia

monitors developments in the Foreign Exchange market and may resort to foreign exchange operations.

4. METHODOLOGICAL FOUNDATIONS OF THE RESEARCH

Given the main aim of this thesis, i.e. to analyze Russian economic performance along with Russian producers' (representing corresponding sectors) competitive position in external and internal markets and via investigation of the real effective exchange rate of ruble in dynamics and quality of Russian institutions to shed some light on the presence of natural resource curse phenomenon in the Russian economy, methodology of the present study rests, correspondingly, on the following several semantic parts:

1. The analysis of Russian macroeconomic indicators;
2. The study of the Russian economy and its sectors competitiveness;
3. The investigation of the Russian economy for the presence of natural resource curse and Dutch disease symptoms, including institutional quality gap analysis along with calculation of the real effective exchange rate of Russian ruble along with analysis of its dynamics;
4. The investigation of interrelation among the structure of Russian export basket (expressed as the ratio of Russian "non-oil" export to "oil" export), GDP growth, crude oil price and the real effective exchange rate of Russian ruble.

The research framework is represented in the map that is visualized on the following Figure 4.1.1.

Economic competitiveness of a state (and its sectors) is a statistical portrait of the ability to participate in international trade, to maintain and increase certain segments in the world markets, to produce goods that meet world standards. Competitiveness being a complex characteristic is expressed through a variety of indicators, such as exports and their share on the world markets, the presence of absolute and relative competitive advantages in foreign trade, the gross domestic product, infrastructure development and many others. That is why in order to achieve the main aim of the present thesis and to answer the research questions stated in the beginning of the study it is required to conduct a comprehensive research on the basis of multi-criteria approach.

Methodological basis of the research bears on the principles of dialectical logic, scientific abstraction and systematic approach that allows considering the socio-economic process in its development and interconnection. Decomposition method will be used, i.e. scientific method, in which the basic idea is to decompose the problem into subproblems, replacing solving of one big issue by solving the series of smaller and simpler tasks.

The key conclusion that emerges from the above given literature review is that there is a need for such analysis, which focuses not only on trade policy, as defined in the narrow sense, but also on complementary institutional analysis, which is required to ensure that nothing impedes successful realization of Russia's competitive advantages.

In other words, methodology of the present study, being based on the main propositions of the Classical trade theory, Keynesian theory of exchange rate and Institutional theory, employs correspondingly foreign trade performance indicators, real effective exchange rate index and indicators of institutional quality. In addition, vector autoregression along with vector error correction model will be employed to investigate the presence of co-integration property between the structure of Russian exports, GDP growth, price of oil and indicator of price competitiveness - REER.

All these methodological parts are described in more detail below in the corresponding subsections.

Figure 4.1.1: The research framework

Data Gathering from the period from **2000 to 2014**

Main Russian macroeconomic indicators: GDP growth, unemployment rate; inflation; CA ratio to GDP

Scores of the Russian economy in WEF and IMD reports (by individual sub-indices and in total);

Russian foreign trade flows' data (exports and imports by selected commodity groups);
Detection of the main Russian foreign trade partners – grouping them;
Total and sectoral trade flows of main Russian foreign trade partners (Ex and Im by selected commodity groups);

Nominal exchange rate of Russian rouble in relation to currencies of the main Russian foreign trade partners (indirect quotation);
Consumer price indices of the main Russian foreign trade partners;
Russian consumer price indices;
Russian monetary reserves and money aggregate (M2) data;

Institutional quality indicators for Russia;
Institutional quality indicators for other selected resource abundant countries;
Data on industrial manufacturing (by selected commodity groups) in Russia.

Calculations and estimations

The success of Russian economic policies:

- Analysis of the main macroeconomic indicators' dynamics; magic quadrangle.

Russian economic competitiveness in the light of WEF and IMD rankings:

- Comparative analysis of Russian position and its individual indicators in relation to those of the rest of the World

Analysis of Russian producers' position in internal markets:

- Calculation of domestic producers' market shares.

Analysis of Russian producers' competitiveness in external markets:

- Calculation of Balassa Revealed Comparative Advantage Index, Vollrath Revealed Competitiveness Index and Lafay trade specialization index.

Price competitiveness of Russian producers:

- Calculation of the real effective exchange rate of Russian rouble;
- Decomposition analysis of NER and inflation rate differences' influences on REER;
- Correlation analysis between main monetary regulators and REER/Inflation rate.

Investigation of the Russian economy for the presence of Dutch Disease and Natural resource course symptoms:

- Calculation of average annual growth rates of industrial manufacturing (by selected commodity groups) in Russia and average annual growth rates of corresponding Russian imports;
- The share of equipment in total Russian imports in dynamics;
- Institutional quality gap calculation across resource abundant countries: comparative analysis.

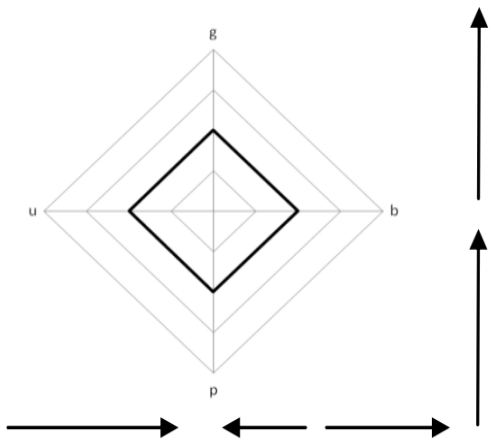
Interrelations among the structure of Russian export basket, GDP growth, price of crude oil and REER:

- Multivariate time-series analysis (VAR/VECM approach with cointegration techniques)

4.1. Macroeconomic performance: magic quadrangle

Every government aims to achieve such a state of the economy, which provides full employment, insignificant or no inflation, external balance and sustainable economic growth.
In the seminal article of Kaldor (1971), where the macroeconomic performance of Great Britain was assessed, the author pioneered an analytical instrument to deal with conflicts in national policy objectives. His approach is based on four economic criteria expressed in quantitative terms as targets: full employment, economic growth, price stability and favorable trade balance (Medrano & Teixeira, 2013). Kaldor noticed that one of these four objectives will always be incompatible with the others. In economic history full employment and economic growth cannot be attained with price stability. Price stability and favorable trade balance cannot be realized concurrently (Mankiw, 2009). However, the Kaldor's article didn't provide readers neither with a mathematical analysis nor with a single diagram. Later, a German scientist and politician Karl Schiller introduced a graphical representation of Kaldor's idea. The resulting intuitive diagram allowed a visual diagnosis of the macroeconomic evolution of a country" (Medrano & Teixeira, 2013). This analytical tool was called later "Magic Square" or "Magic Quadrangle" (see Fig. 4.1.1). Soon after, economists at the OECD began to use this instrument however with a minor modification: Policy Objectives were replaced by Inflation rate indicator.

Figure 4.1.1: Optimal magic quadrangle



Source: Majerova (2015).

The Magic quadrangle is designed in a way that its four axes are aligned with Economic growth (g), Inflation (p), Trade (b) and Unemployment indexes (u). All four axes are measured by different scales, but all of them are expressed in percentages. The state of the economy reflected

by a Magic quadrangle is then related to the size of resulting "area". "Despite this area cannot be calculated, because of the non-uniform scales of the axes, full acceptance had the concept of the ideal, wonderland, economy represented by the larger area of the quadrangle" (Medrano & Teixeira, 2013). "The rule applies that the larger area of quadrangle is, or even farther from the center are the measured values, the success of economic policy is higher" (Majerova, 2015).

Economic objectives, which are aimed at realization of economic policies, are interrelated and interdependent. To achieve these goals the following macroeconomic tools are usually used:

- Fiscal policy, carried out mainly by the government (revenues and expenditures);
- Monetary policy that is carried out mainly by the Central Bank and deals with the amount of money in circulation;
- Incomes policy that is aimed at regulation of wages and prices;
- Foreign policy that aims at GNP growth by means of Foreign Economic Relations.

Magic Quadrangle includes, on the one hand, a stable price level and external economic balance, on the other - a high level of employment and economic growth. Formation of the goals requires careful consideration and detailed specification when projections and work programs are created.

Generally, the economic performance of a country depends on the initial economic conditions and practical economic policy of the government, which usually pursues several objectives simultaneously (Tuleja, 2002). "To achieve mutual harmony of these objectives in economic terms is very difficult. If the government of a country intended to increase economic growth, in the same time it decreases the unemployment rate, which means that these two indicators are complementary. On the other hand, there are contradictory objectives, conflict goals, the example of which is economic growth that is associated with the growth of the inflation rate of the country" (Majerova, 2015). How successfully a compromise solution was found and implemented in a given country can be reflected by the Magic quadrangle.

4.2. Competitiveness of Russian producers in internal and external markets

Indicator of market share

The methodology for calculating market share of domestic producers used in the present research is based on the study of Blank, Gurvich and Ulyukaev (2006). To calculate the share of domestic producers in corresponding internal markets the following data will be used: the volumes of industrial production by selected (9) commodity groups representing corresponding types of economic activity (values are expressed in Russian rubles (RUR)), data on imports and exports of the same commodity groups (raw data were expressed in US dollars and then with the use of corresponding to each period exchange rates were converted to RUR). This data allows for the estimation of the domestic supply (Si) and domestic demand (Di) volumes

$$S_i = Y_i - Ex_i * e, \tag{7}$$

$$D_i = S_i + Im_i * e, \tag{8}$$

where Y_i – volumes of production in *i*-commodity group; Ex_i and Im_i – volumes of exports and imports of *i*-commodity group (in USD); e – RUR/USD nominal exchange rate.

The share of domestic producer in corresponding internal market is then calculated with the use of the following ratio:

$$v_i = S_i / D_i. \tag{9}$$

The position of domestic producers in corresponding external markets is reflected in the present study by Balassa, Vollrath and Lafay indices.

Balassa Revealed Comparative Advantage Index

The Classical theory of comparative advantage predicted that gains from exchange of goods maximize welfare and free trade would lead to world economic prosperity. However, the determinants of comparative advantage differ among various trade theories. The Ricardian theory, for instance, explained comparative advantage from costs and technological differences viewpoint, the Heckscher-Ohlin-Samuelson theory considered factor's price differences, the theory of product cycle examined technological innovation, Neo-technology theory also took into account factor efficiency, but considered a learning-by-doing effect (soft technological change) as the main cause of comparative advantage differences. A comparative advantage faces a measurement problem, as it is defined in terms of autarkic price relationships that are not observable. Trade statistics reflect only post-trade situations (Bender & Li, 2002). The Revealed comparative advantage (RCA) approach, pioneered by Balassa (1965), assumed that the true

pattern of comparative advantage can be observed from post-trade data only. Balassa RCA compares the export share of a given sector in a country with the export share of that sector in the world market. The RCA index is calculated as follows (Balassa, 1986):

$$RCA = (X_{ij} / X_{it})/(X_{nj} / X_{nt}) = (X_{ij} / X_{nj})/(X_{it} / X_{nt}), \quad (10)$$

where X_{ij} – is exports of *j*-commodity from *i*-country; *n* – a set of countries; *t* – a set of commodities.

RCA index is based on export performance and existing trade patterns. It measures a country's exports of a commodity relative to its total exports. Thus, if RCA>1, then a comparatitive advantage is revealed. Up today the Balassa's RCA index is the most common method of calculating the comparative advantages. It served as a base for later developments of new, more relevant to modern economic realities indices. Among later alternative attempts to measure comparative advantage the following the most popular indices can be listed: Vollrath Competitive index (VCA) and Lafay index.

Vollrath Revealed Competitiveness Index

According to approach suggested by Volrath the revealed competitiveness (RC) is calculated as the logarithm of the relative export advantage (lnRXA) minus the logarithm of the relative import advantage (lnRMA). It is expressed as:

$$VRC = RC = lnRXA – lnRMA, \quad (11)$$

where *RXA* equals to Balassa *RCA* index, *RMA* is calculated on the basis of the formula (10), but instead of export flows imports are considered.

Values greater than zero reveal a comparative advantage, correspondingly negative values reveal a comparative disadvantage (Vollrath, 1991).

Lafay index of specialization

The next indicator, which was proposed by Lafay (1992), measures the extent of a country's specialization in a given sector in international dimension. The Lafay index (LFI), by taking into account imports, allows control for intra-industry trade and re-export flows. LFI index weights each product's contribution according to the respective importance in total trade. For a given country *i*, and for any given product *j* (*N* – is a selected set of products), the Lafay index is defined as:

$$LFI_j^i = 100\left(\frac{x_j^i - m_j^i}{x_j^i + m_j^i} - \frac{\sum_{j=1}^{N}(x_j^i - m_j^i)}{\sum_{j=1}^{N}(x_j^i + m_j^i)}\right)\frac{x_j^i + m_j^i}{\sum_{j=1}^{N}(x_j^i + m_j^i)}, \quad (12)$$

where x^i_j and m^i_j – are correspondingly exports and imports of *j*-commodity from *i*-country.

Using this index we consider the difference between each item's normalized trade balance and overall normalized trade balance. Given that the index measures each group's contribution to the overall normalized trade balance, the following relation holds: $\sum_{j=1}^{N} LFI_j^i = 0$. Positive values of the Lafay index indicate the existence of comparative advantages in a given item; the larger the value is, the higher is the degree of specialization. On the contrary, negative values point to de-specialization (Zaghini, 2003).

4.3. Investigation of Natural resource curse and Dutch disease symptoms' presence

4.3.1. Institutional quality analysis

In accordance with the model of Mehlum, Moene, and Torvik (2006) (ongoing Mehlum-Moene-Torvik model) the influence of institutions and resources on economic welfare is not monosemantic and determined by a value of a threshold function. It was shown that an economy operates in one of two modes: either production or embezzlement. Which mode an economy belongs to depends only on a value of a threshold function, precisely above or below it is regarding a certain fixed threshold, which in turn depends on two parameters – quality of institutions (using the terminology of Mehlum, Moene and Torvik (2006), high-quality institutions are considered as "production-friendly" while opposite ones - as "grabber-friendly") and reserves of resources. Later on Kartashov (2006) on the basis of Mehlum-Moene-Torvik model (2006) tested econometrically threshold regression specifications. As a result the empirical analysis of a sample of countries upon two modes has shown that final distribution is consistent with the intuitive notions about these countries. For example, such "countries like USA, Canada, Norway, Australia are curse-free and enjoy economic growth due to their producer-friendly institutions with exceptionally high quality (Feld & Schneider, 2010). The estimation of Kartashov, G. (2006) utilized approximately the same sample of countries, which was used in researches of Mehlum et al (2006) and Sachs & Warner (2001) with a purpose of eventual comparison, and the analyzed period was 1970-2005. Very similar research was done by Sarmidi, Law & Jafari (2013), where authors also using an innovative threshold estimation technique revealed that a threshold effect in relationship between natural resources and economic growth exists. Pursuant to Kartashov (2006) Russian economy till 2005 had been belonging to the embezzlement mode.

Based on mentioned above, the detailed examination of the Russian institutional system's quality in the subsequent period, namely over the past 10 years from 2004 to 2014, becomes quite interesting, as well as to answer the question – whether there had been any movement towards positive change or Russian economy still belongs to the embezzlement mode. However, our data will cover a bit longer period of time to make this analysis better connected with earlier works on corresponding topic. Also in our interest to analyze the current state of the Russian institutional system, as well as the dynamics of the key Russian institutions' development with a parallel comparison obtained data with similar data of other countries, for instance, Norway (as one of the leaders in the field of institutional development and a resource abundant country). For this

purpose we will investigate development trends of the key institutions in a sample of countries on the basis of the most authoritative set of institutional development indicators.

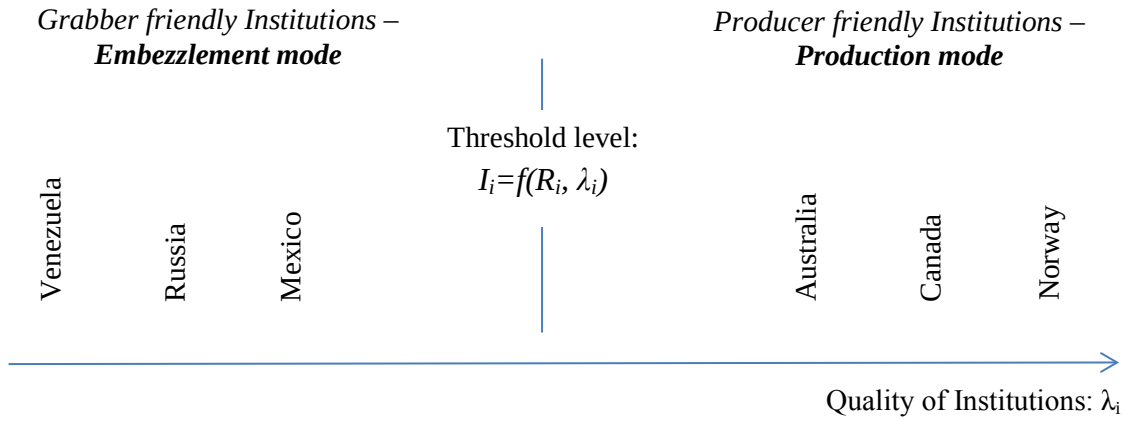
The aim is to identify the position of Russia among selected resource abundant countries with regard to the quality of institutions and its development in the light of the puzzling phenomenon of "natural resource curse" (onwards NRC). The comparison will be done among the following countries: Venezuela, Russia, Mexico, Australia, Canada and Norway. These countries were selected according to their position (from the worst to the best correspondingly) with regard to the threshold level, defined as a function of institutional quality and natural resource reserves of a country within the threshold model. This econometric model had been suggested by Mehlum et al (2006) and refined later on by Kartashov (2006).

Before we start consideration of institutional indices let's take a look at distribution of the selected countries between embezzlement and production modes (see Figure 4.3.1). These resource abundant countries were selected from a set of countries (practically the same countries were considered in the researches of Mehlum et al (2006), Sachs & Warner (1999) and Kartashov (2006)) according to the following criteria – two countries were taken from the depth of the corresponding modes (Venezuela and Norway), two countries situated in immediate proximity from the threshold level (Mexico is below and Australia is above) and the last ones took the intermediate position within corresponding modes (Russia and Canada). Figure 4.3.1 schematically depicts this distribution, where Venezuela, Russia and Mexico belong to an embezzlement mode due to grabber friendly institutions, Australia, Canada and Norway relate to a production mode with respectively producer friendly institutions. The Mehlum-Moene-Torvic model (2006) suggested a threshold level as a function of two parameters - proven reserves of resources and quality of institutions $I_i=f(R_i, \lambda_i)$.

Later on Kartashov (2006), by means of threshold regression, empirically tested the findings of the Mehlum-Moene-Torvic's model (2006) and specified the threshold level as a value of the following threshold function $I_i=\text{II}\left[\frac{R_i(1-\lambda_i)}{\lambda_i} > d\right]$, where R_i – resources, which an i-country possesses ($R_i>0$), λ_i – quality of institutions in i-country ($\lambda \in [0;1]$), d – a threshold (this parameter was estimated on the basis of cross-sectional specification and pursuant to Hansen (1999)). According with the results of Kartashov's (2006) estimations despite the value of the threshold function/level is not constant, the distribution of the selected countries between modes and relative to each other was practically the same, except couple of times when Mexico and Australia had changed their places with regard to the occupied mode. Thereby schematic Figure 4.3.1 illustrates the position of the selected countries up to 2005 year. We will investigate

institutional development of these countries both before 2005 (this will allow to connect present analysis with others earlier) and after till 2014 year.

Figure 4.3.1: Distribution of the selected countries between the modes



Source: Own elaboration based on Kartashov, G. (2006), *Mehlum, H., Moene, K.* and *R. Torvik,* (2006).

The present analysis, being based on the results of mentioned authors, employs in turn index-verification of NRC institutional interpretation. Since institutional system is represented by four main pillars (legal institutions, regulatory institutions, institutions of economic coordination and risk-sharing, and institutions of human capital development) we took one of the most recognizable indexes from each group and analyzed its dynamics for each country with parallel mutual comparison. Thus, the following indexes will be used: family of WGI indexes, which represents both legal and regulatory institutions and provides complex perspective on the institutional framework evaluating such areas as voice and accountability, political stability, government effectiveness, regulatory quality, rule of law and control of corruption, the World Bank indicator "Domestic credit to private sector (% of GDP)", which reflects the performance of economic coordination and risk-sharing institutions, and finally Human Development Index.
In solving the assigned task the methods of logical, comparative, statistical analysis and synthesis will be utilized.

4.3.2. Calculation of the real effective exchange rate of Russian ruble

According to the methodology of the Russian Federation's Central Bank, when constructing the real effective exchange rate index to a basket of foreign currencies, currencies of those foreign trade-partners have to be taken into account, the weight of which in total foreign trade turnover is not less than 0.5%. However, the number and variety of these countries over the period under analysis (from 2000 to 2014) was different. For that reason among Russia's foreign trade

partners were decided to select such countries, the presence and sum of shares of which in the total Russia's foreign trade turnover over the analysed period were relatively constant. The total share of these countries in the total foreign trade turnover of the each year should be not less than 65 %.

Formula for calculation of REER is given below:

$$REER_m = \prod_{i=1}^{n} \left(\frac{P_m}{P_m^k} \cdot \frac{NER_m^k}{NER_{m-1}^k} \right)^{w_m^k}, \quad (13)$$

where $REER_m$ – monthly real effective exchange rate to USD and EUR; P_m – consumer price index that demonstrates the ratio of inflation rate for the month-*m* to previous month-(*m-1*) in Russia; P^k_m – the same index for country-*k*; NER^k_m – the monthly average nominal exchange rate of Russian rouble (indirect quotation) to *k*-currency in month-m; NER^k_{m-1} – the same for the previous month-(m-1); w^k_m – monthly weight of *k*-currency (normalized); $n = 23$; *k* – country.

At the first stage, monthly average index of Russian ruble *nominal* exchange rate relative to a selected currency-*k* ($NERI_m^k$) was calculated. The values of that index are calculated as a ratio of monthly average Russian ruble nominal exchange rate per a selected currency in a given month-*m* to monthly average Russian ruble nominal exchange rate per a selected currency in the previous month:

$$NERI^k_m = NER^k_m / NER^k_{m-1;} \quad (14)$$

At the second stage, monthly average index of Russian ruble *real* exchange rate relatively to a selected currency-*k* in a given month-*m* was calculated:

$$RERI^k_m = P_m * NERI^k_m / P^k_m = P_m / P^k_m * NER^k_m / NER^k_{m-1} = P_m / P^k_m * NERD^k_{m-1} / NERD^k_m; \quad (15)$$

where $RERI^k_m$ – is the real exchange rate of Russian ruble per currency-k in month-m; $NERD^k_m$ – is a direct quotation of the nominal exchange rate of Russian ruble per currency-k in month-m.

At the third and final stage, the real *effective* exchange rate of Russian ruble in relation to all currencies was calculated on the basis of formula (13).

If the calculated value of REER index is higher than unity it means the growth of index relatively to the previous month and vice versa. The growth and decline in index values are expressed in percentages. The level of the previous month was taken as 100% so that a percentage growth/decline in REER index values was calculated as ($REER_m$ – 1) * 100 %. REER index curve measured in percentages is then calculated with the use of the following formula:

$$REER_m(\%) = REER_{m-1}(\%) - (REER_m - 1) * 100\ \%. \quad (16)$$

According to the formula (13) the REER index is influenced by the values of inflation rate (expressed as Consumer Price Index) P_m, P_m^k and nominal exchange rate index NER_m^k. Thus, the resulting value of the REER index can be rewritten as:

$$REER_m = REER\ (P_m) * REER\ (NER_m), \quad (17)$$

where $REER\ (P_m)$ – is a REER index purified from NER_m influence (or when NER_m is constant), but influenced by changes in inflation rate; $REER\ (NER_m)$ – is a REER index purified from P_m influence (or when P_m is constant), but influenced by changes in Nominal exchange rate index.

Following the same as in the formula (13) logic we get:

$$REER\ (P_m) = \prod_{k=1}^{n} (P_m / P_m^k)^{w_m^k}\ ; \quad (18)$$

$$REER\ (NER_m) = \prod_{k=1}^{n} (NER_m^k)^{w_m^k}\ ; \quad (19)$$

Calculation of percentage changes in $REER\ (P_m)$ and $REER\ (NER_m)$ is conducted the same way as it suggested by formula (16):

$$REER\ (P_m, \%) = REER\ (P_{m-1}, \%) - (REER\ (P_m) - 1) * 100\ \%\ ; \quad (20)$$

$$REER\ (NER_{m-1}, \%) = REER\ (NER_{m-1}, \%) - (REER\ (NER_m) - 1) * 100\ \%. \quad (21)$$

Using formulas (16) and (17) we get:

$$REER_m\ (\%) = REER_{m-1}(\%) - (REER\ (P_m) * REER\ (NER_m) - 1) * 100\ \%. \quad (22)$$

In accord with Panilov (2009), since $(x - 1) * (y - 1) = x * y - x - y + 1$, then for any x and y the following identity is true: $x * y = x + y - 1 + (x - 1) * (y - 1)$.

If x and y values differ little from unity, then the following approximate formula is true:

$$x * y \approx x + y - 1. \quad (23)$$

Error of the formula (23) expressed in percentages is then: $((x - 1) * (y - 1))/100\ \%$. Error values become significant, in case if $(x - 1)$ and $(y - 1)$ equal to 10 % and more (Orlov, 2002).

Taking into account that $REER\ (P_m)$ and $REER\ (NER_m)$ do not exceed 5%, consequently we can assert that:

$$REER\ (P_m) * REER\ (NER_m) \approx REER\ (P_m) + REER\ (NER_m) - 1. \quad (24)$$

Substituting expression (18) into (16) we get:

$$REER_m\,(\%) \approx REER_{m-1}(\%) - (REER\,(P_m) + REER\,(NER_m) - 2) * 100\ \%. \quad (25)$$

If we consider right part of the formula (19) separately and simplify it using formulas (20) and (21), we get:

$REER_{m-1}(\%) - (REER\,(P_m) + REER\,(NER_m) - 2) * 100 = REER\,(P_{m-1}\,,\%) -$

$- (REER\,(P_m) - 1) * 100 + REER\,(NER_{m-1},\%) - 100 - (REER\,(NER_m) - 1) * 100 =$

$= REER\,(P_m\,,\%) + +REER\,(NER_m\,,\%) - 100.$

Thus, REER index, where influences of inflation and nominal exchange rate are separated, can be written as:

$$REER_m\,(\%) \approx REER\,(P_{m\,,}\%) + REER\,(NER_m\,,\%) - 100. \quad (26)$$

Formulas (17) – (26) given above show the logic according to which the main formulas (13) and (16) were represented the way allowing distinguishing influences exerted by inflation rate and nominal exchange rate on REER. This decomposition helps to see what factor was the strongest cause of the real effective exchange rate appreciation or depreciation. Taking into account the fact that one of the partial aims of the research is to analyze the recent dynamics of the real effective exchange rate of Russian rouble, the decomposition analysis is seen as justified since it shed some light on the roots of REER fluctuations.

Dutch disease symptoms

According to the literature review done in the previous section of the study, among symptoms pointing to the Dutch disease the following key of them can be listed:

- Domestic currency appreciation;
- The share of equipment in total imports in dynamics;
- Growth rates in Industrial manufacturing vs. growth rates in corresponding imports.

The methodology of evaluation a domestic currency appreciation / depreciation was described in detail above. Analysis for the presence of the second symptom doesn't require any detailed methodology since its investigation is intuitively simple. With regard to the third symptom, methodology of its analysis is provided below.

For a meaningful assessment of any phenomenon development in time, a number of various analytical indicators can be used. One of the most common among them is the average growth rate. The average annual growth rate in industrial manufacturing of selected groups of commodities in the Russian economy as well as the average rate of increase in imports of corresponding groups of commodities is calculated in the present study employing a standard

statistical approach for a time series. The period for the analysis is from 2000 to 2014. The obtained values will then be compared. The results of that comparison are given in the Table 2. The formula used for calculation of the average growth rate is as follows:

$$GRA^{i}_{GO} = ((GO^{i}_{t}/GO^{i}_{t0})^{1/n} - 1)*100\%, \quad (27)$$

where *GRA* – average growth rate expressed in %; GO^{i}_{t} – gross output in sector *i* in 2014; GO^{i}_{t0} – gross output in sector *i* in 2000; *n* – number of observations with the same periodic in the selected period (in our case *n=15*).

The same approach was employed for calculation of the average rate of increase in imports:

$$GRA^{i}_{IM} = ((IM^{i}_{t}/IM^{i}_{t0})^{1/n} - 1)*100\%, \quad (28)$$

where *GRA* – average growth rate expressed in %; IM^{i}_{t} – import in sector *i* in 2014; IM^{i}_{t0} – import in sector *i* in 2000; *n* – number of observations with the same periodic in the selected period (in our case *n=15*).

4.4. Multivariate time series analysis: VAR/VECM approach

4.4.1. The specifics of macroeconomic time-series analysis

A number of models exist to analyze multivariate time series properties and interrelations. Juselius (2014) argues, the most important reason why namely Vector Auto-Regressions (VARs) are especially useful in a description of macroeconomic time series is the possibility of combining short-run and long-run information in the data by exploiting the co-integration property. According to Sims (1980) VAR models provide a coherent and credible approach to data description, forecasting, structural inference and policy analysis.

A VAR is an n-equation, n-variable model (system), in which each variable is expressed as a function of own lags as well as lags of each of the other variables. VAR model was proposed by K. Sims as an alternative to a system of simultaneous equations that involve substantial theoretical limitations. According to Sims (1980) VAR models provide a coherent and credible approach to data description, forecasting, structural inference and policy analysis. As Juselius (2014) argues, the most important reason why VAR models are especially useful in a description of macroeconomic time series is the possibility of combining long-run and short-run information in the data by exploiting the co-integration property: "VAR model, when appropriately allowing for unit roots and, hence, co-integration, offers a potential richness in the specification of economically meaningful short- and long-run structures and components, such as steady-state relations and common trends, interaction and feed-back effects".

The order of VAR model is determined by the order of lag model. The number of equations in the model equals to the number of variables. In general form, VAR (p) model for *k*-variables and *p*-number of lags is written as follows:

$$\begin{cases} x_{t1} = \alpha_1 + \alpha_{11}^{[1]} x_{t-1,1} + \ldots + \alpha_{1k}^{[1]} x_{t-1,k} + \alpha_{11}^{[2]} x_{t-2,1} + \ldots + \alpha_{1k}^{[2]} x_{t-2,k} + \ldots + \alpha_{11}^{[p]} x_{t-p,1} + \ldots + \alpha_{1k}^{[p]} x_{t-p,k} + u_{t1} \\ x_{t2} = \alpha_2 + \alpha_{21}^{[1]} x_{t-1,1} + \ldots + \alpha_{2k}^{[1]} x_{t-1,k} + \alpha_{21}^{[2]} x_{t-2,1} + \ldots + \alpha_{2k}^{[2]} x_{t-2,k} + \ldots + \alpha_{21}^{[p]} x_{t-p,1} + \ldots + \alpha_{2k}^{[p]} x_{t-p,k} + u_{t2} \\ \ldots \\ x_{tk} = \alpha_k + \alpha_{k1}^{[1]} x_{t-1,1} + \ldots + \alpha_{kk}^{[1]} x_{t-1,k} + \alpha_{k1}^{[2]} x_{t-2,1} + \ldots + \alpha_{kk}^{[2]} x_{t-2,k} + \ldots + \alpha_{k1}^{[p]} x_{t-p,1} + \ldots + \alpha_{kk}^{[p]} x_{t-p,k} + u_{tk} \end{cases}, \quad (29)$$

where α_k – free parameters; α_{ij} – autoregression coefficients; u_{tk} – mutually uncorrelated "white noises"; k – number of variables; p – number of lags (Bannikov, 2006).

Estimation of the model parameters can be performed with the use of the least squares method applying it separately for each equation, which makes the use of these models very attractive (Kantorovich, 2003). Estimation of the model (29) is supposed to be done by feasible

generalized least squares (GLS). For this purpose the individual equations will first be estimated by OLS. The residuals will be used to estimate the white noise covariance matrix Σ_u as:

$$\widehat{\Sigma}_u = T^{-1} \sum_{t=1}^{T} \hat{u}_t u_t', \tag{30}$$

where u_t – is a *k*-dimensional unobservable zero mean white noise process with positive definite covariance matrix $E(u_t u'_t) = \Sigma_u$.

The lag order of the exogenous variables x_t , *q*, has to be prespecified by a scientist before modeling. For a range of lag orders, *n*, the model is estimated by OLS (applied to each equation separately).

The optimal lag order will be chosen in the present study by minimizing one of the following information criteria:

$$AIC(n) = \log\det(\widehat{\Sigma}_u(n)) + \frac{2}{T} nK^2, \tag{31}$$

$$HQ(n) = \log\det(\widehat{\Sigma}_u(n)) + \frac{2\log\log T}{T} nK^2, \tag{32}$$

$$SC(n) = \log\det(\widehat{\Sigma}_u(n)) + \frac{\log T}{T} nK^2, \tag{33}$$

$$FPE(n) = \left(\frac{T + n^*}{T - n^*}\right)^K \det(\widehat{\Sigma}_u(n)), \tag{34}$$

where AIC – Akaike information criterion; HQ – Hannan-Quinn information criterion; SC – Schwarz information criterion; FPE – Final prediction error; $\widetilde{\Sigma}_u(n)$ is estimated by $T^{-1} \sum_{t=1}^{T} \hat{u}_t u_t'$, n^* – is the total number of parameters in each equation of the model, *n* – is the lag order of the endogenous variables.

The macroeconomic dynamics crucially depend on the lag order choice because the statistics of interest are functions of the order of the autoregressive lag polynomial (Kilian, 2001). In order to select the number of lags we rested on information regarding the autocorrelation function of the reduced form of VAR residuals and the likelihood ratio tests (Welfe, 2013).

VARs have good explanation properties when applied to covariance-stationary time series, but encounter some difficulties when applied to nonstationary or integrated processes. Comprehensive theoretical developments were made by Granger and Engle in their seminal work “Econometrica” (1987), in which they raised the possibility that two or more integrated, non-stationary time series might be cointegrated, so that some linear combination of these series could be stationary even though each series is not. “If two time series are cointegrated, then the

time series of the deviations from the cointegrating linear combination is stationary. Therefore, the cointegrating linear combination defines a long run equilibrium relationship. The existence of this equilibrium must be due to some real economic forces. <…> In error correction models (VECMs), the direction and the magnitude of the current movement of a variable is a function of its past deviation from the long run equilibrium" (Granger & Engle, 1987).

4.4.2. The analysis for the presence of unit roots

Nelson C. R. and Kang H. (1984) showed that when working with non-stationary time series one can get "spurious" regression among analyzed variables. Since that time any investigation of time series is customary to begin with the test for the presence of unit roots. In case of detecting a unit root there is a need to apply the filter (*1- L*). If there are several individual roots, this filter should be applied several times. Check the data for the presence of unit roots is not difficult, because a various tests for unit roots detecting exist and they described in detail in textbooks on time series analysis.

Somewhat more complicated is the case of dealing with time series which exhibit seasonality (data that were collected periodically). In this case, non-stationary may occur both because of the usual unit root at zero frequency and due to the presence of unit roots at seasonal frequencies. Therefore, the researcher faces a choice whether there is a need to apply the first difference filter, the annual difference or both.

The emergence of the concept of "seasonal unit root" was due to the fact that various time series often exhibit seasonality (a classic example of seasonal series is data on gross output). A number of tests were elaborated to test for seasonal unit roots. The most known among them are: Dickey-Hasza-Fuller (DHF) test (1984) and OCSB test pioneered by Osborn, Chui, Smith and Birchenhall (1988). Conventional tests for unit roots suggest that not only modulus of these roots equal to one, but also unit roots themselves must be strictly equal to one, i.e. such roots correspond to peaks in the data at zero frequency (Hylleberg, Engle, Granger, Yoo, 1990). Moreover, the usual unit root implies the absence of any other roots, which is, generally speaking, not true, because the seasonal data often exhibit different relationships between observations. There may be a connection between, for example, the first quarters alone, separately between the second ones, third ones and separately between the fourth quarters. Graphically this corresponds to not declining variance of the series, when clearly expressed seasonal fluctuations do not damp with time.

Despite general agreement on the importance of seasonality, less so is for its treatment. At the present time, method suggested by Hylleber, Engle, Granger and Yoo in 1990 (HEGY test) has become the universally accepted one of checking seasonal unit roots presence in time series. In addition, the idea underlying the HEGY served as the basis for introducing the concept of seasonal cointegration and the development of methods of its testing.

Therefore, in the present study namely this approach will be discussed in more detail and used for further empirical analysis.

4.4.3. Handling seasonality: HEGY test

In what follows several ways to handle seasonality are listed. Each of them implicitly make different assumptions regarding time series properties (Depalo, 2008):

- a *purely deterministic* seasonal process:

$$y = x\,\beta + \sum_{i=1}^{3} s_i\, D_i\ ; \tag{35}$$

- a *stationary* seasonal process:

$$\varphi(L)\, Y_t = \epsilon_t\ ; \tag{36}$$

$$\varphi(L) = (1 - \phi_4\, L^4)\ ; \tag{37}$$

- an *integrated* seasonal process:

$$(1 - L^4)\, Y_t = \epsilon_t$$

$$= (1 - L)\,(1 + L)\,(1 + L^2). \tag{38}$$

The differences among these approaches "lie in how they react to the shocks to the seasonal patterns. In deterministic seasonal process shocks have no effect on the seasonal pattern, and in stationary seasonal process they have temporary effect which would diminish with time passes by. But in nonstationary process the shocks have non-diminishing effect, causing permanent changes to the seasonal pattern and increasing variance of the series" (Menh and He, 2012). In this light, the nonstationary process which exhibits seasonality "raises the most concern and testing for seasonal unit roots has high priority in the modeling procedure. The misspecification of the type of seasonality would cause severe bias in modeling and forecasting process (Menh & He, 2012).

In accordance with Depalo (2008) a general expression for seasonal processes combines all mentioned above cases and can be compactly represented by the following equation:

$$d(L)\, a(L)\, (Y_t - \mu_t) = \epsilon_t\ ; \tag{39}$$

where

- roots of $a(L) = 0$ lie outside the unit circle;

- roots of $d(L)=0$ lie on the unit circle;
- $\mu_t = x\,\beta + \sum_{i=1}^{3} s_i\, D_i$

Thus, stationary components of y are in $a(L)$, while deterministic seasonality is in μ_t when there are no seasonal unit roots in $d(L)$. Hylleberg et al (1990) proposed a test to detect seasonal unit roots at all seasonal frequencies, as well as at zero frequency. Originally the HEGY test was developed for the quarterly data. In order to do that they considered the Lagrangian approximation: any possibly infinite or rational polynomial $\varphi(L)$ which is finite valued at the distinct, nonzero, possibly complex points $\theta_1,...,\theta_p$, can be expressed in terms of elementary polinomyal and a remainder, as follows:

$$\varphi(L) = \sum_{k=1}^{n} \lambda_k\, \Delta(B)/\delta_k(B) + \Delta(B)\varphi^{**}(L)\ ; \qquad (40)$$

where λ_k - are a set of constant, $\varphi{**}(L)$ is possibly infinite or rational polynomial and $\Delta(B)$ and $\delta_k(B)$ are coefficients.

The expression (40) can be in simpler terms rewritten as:

$$1 - L^s|_{s=4} = (1 - L)(1 + L)(1 - iL)(1 + iL)\ ; \qquad (41)$$

where s – is number of equal periods. Usually, s = 2; 4; 12.

The expression (41) suggests the possible presence of four unit roots: +1 (usual unit root), -1 (the seasonal semi-annual unit root) and +i, –i (quarterly unit roots).

The tables of critical values for testing the null hypothesis of the presence of seasonal unit roots test were drawn up for the various levels of significance, but only for 48, 100, 136 and 200 observations. At the same time authors have developed 5 modifications of the test that either includes or not different deterministic components. The variants of the test are:

1) basic;
2) with a constant;
3) with a constant and seasonal dummies;
4) with a constant and trend;
5) with a constant and seasonal dummy trend.

The basic test is reduced to the construction of the following regression:

$$\Delta_4 Y_t \equiv Y_t - Y_{t-4} = \lambda_1 Y_{1t-1} + \lambda_2 Y_{2t-1} + \lambda_3 Y_{3t-2} + \lambda_4 Y_{3t-1} + \epsilon_t; \qquad (42)$$

where $Y_{1t} \equiv (1 + L + L^2 + L^3)\, Y_t$;

$Y_{2t} \equiv -(1 - L + L^2 - L^3)\, Y_t$;

$Y_{3t} \equiv -(1 - L^2)\, Y_t$;

Then, the following hypotheses are tested (see Table 4.4.1):

Table 4.4.1: Seasonal unit roots testing: HEGY-approach

Null hypothesis (H_0)	$\lambda_1 = 0$	$\lambda_2 = 0$	$\lambda_3 \cap \lambda_4 = 0$
Alternative hypothesis (H_1)	$\lambda_1 < 0$	$\lambda_2 < 0$	$\lambda_3 \neq 0$; $\lambda_4 \neq 0$

Source: Own elaboration based on Hylleberg, Engle, Granger & Yoo (1990).

In the appendices (Table A-9) are given critical values from the small-sample (48, 100, 136, 200) distributions of test statistics for seasonal unit roots on 24000 Monte Carlo replications: data generating process $\Delta_4 x_t = \epsilon_t \sim$ nid (0,1). A natural extension of unit root concept is the cointegration and VECM. In what follows the latter is described in more detail.

4.4.4. Cointegration analysis and VECM

Detection of long-run relationship among analyzed variables has to be done with the use of cointegration analysis. The latter is possible if all the varibles (series) are non-stationary and integrated of the same order I(n). This must be revealed in advance by ADF or/and HEGY tests' results. Provided this requirement fulfilled, the long-run relationship might be examined (Bannikov, 2006; Rumánková, 2012).

The number of lags in the underlying VAR

After conduction of all the preliminary tests one can estimate whether the data under analysis have any cointegration vector(s). Before estimating the parameters of a VECM model, one must choose the number of lags in the underlying VAR, the trend specification, and the number of cointegrating equations.

Thus, first, one needs to detect the best lag order. In STATA it is realized via command "*varsoc*" that reports the final prediction error (FPE), Akaike's information criterion (AIC), Schwarz's Bayesian information criterion (SBIC), and the Hannan and Quinn information criterion (HQIC) lag-order selection statistics for a series of vector autoregressions of order 1,.., maxlag(n) (see formulas (31), (32), (33), (34)). A sequence of likelihood-ratio test statistics for all the full VARs of order, less than or equal to the highest lag order, is also reported. As shown by Nielsen (2001), the lag-order selection statistics can be used in the presence of I(1) variables.

To test for cointegration or fit cointegrating VECMs, we must specify how many lags to include. Building on the work of Tsay (1984) and Paulsen (1984), Nielsen (2001) has shown that the order of the corresponding VECM is always one less than the VAR. "*Vec*" makes this adjustment automatically, so we will always refer to the order of the underlying VAR.

The number of cointegrating equations

Having chosen the number of lags in the underlying VAR, the second step is to determine the number of cointegrating equations in a vector error-correction model (VECM) as Johansen suggests (1988). In STATA it is realized via "*vecrank*" command that produces corresponding statistics. "*Vecrank*" implements three types of methods for determining r, the number of cointegrating equations in a VECM. The first is Johansen's "trace" statistic method. The second is "maximum eigenvalue" statistic method. All two methods are based on Johansen's maximum likelihood (ML) estimator of the parameters of a cointegrating VECM.

Building on the work of Anderson (1951), Johansen (1995) derives an ML estimator for the parameters and two likelihood-ratio (LR) tests for inference on r. These LR tests are known as the trace statistic and the maximum-eigenvalue statistic because the log likelihood can be written as the log of the determinant of a matrix plus a simple function of the eigenvalues of another matrix.

Let λ_1, …, λ_K be the K eigenvalues used in computing the log likelihood at the optimum. Furthermore, assume that these eigenvalues are sorted from the largest λ_1 to the smallest λ_K. If there are ($r < K$) cointegrating equations, and α and β have rank r and the eigenvalues λ_{r+1}, …, : λ_K are zero (Stata, 2013).

The trace statistic: the null hypothesis of the trace statistic is that there are no more than r cointegrating relations. Restricting the number of cointegrating equations to be *r* or less implies that the remaining ($K - r$) eigenvalues are zero. Johansen (1995) derives the distribution of the trace statistic:

$$-T \sum_{i=r+1}^{K} \ln(1 - \hat{\lambda}_i), \tag{43}$$

where T - is the number of observations and the $\hat{\lambda}_i$ - are the estimated eigenvalues.

For any given value of *r*, large values of the trace statistic are evidence against the null hypothesis that there are *r* or fewer cointegrating relations in the VECM.

The maximum-eigenvalue statistic: the alternative hypothesis of the trace statistic is that the number of cointegrating equations is strictly larger than the number r assumed under the null hypothesis. Instead, we could assume a given *r* under the null hypothesis and test this against the alternative that there are ($r + 1$) cointegrating equations. Johansen (1995) derives an LR test of the null of *r* cointegrating relations against the alternative of ($r + 1$) cointegrating relations. Because the part of the log likelihood that changes with *r* is a simple function of the eigenvalues of a (K x K) matrix, this test is known as the maximum-eigenvalue statistic. This method is used

less often than the trace statistic method because no solution to the multiple-testing problem has yet been found.

VECM estimation

For the purpose of a meaningful analysis estimation of VECM coefficients has to be done on the basis of the equation (38) given below. The number of equations in the model equals to the number of variables. Thus, the error correction model for *N* cointegrated variables can be rewritten as:

$$\Delta X_t = \eta + \alpha\beta' X_{t-1} + \sum_{s=1}^{p} C_s \Delta X_{t-s} + \varepsilon_t, \tag{44}$$

where $X_t = (X_{1t}, X_{2t,\ldots}, X_{Nt})$ is a *N*x1 vector of the *N*-cointegrated variables, which are supposed to be integrated of order 1 (I(1)); $\eta = (\eta_1, \eta_2, \ldots, \eta_N)$ is a *N*x1 vector of intercepts; $\beta = (\beta^{(1)}, \beta^{(2)}, \ldots, \beta^{(r)})$ is the *N*x*r* cointegrating matrix consisting of the *r*-cointegrating vectors; α is a *N* x *r* matrix of the *r*-adjustment coefficients for each of the *N* variables; C_s are *N*x*N* matrixes of autoregressive coefficients, s > p; ($\sum_{s=1}^{p} C_s \Delta X_{t-s}$) is a VAR or short-run component; $\varepsilon_t = (\varepsilon_{1t}, \varepsilon_{2t}\ldots, \varepsilon_{Nt})$ is a *N*x1 vector of mutually uncorrelated white noise disturbances from (0,∑) (Bannikov, 2006; Rumánková, 2012; Kocenda & Cerný, 2007).

There are several following types of parameters of interest:

1. The parameters in the cointegrating equations β;
2. The adjustment coefficients α;
3. The short-run coefficients;
4. Some standard functions of β and α that have useful interpretations.

Estimation of the model parameters can be performed with the use of the least squares method applying it separately for each equation, which makes the use of these models very attractive (Lütkepohl, 2004). Estimation of the model (44) is supposed to be done by feasible generalized least squares (GLS). For this purpose the individual equations will first be estimated by OLS. The residuals will be used to estimate the white noise covariance matrix Σ_u as:

$$\widehat{\sum}_u = T^{-1} \sum_{t=1}^{T} \hat{u}_t u_t', \tag{45}$$

where u_t – is a *k*-dimensional unobservable zero mean white noise process with positive definite covariance matrix $E(u_t u'_t) = \Sigma_u$.

Postestimation analysis

Granger causality: If we want to check, after fitting a VAR, whether one variable is a Granger-cause of another we may run a Granger-causality test (Granger, 1969). A variable X is considered to be a Granger-cause of variable Y if, given the past values of Y, past values of X are useful for predicting Y. "A common method for testing Granger causality is to regress Y on its own lagged values and on lagged values of X and test H_0 that the estimated coefficients on the lagged values of X are jointly zero. Failure to reject H_0 is equivalent to failing to reject the hypothesis that X does not Granger-cause Y" (Stata, 2013).

Stability of VECM: If a VECM has *K*-endogenous variables and *r*-cointegrating vectors, there will be $(K - r)$ unit moduli in the companion matrix. If any of the remaining moduli computed by "*vecrank"* are too close to one, either the cointegrating equations are not stationary or there is another common trend and the rank (*n*) specified in the *"vec"* command is too high.

Normality: The single-equation results are against the null hypothesis that the disturbance for that particular equation is normally distributed. The results for all the equations are against the null that all *K* disturbances have a *K*-dimensional multivariate normal distribution. Failure to reject H_0 indicates lack of model misspecification (Stata, 2013). As noted by Johansen (1995), the log likelihood for the VECM is derived assuming the errors are independently and identically distributed (i.i.d.) normal, though many of the asymptotic properties can be derived under the weaker assumption that the errors are merely i.i.d. (Stata, 2013). Thus, we can conclude that that the requirement of normally distributed disturbances of VECM is not as strong as requirement of autocorrelation absence amongst the variables.

Autocorrelation: In STATA it is conducted with the use of command "*veclmar*", which carries out a Lagrange multiplier (LM). In accordance with Johansen (1995, 21–22) postestimation analysis of VECMs is predicated on the errors' not being autocorrelated. The test is performed at lags L = 1, 2,…, max lag (n). For each L, the null hypothesis of the test is that there is no autocorrelation at lag L.

4.4.5. Description of the initial data

With the use of VAR/VECM approach we will try to find the answer to the question is there any interrelationship among "non-oil" exports, real effective exchange rate (REER), GDP growth and price of URALS oil. In fact we are interested in identifying a long-run equilibrium (if any) between, on the one hand, "non-oil" exports and REER, on the other – between "non-oil"

exports and price of oil. What has the strongest impact on the structure of Russian exports: exogenous for Russian economy parameter – price of oil, or endogenous one, that can be regulated by appropriate monetary policy – real effective exchange rate? How strong and stable these interrelations are?

The suggested model is as follows:

$$EXNO\_EXO = f(GDPG, REER, POIL). \quad (46)$$

The following parameters will serve as variables in the suggested model: EXNO_EXO – is a ratio of "non-oil" exports to "oil" exports. "Non-oil" implies everything that Russia exports except "oil" – crude oil, processed oil, natural gas and other types of energy raw materials (Mineral products). The values of this variable are expressed in %; GDPG – is a gross domestic product growth, its values are expressed in %; REER – is the index of the real effective exchange rate of Russian ruble, in p.p.; POIL – is the price of Urals crude oil, in RUR.

Thereby, the aim is, on the basis of available along with the constructed within the present study data (REER index), to examine the interrelations among the corresponding variables. The model, thus, will incorporate the following parameters: REER, price of oil, share of "non-oil" exports in total Russian exports and GDP. The sample period selected for modeling runs from 2000.Q1 to 2014.Q4.

The sources, where the corresponding data were taken from, are as follows: The Federal State Statistics Service of the Russian Federation (GDP growth), information and analytical portal "Neftetransportnaya territoria" (price of URALS crude oil) and The Federal Customs Service of the Russian Federation (export data). The real effective exchange rate of Russian ruble was calculated in this study being rest on the current methodology of the Central Bank of the Russian Federation. The consumer price index (CPI) will serve in these calculations as a deflator.

5. EMPIRICAL ANALYSIS

5.1. Russian economic performance brief overview

Prior to answering the research questions, there is a need to investigate the very nature of the Russian economy, to look at its structure and analyze the recent dynamics of its main macroeconomic indicators. This information will help to understand both the specifics of the Russian economy (along with its sectors) and circumstances under which the recent development of the latter is taking place.

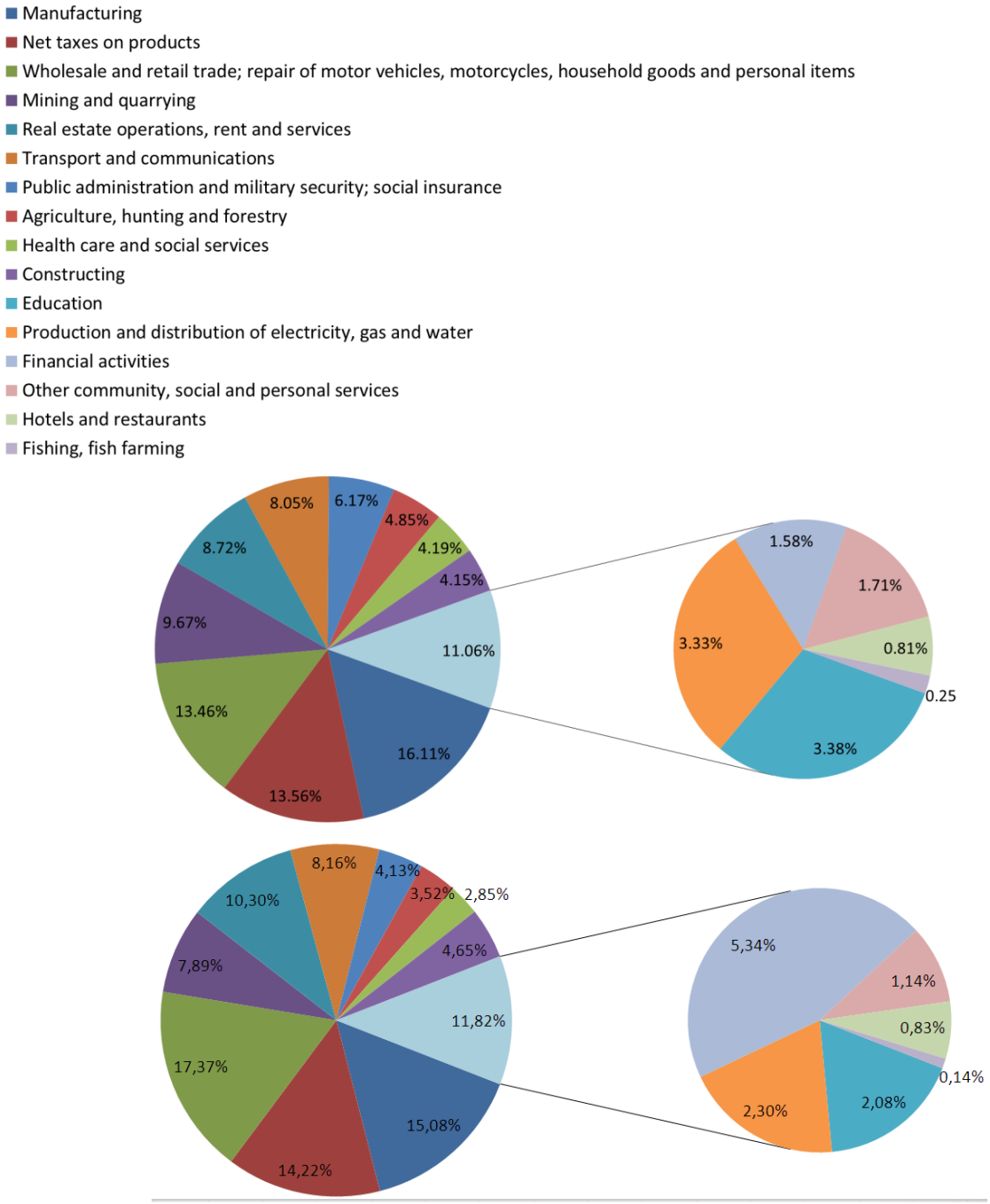
5.1.1. The structure of the Russian economy

The structure of the Russian economy is represented here as a structure of Russian GDP by kind of economic activity. Shares of individual activities are given in percentages of total value of GDP for corresponding year. The dynamics of these shares is depicted on the Figure 5.1.1, where the top graph illustrates data from the beginning of the analyzed period, i.e. 2000, and the bottom graph illustrates data from the last year of the analyzed period, i.e. 2014.

As we can see from that Figure the structure of the Russian economy by type of economic activity during the analyzed period remained mostly the same. The biggest changes in shares' values were recorded for the following activities: Wholesale and retail trade – from 13.46 % in 2000 to 17.37 % in 2014 (that is almost 4 % growth) and financial activities – from 1.58 % in 2000 to 5.34 % in 2014 (that is 3.76 % growth). Slight increases were also recorded for: Net taxes on products (≈0.5 %), Real estate operations, rent and services (≈1.5 %) and Constructing (≈0.5 %). In contrast, biggest declines in shares' values were observed for the following activities: Public administration and Military security; social insurance (≈2.0 %), Mining and quarrying (≈2.0 %), Agriculture, hunting and forestry (≈1.5 %), Health care and social services (≈1.5 %), Manufacturing (≈1.0%), Education (≈1.0%) and Production of electricity, gas and water (≈1.0%). In total, share declines was recorded for 9 types of activities, while increase - for 7.

The observed dynamics of the Russian economic structure allows us to conclude that increased shares of Wholesale, retail trade and financial activities along with decline in GDP shares of Manufacturing, point to one of the main presuppositions of the Dutch disease. In this light further investigation of the Russian economy for the presence of other symptoms indicating to Dutch disease in particular and Natural resource curse in general becomes worth pursuing.

Figure 5.5.1: Structure of Russian GDP by kind of economic activity in 2000 (top graph) and 2014 (bottom graph), as % of totals



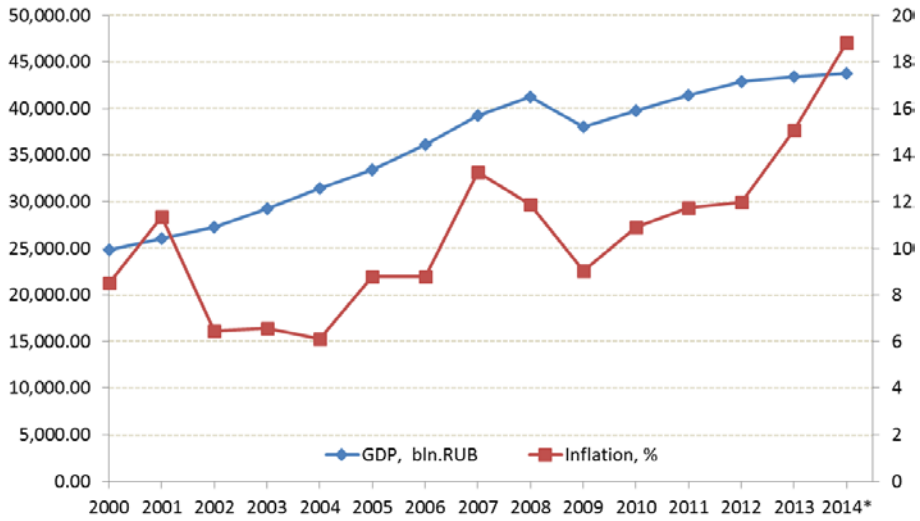
Source: Own elaboration based on data taken from Russian Federation's Federal State Statistics Service.

Table A-1 that is given in the appendices provides readers with the numerical values on gross value added by economic activity, expressed in constant 2008 prices.

5.1.2. Main macroeconomic indicators in Russia: current state and development dynamics

Values of the Gross Domestic Product, being one of the most important macroeconomic indicators, reflect a country's economic health. Figure 5.1.2 given below depicts the dynamics of Russian GDP in constant 2008 prices aling with average per year values of Russian Inflation rate.

Figure 5.1.2: Gross Domestic Product in constant 2008 prices and Inflation rate in the Russian Federation on average per year (2000-2014)



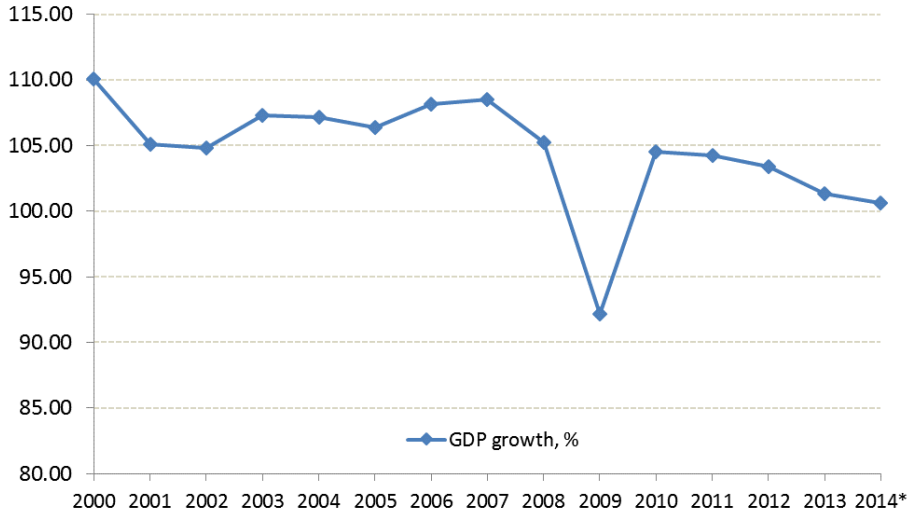
Year	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014*
GDP, bln.RUB	24,799.93	26,062.53	27,312.27	29,304.93	31,407.84	33,410.46	36,134.56	39,218.67	41,276.85	38,048.63	39,762.24	41,457.77	42,869.64	43,444.43	43,722.69
Inflation, %	8.52	11.36	6.45	6.58	6.11	8.78	8.8	13.28	11.87	9.02	10.91	11.74	11.99	15.06	18.82

NOTE: * - Data for 2014 are presented taking into account the data on the Crimean Federal District.

Source: Own elaboration based on data taken from Russian Federation's Federal State Statistics Service: http://www.gks.ru/wps/wcm/connect/rosstat_main/rosstat/ru/statistics/accounts/# and official webpage of Statbureau: https://www.statbureau.org/ru/russia/inflation

At first sight, the observed dynamics of Russian GDP seems quite positive since it demonstrates an increasing trend. However, taking into consideration the given aside dynamics of Inflation rate in the Russian Federation, this first conclusion becomes a bit doubtful. Thus, in order to have a possibility to take a look at the real development of GDP values, it was decided to estimate year-to-year GDP growth (see Figure 5.1.3).

Figure 5.1.3: GDP growth in the Russian Federation (2000-2014), as a % of the previous year



Year	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014*
GDP growth, %	110.05	105.09	104.80	107.30	107.18	106.38	108.15	108.54	105.25	92.18	104.50	104.26	103.41	101.34	100.64

Source: Own elaboration based on data taken from Russian Federation's Federal State Statistics Service: http://www.gks.ru/wps/wcm/connect/rosstat_main/rosstat/ru/statistics/accounts/#

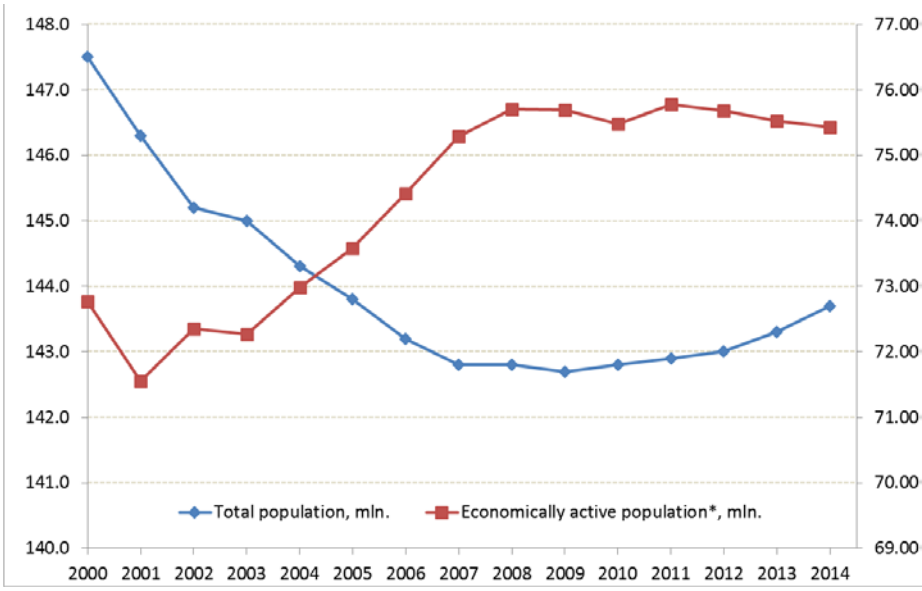
Now, the obtained figures point to a negative trends in the development of GDP values. In fact, we can conclude that over the analyzed period a slowdown in economic growth was recorded. A slight GDP growth was observed in 2002, 2005 and 2006. In 2009 a sharp increase in GDP can be considered as a natural recovering to initial values after a shock persived by the economy in crisis 2008 year.

For Russia, which is richly endowed with natural resources and referred to as a development economy, a slowdown of economic growth may be a manifestation of so called Natural resource curce. According to the literature review, a decline in GDP growth although being a required criterion is not a sufficient one to declare that Natural resource curse takes place in Russia. For that reason, further analysis that will be focused on the quality of Russian institutions is required. At the same time there is a need to check the presence of the Dutch disease symptoms in order to exclude another interpretation of the Natural resource curse phenomenon.

The next Figure 5.1.4 provides readers with an idea of how positively the situation with total population and economically active population was developing in the Russian Federation in recent years. As we can see the total population over the analyzed period has declined from 147.5 million of citizens in 2000 to 143.7 million in 2014. Nevertheless, in should be noted that despite the overall decline, a positive trend has being observed from 2009 pointing to a growth in the total population. At the same time, the number of economically active population had been

growing relatively more rapidly up to 2008, demonstrating after this year a decline in growth achieving more or less stable approximate value of 77.5 million.

Figure 5.1.4: Total population and economically active population of the Russian Federation on average per year (2000-2014)



Year	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Total population, mln.	147.5	146.3	145.2	145.0	144.3	143.8	143.2	142.8	142.8	142.7	142.8	142.9	143.0	143.3	143.7
Economically active population*, mln.	72.77	71.55	72.36	72.27	72.98	73.58	74.42	75.29	75.70	75.69	75.48	75.78	75.68	75.53	75.43

NOTE: * - Figures on Economically active population are measured by the right axis.

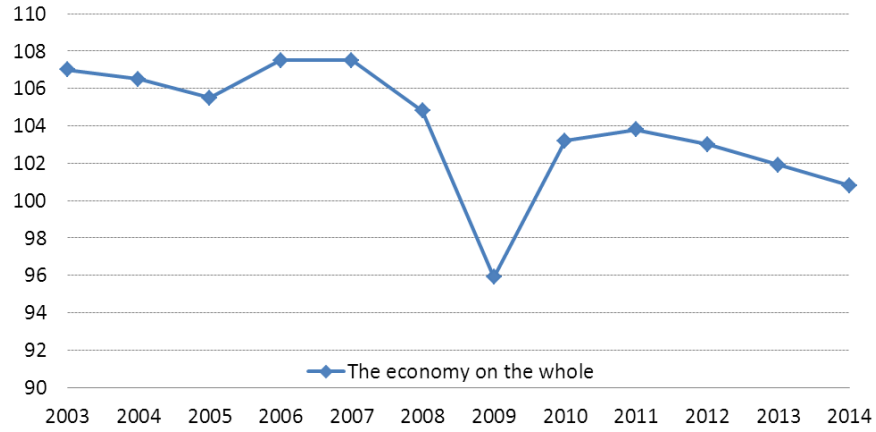
Source: Own elaboration based on data taken from Russian Federation's Federal State Statistics Service:
http://www.gks.ru/wps/wcm/connect/rosstat_main/rosstat/ru/statistics/population/demography/#
http://www.gks.ru/wps/wcm/connect/rosstat_main/rosstat/ru/statistics/wages/labour_force/#

The difference in the observed dynamics of total population and economically active population in Russia can be explained by the problem of aging population. A positive trend observed after 2009 in the development of the values on total population can be explained by the launch of the program of state support for Russian families bringing up children. This program is known as "Maternal (family) capital" and it was started in 1.01.2007. The size of the parent capital is indexed annually. In 2007 the amount of support accounted for 250,000.00 RUR, whilst in 2014 it was 429,408.50 RUR.

Despite some positive trends have been observed in the situation regarding population, index of productivity registered in the Russian economy is not favorable. According to available data that

are provided by the Russian Federal State Statistics Service, index of productivity, expressed as a percentage of the previous year value, points to a decline of average productivity for the whole Russian economy. The explanation behind this is not evident. Regardless having figures on economically active population, one should take into account the unemployment rate as well. The table given below Figure 5.1.5 provides us with this information.

Figure 5.1.5: Index of productivity of the Russian economy (2003-2014), as a percentage of the previous year (%)



Year	2003	2004	2005	2006	2007	2008	2010	2010	2011	2012	2013	2014
Index for the economy on the whole, %	107	106.5	105.5	107.5	107.5	104.8	103.174	103.2	103.8	103	101.9	100.8

Source: Own elaboration based on data taken from Russian Federation's Federal State Statistics Service: http://www.gks.ru/wps/wcm/connect/rosstat_main/rosstat/ru/statistics/accounts/#

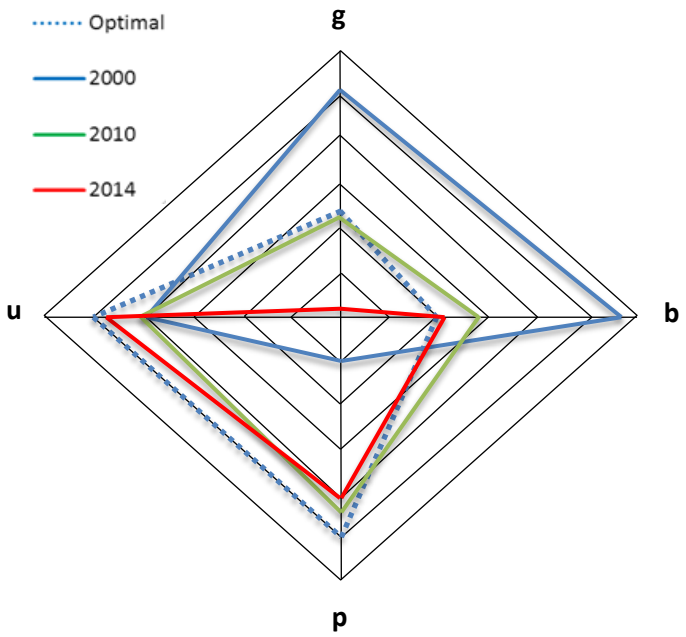
Thus, as we can see - the economically active population has grown, unemployment rate has decreased and at the same time the index of productivity has fallen. The roots of that contradictory at first sight situation can be found in institutional theory that explains the behavior of economic agents under specific circumstances.

To sum up the overall macroeconomic situation in Russia over the analyzed period it was decided to construct the Magic quadrangle, which serves as a tool for analysis and comparison of main macro indicators' development.

The Table given beneath the Figure 5.1.6 provides the observed values of particular indicators that were marked then on the corresponding axes of magical quadrangle and a conflict in achieving individual goals. The optimal values for all particular indicators are taken on the basis of target goals and recommendations for the Russian Federation.

As we can see the success in achieving individual targets upon corresponding macroeconomic indicators in Russia since 2000 was different depending on the concrete parameter. The most successful among analyzed outcomes appeared the reduction of unemployment rate. The value upon this parameter almost achieved the optimum level of 5 %. Despite a significant positive change in the value of inflation rate in Russia between 2000 and 2010, a negative dynamics after 2010 was recorded. It must be stated that the aim of achieving low rates if inflation were not yet realized into practice. Generally, high inflation rates are associated with an excessive growth of the money supply.

Figure 5.1.6: Magic quadrangle of the Russian Economy



Indicator	Abbrev.	Goal	Value			
			Optimal	2000	2010	2014
GDP growth rate	g	maximum	4.50	10.10	4.35	0.65
Inflation rate	p	minimum	4.00	20.93	6.88	7.82
Unemployment rate	u	minimum	5.00	10.44	7.57	5.16
Share of CA balance to GDP	b	zero	0.00	18.00	4.70	1.12

Source: Own elaboration based on data taken from Russian Federation's Federal State Statistics Service: http://www.gks.ru/wps/wcm/connect/rosstat_main/rosstat/ru/statistics/accounts/#

The latter are usually caused by a sharp rise in export revenues, which leads to a high inflow of foreign currency into the country. This in turn results in a strengthening of the national currency. In addition, a consequent growth in incomes creates additional demand for goods and services, which leads to an increase in price level (inflation) and an increase in the volume of imports. In

other words, high inflation rates may indirectly signalize about the presence of Dutch disease in the Russian economy. In this light further investigation is needed.

It should be noted, that optimum values upon individual indicators may vary across countries depending both on the size of corresponding economy and level of its economic development, i.e. whether it is considered as developed or developing one.

5.1.3. Russian foreign trade: sectoral structure and main partners

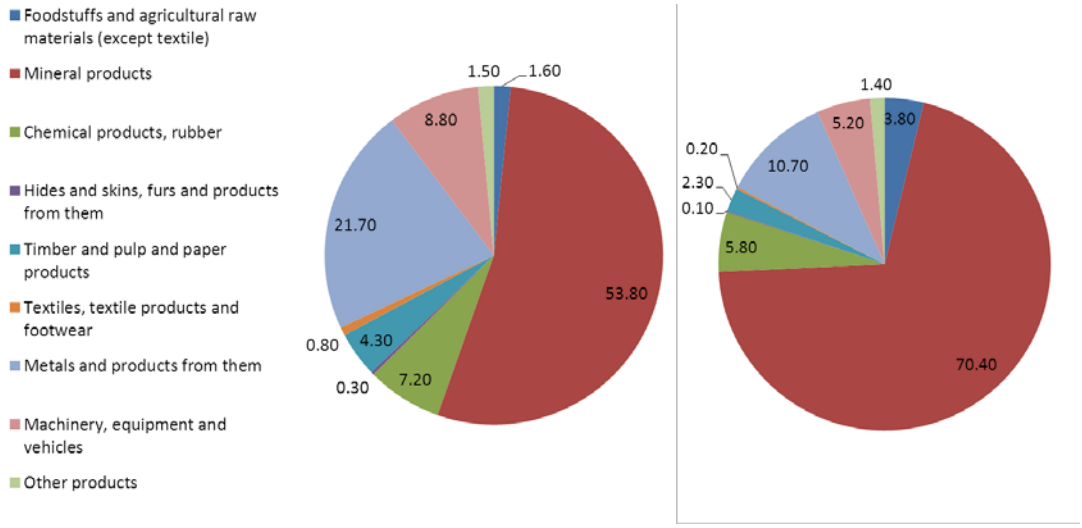
Foreign trade being one of the main macroeconomic indicators reveals a country's international position in terms of its ability to achieve and implement into practice its competitive advantages. Since external activities in the form of foreign trade are referred to as a determinant of national competitiveness, investigation of these activities becomes a mandatory component for the present study.

Foreign trade of the Russian Federation is reflected by its export and import flows. Structure of Russian exports and Imports by individual sectors given in percentage shares of total provided in the Table A-2 (see Appendices). Figure 5.1.7 given below depicts these structures' initial (in 2000) and final (in 2014) for the analysis states.

Accordingly to the observed values, the first thing that deserves our attention is that the share of Mineral products in total Russian exports has increased significantly, that is from 53.80 in 2000 to 70.40 in 2014, which is almost by 20%, by one fifth of the total Russian exports! This is a disturbing symptom of increasing dependence of the Russian economy on energy raw materials, mainly crude oil and natural gas. Taking into account that this fact has accompanied by a sharp increase in the share of Machinery in total Russian imports, we can state that Russian economy definitely reveals every reason to suppose the presence of Dutch disease. Investigation of the next and the most important symptom of the latter, namely the real effective exchange rate appreciation, will be organized in what follows.

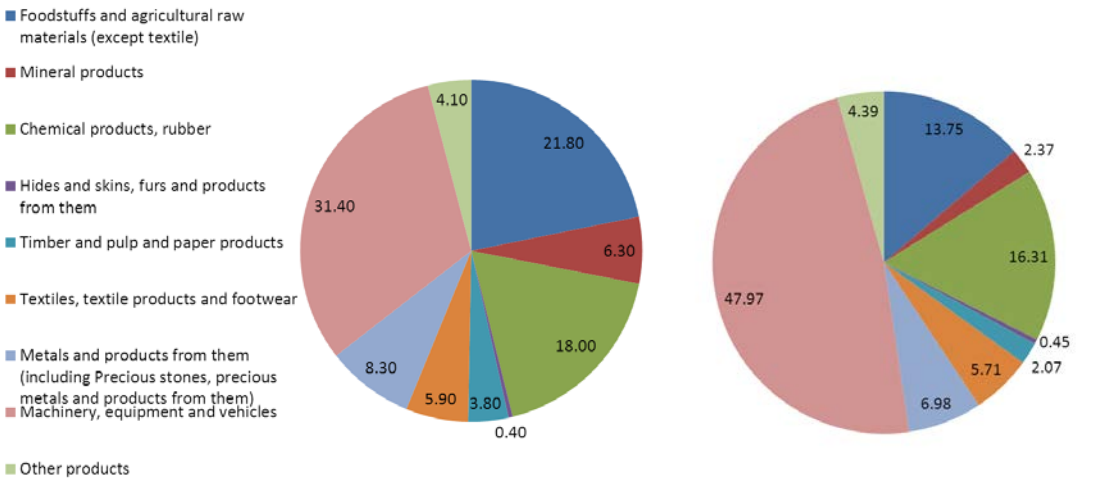
Prior to that analysis we need to identify main foreign trade partners of Russia. They were detected on the basis of data on both export and import flows (see Table 5.1.1). The approach that was used for selection among them countries that will represent in the present study key Russian partners is described in more detail in the subsection 4.3.2.

Figure 5.1.7: Structure of Russian Exports by commodity group in 2000 (left graph) and 2014 (right graph), as % of total



Source: Own elaboration based on data taken from
http://www.customs.ru/index.php?option=com_newsfts&view=category&id=52&Itemid=1978&limitstart=80

Figure 5.1.8: Structure of Russian Imports by commodity sector in 2000 (left graph) and 2014 (right graph), as % of total



Source: Own elaboration based on data taken from
http://www.customs.ru/index.php?option=com_newsfts&view=category&id=52&Itemid=1978&limitstart=80

When the vast majority of partners with high shares were already selected, but the sum of their shares was not sufficient for the analysis (less than 65% of total trade turnover), it was decided to add some more countries the way to form and complement the following several economic/geographical blocks (groups): European Union, Commonwealth of Independent States, BRICS and Asia-Pacific Economic Cooperation.

Table 5.1.1: The main foreign trade partners of the Russian Federation and their shares in Russian total trade (2000, 2013)

№	Country	Share of a country in total exports, %		Share of a country in total imports, %		Total trade normalized weights		Overall trend
		2000	2013	2000	2013	2000	2013	
1.	Germany	7.45	4.87	14.06	12.15	0.1327	0.1138	↓
2.	United States	6.67	2.12	6.79	5.21	0.0960	0.0421	↓
3.	Ukraine	4.79	3.31	9.13	5.12	0.0856	0.0601	↓
4.	Belarus	4.75	6.32	9.18	4.34	0.0854	0.0510	↓
5.	Italy	4.64	5.87	4.91	5.10	0.0675	0.0818	↑
6.	China	4.41	9.48	3.32	17.11	0.0588	0.1349	↑
7.	Poland	4.27	6.42	2.13	3.17	0.0528	0.0424	↓
8.	Japan	3.67	4.39	1.52	4.21	0.0441	0.0504	↑
9.	Netherlands	3.55	4.43	2.62	2.08	0.0472	0.1153	↑
10.	United Kingdom	3.49	2.26	2.54	3.09	0.0463	0.0373	↓
11.	Finland	3.14	3.02	4.45	4.41	0.0501	0.0284	↓
12.	France	3.10	2.13	3.81	4.18	0.0471	0.0337	↓
13.	Kazakhstan	2.21	4.41	4.70	2.03	0.0415	0.0402	↓
14.	Turkey	2.14	5.38	1.35	2.12	0.0276	0.0497	↑
15.	Czech Republic	1.71	2.04	1.02	1.98	0.0218	0.0172	↓
16.	Spain	1.67	2.01	1.25	1.89	0.0223	0.0166	↓
17.	South Korea	1.52	1.98	1.51	3.04	0.0218	0.0382	↑
18.	India	1.00	0.93	1.84	1.45	0.0176	0.0151	↓
19.	Sweden	0.68	1.87	1.33	1.39	0.0123	0.0127	↑
20.	Brazil	0.46	0.61	1.09	1.07	0.0090	0.0083	↓
21.	Austria	0.39	0.0069	1.37	1.35	0.0094	0.0078	↓
22.	Armenia	0.11	0.26	0.11	0.11	0.0016	0.0021	↑
23.	South Africa	0.08	0.0088	0.14	0.25	0.0015	0.0009	↓
Total share in TT		**65.90**	**74.13**	**80.17**	**86.85**	**1.0000**	**1.0000**	

Source: Own elaboration based on raw data taken from https://atlas.media.mit.edu/en/profile/country/rus/.

Despite the shares of Armenia and South Africa in total Russian foreign trade turnover is not significant, these countries were included into the analysis to complement such blocks of countries as Commonwealth of Independent States (CIS) and BRICS correspondingly. The complemented this way blocks will serve in the further analysis as corresponding groups of partners, in relation to which the competitiveness of Russian producers will be evaluated (see

Table 5.1.2). These blocks will be considered as corresponding external markets. However, the APEC as a group will be excluded from the analysis since the number of countries within this group is not representative; Japan and USA will be considered within the group consisted of all selected partners and correspondingly called "All trade partners".

Table 5.1.2: Selected key trade partners[1)] of the Russian Federation

Economic/Regional Unions	Countries (LCU)
European Union, **EU**	Germany (EUR), Netherlands (EUR), Spain (EUR), Austria (EUR), Finland (EUR), Italy (EUR), Sweden (EUR), France (EUR), Poland (PLN), United Kingdom (GBP), Czech Republic (CZK).
BRICS	Brazil (BRL), India (INR), China (CNY), Africa (ZAR).
Commonwealth of Independent States, **CIS**	Belarus (BYR), Ukraine (UAH), Kazakhstan (KZT), Armenia (AMD).
Asia-Pacific Economic Cooperation, **APEC**	USA (USD), Japan (JPY), South Korea (KRW).

NOTE: 1) accordingly to total trade flows during the period from 2000-2013.

Source: Own elaboration.

As a result, the total amount of countries selected for further analysis is 23, all together they constitute "All trade partners" group; in addition these countries were grouped to form the following groups of Russian foreign trade partners: "European Union", "BRICS" and "Commonwealth of Independent States".

Thus, brief overview of the Russian economy and its performing over the period under analysis, i.e. from 2000 to 2014, revealed that Russian economy definitely reveals every reason to suppose the presence of the Dutch disease. However, since Dutch disease is primarily related to the problem of real appreciation of national currency the further investigation is needed. The most important symptom of the latter, along with low institutional quality, is the real effective exchange rate appreciation. On the other hand, REER can serve as a macro indicator of price competitiveness, which determines relative position of domestic producers in external markets.

For that reason, prior to detailed analysis of the Russian economy for the presence of other Dutch disease and natural resource curse symptoms we first will investigate competitiveness issue.

Russian economic competitiveness' overall perception reflected in WEF Global Competitiveness Reports and IMD World Competitiveness Yearbooks will give an objective insight to the assessment of the Russian Federation's position in international dimension. Then, already in more narrow sense, will be analyzed the position of Russian producers representing key economic sectors in corresponding external markets, which will be done within the frameworks of main propositions of the Classical trade theory by means of RCA indices proposed by Balassa, Vollrath and Lafay. After that, the recent dynamics (from 2000 to 2014) of the real effective exchange rate of Russian rouble will be analyzed. The results of that analysis will be interpreted from two points of view: price competitiveness existence and presence of the Dutch disease.

5.2. Competitiveness of the Russian economy and its sectors

5.2.1. Russian position in WEF and IMD rankings: comparative analysis

The position of the Russian Federation in WEF Global Competitiveness Reports and IMD World Competitiveness Yearbooks will help to understand the perception of Russia's competitiveness in international dimension from the standpoints of these rankings. Since these organizations use different methodologies during constructing and interpreting an overall competitiveness index, the retrospective overview of Russian index in dynamics (from both reports) might occur quite interesting and useful for the further analysis. For this purpose annual data from WEF Global Competitiveness Reports and IMD World Competitiveness Yearbooks will be used to construct respective graphs representing the Russia's position in dynamics from 2000 till 2014 year.

The below given Table 5.2.1 provides readers with data on Russian competitiveness taken from WEF Global Competitiveness Reports covering the period from 2000 to 2014. Due to the fact that methodology of Competitiveness Index calculation has been modified during that period the Table is divided into two parts, before 2005 and after. Up to 2005 Global Competitiveness Index was composed of 6 sub-indices, while after – already of 12. It should also be noted that the number of countries included into the comparative analysis is not constant revealing the tendency to increase over the time.

Table 5.2.1: WEF Global Competitiveness Index of the Russian Federation (2000 – 2014)

Period of assessment	2000	2001	2002	2003	2004	2005
GCI Ranking	**55 (59*)**	**63 (78*)**	**64 (80*)**	**70 (102*)**	**70 (104*)**	**75 (117*)**
SubIndices						
Macroeconomic Environment subIndex	**52**	**56**	**35**	**61**	**56**	**58**
Public Institutions subIndex	*	*	65	81	89	91
Technology subIndex	*	*	66	69	67	73
The Business Competitiveness Index	52	56	58	66	61	74
Company operations and strategy ranking	33	54	62	69	62	77
Quality of the national business environment ranking	53	55	56	64	60	70

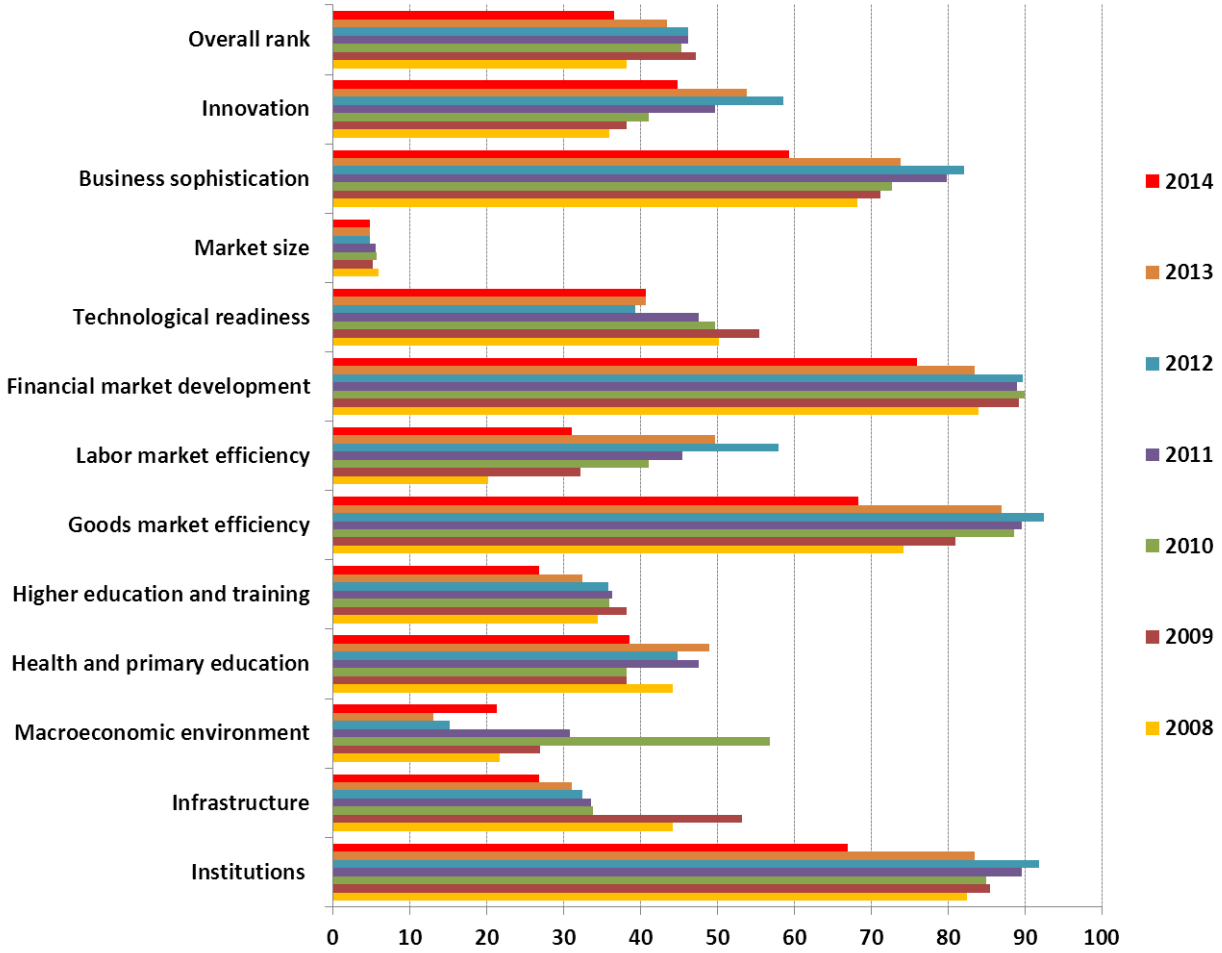
Period of assessment	2006	2008	2009	2010	2011	2012	2013	2014
GCI Ranking - Overall index	**62 (125*)**	**51 (134*)**	**63 (133*)**	**63 (139*)**	**66 (142*)**	**67 (144*)**	**64 (148*)**	**53 (144*)**
Sub-Indices								
Basic conditions:	**66**	**56**	**64**	**65**	**63 (36.4%)**	**53 (30%)**	**47 (26.9%)**	**44 (25.5%)**
- Institutions	114	110	114	118	128	133	121	97
- Infrastructure	61	59	71	47	48	47	45	39
- Macroeconomy	33	29	36	79	44	22	19	31
- Health and primary education	77	59	51	53	68	65	71	56
Efficiency enhancers:	**60**	**50**	**52**	**53**	**55 (50%)**	**54 (50%)**	**51 (50%)**	**41 (50%)**
- Higher education and training	43	46	51	50	52	52	47	39
- Market efficiency	60	99	108	123	128	134	126	99
- Efficiency of the labor market	**	27	43	57	65	84	72	45
- Development of the financial market	**	112	119	125	127	130	121	110
- Technological readiness	74	67	74	69	68	57	59	59
- The market size	**	8	7	8	8	7	7	7
Innovation factors:	**71**	**73**	**73**	**80**	**97 (13.6%)**	**108 (20%)**	**99 (23.1%)**	**75 (24.5%)**
- Business sophistication	77	91	95	101	114	119	107	86
- Innovation	59	48	51	57	71	85	78	65

NOTE: * — the number of countries in the datasets.
** — In accord with WEF current methodology in particular years there was no data on these sub-indices.

Source: Own elaboration based on data taken from World Economic Forum official webpage: http://www.weforum.org/reports;

Since the number of countries included in the WCY databases changed from year to year, thus, prior to constructing a graph depicting Russia's position in relation to the rest of countries in dynamics, there is a need to recalculate Russian scores taking into account the size of the corresponding years samples. Otherwise the ranks from the individual years will not be directly comparable. As a result, new values indicating Russian ranks were recalculated and given in percentage points.

Figure 5.2.1: The WEF Global Competitiveness Index of Russian Federation (2006-2014), scores in p.p.



Source: Own elaboration based on data taken from World Economic Forum official webpage: http://www.weforum.org/reports

In accordance with the World Economic Forum methodology low scores point to high rank of the country in relation to other countries that reflects better position in a corresponding field. As we can from the Figure 5.2.1 given above the best ranks were observed for Russian market size, the worst – for Financial market development. Relatively good results were recorded for indicators of Macroeconomic environment and Infrastructure. The latter in addition showed steadily positive development dynamics. Also positive trends in evolution were recoded for indicators reflecting Technological readiness. Four out of twelve pillars of Russian competitiveness reveal relatively low position of the country (60-90 p.p.) in comparison to other countries. They are: Financial market development, Institutions, Goods market efficiency and Business Sophistication. Six pillars point that Russia occupies a position in the middle of the list of countries under analysis: Technological readiness, Innovations, Health and primary education,

Higher education and training, Labor market efficiency and Infrastructure. The last two, Macroeconomic environment and Market size, are referred to as the strongest sights of Russian competitiveness.

Now we take a look at the position of the Russian Federation in the IMD Yearbooks. Due to the issues of data availability detailed information on Russian competitiveness reflected by individual sub-indices is given for years after 2008. The period from 2000 to 2008 is described by "Overall index" only. In this Reports competitiveness is evaluated upon four factors: Economic Performance, Government Efficiency, Business Efficiency and Infrastructure. The ranks of individual sub-factors as well as overall index values are given in Table.

Table 5.2.2: The IMD World Competitiveness Index of Russian Federation (2000-2015)

Period of assessment	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**
Overall index	**47 (47*)**	**45 (49*)**	**43 (49*)**	**52 (53*)**	**50 (53*)**	**54 (53*)**	**46 (53*)**	**43 (55*)**
Period of assessment	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**
Overall index	**47 (55*)**	**49 (57*)**	**51 (58*)**	**49 (59*)**	**48 (59*)**	**42 (60*)**	**38 (60*)**	**45 (61*)**
Sub-Factors								
Economic Performance	49	49	49	42	45	34	41	43
Government Efficiency	40	39	30	46	45	43	37	44
Business Efficiency	53	54	49	54	53	53	53	54
Infrastructure	38	38	45	38	38	39	35	36

NOTE: * – the number of countries in the datasets.

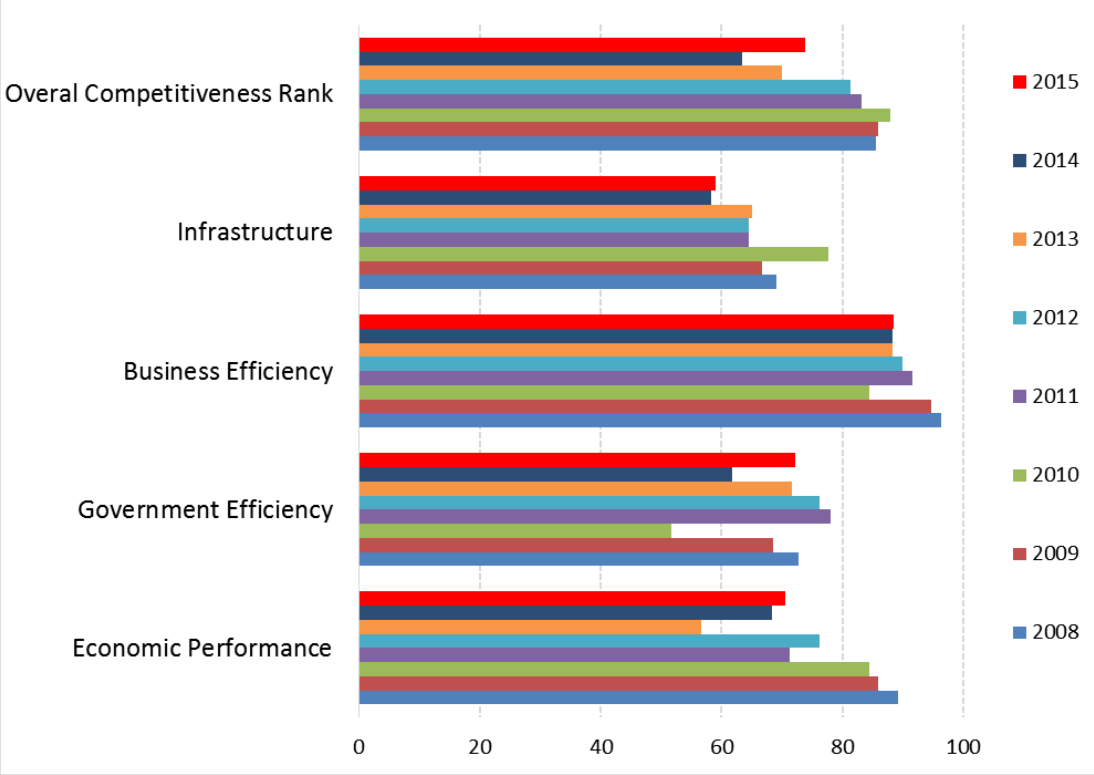
Source: Own elaboration based on data taken from World Competitiveness Yearbooks elaborated by Institute of Management Development: http://www.imd.org/wcc/news-wcy-ranking/

Similarly to data from WEF reports there is a need to recalculate values of all scores since the number of countries included into the analysis changed from year to year and comparison of ranks among individual years is not possible. As a result, new values indicating Russian ranks were recalculated and given in percentage points.

Before the comparison of Russian scores (ranks) from WEF and IMD reports one should take into account that the number of countries in their datasets differs significantly. For example,

WEF reports are based over the last last five years on comparisons of more than 140 countries, while IMD Competitiveness Yearbooks work with around 60 countries. Thus, strictly speaking the ranks of these two organizations are not directly comparable due to the sizes of the samples. However, these reports can be compared in terms of the dynamics of individual sub-factors' ranks and their mutual interrelations within separate reports.

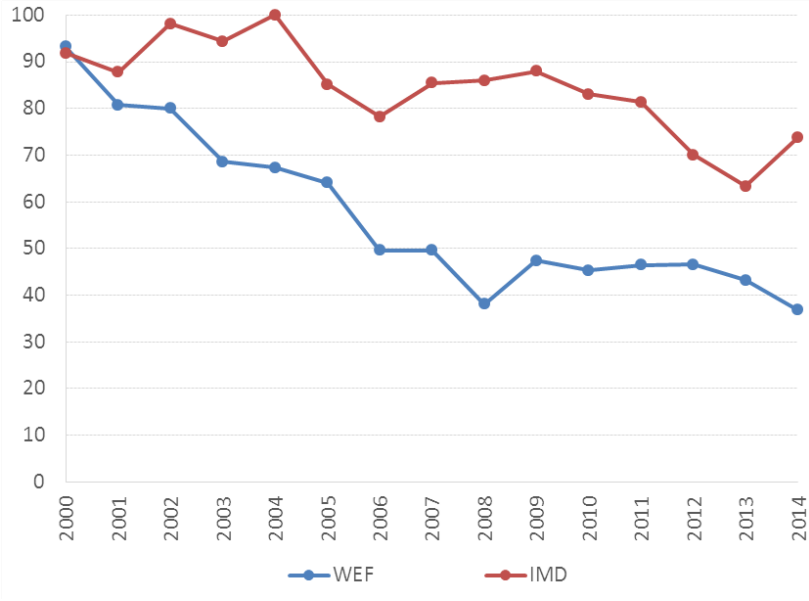
Figure 5.2.2: The IMD World Competitiveness Index of the Russian Federation (2008-2015), scores in p.p.



Source: Own elaboration based on data taken from World Competitiveness Yearbooks elaborated by Institute of Management Development: http://www.imd.org/wcc/news-wcy-ranking/

As we can see from the Figure 5.2.2 given above the dynamics of Infrastructure rank values reveals a positive trend in development, similarly as it was recorded in WER reports. At the same time, Business efficiency in Russia in accordance with IMD over the analyzed period demonstrated insignificant changes, while in accordance with WEF – it changed dramatically. With regard to overall Russian competitiveness, WEF and IMD rankings are unanimous in their assessments: on average over the analyzed period it has increased.

Figure 5.2.3: Comparison of WEF and IMD overall competitiveness rankings upon Russia in dynamics, 2000 – 2014, p.p.



Source: Own elaboration.

Despite the IMD and WEF reports provide us with quite detailed information on various aspects of social, political and economic state of a country, nevertheless, they do not deal with investigation of reasons of that state. In other words, the reports are silent about the roots of one or another ranking. Thus, the next section will be devoted to the analysis of foreign trade performance that is one of the cornerstones of a country's economic competitiveness genesis.

5.2.2. Russian producers' position in internal and external markets

Relative position of Russian producers in internal markets

To investigate the position of Russian producers in domestic markets relative to its foreign competitors it was decided to estimate their market shares in corresponding markets. Prior to this analysis it was necessary to collect data both on volumes of industrial manufacturing and corresponding export and import flows. Table 5.2.3 given below provides data on industrial manufacturing in Russia by key commodity groups.

The position of Russian producers in domestic markets relative to its foreign competitors was then estimated as their market shares in corresponding markets. Assessment was done with the use of formulas (7), (8) and (9). The closer a market share of a domestic producer to unity the more competitive a position of this producer is towards to its foreign competitors within the frameworks of the selected internal market.

As we can see from the Table 5.2.4 given below the estimated shares of domestic producers in internal markets differ among various sectors (types of economic activities). Their dynamics are also different, however the most common trend for the majority of values is to decline. The highest current market shares of Russian producers are observed in the following internal markets (listed in descending order): Precious metals, precious stones and products from them (0.95), Mineral products (0.94), Metals and products from them (0.81), Timber and pulp and paper products (0.77), Foodstuffs and agricultural raw materials (except textile) (0.77). The lowest current market shares of Russian producers are observed in the following internal markets (listed in ascending order): Textiles, textile products and footwear (0.27), Hides and skins, furs and products from them (0.41), Chemical products, rubber (0.49), Machinery, equipment and vehicles (0.50).

Table 5.2.3: Volumes of industrial production in Russia: gross outputs by commodity sector (2000 - 2014) in current prices, mln.of RUR

Year	Foodstuffs and agricultural raw materials	Mineral products	*Including: Fuel and energy products*	Chemical products, rubber	Hides and skins, furs and products from them	Timber and pulp and paper products	Textiles, textile products and footwear	Metals and products from them (including Precious	Machinery, equipment and vehicles
2000	826,648	1,264,980	*366,331*	14,826	217,154	116,318	154,209	767,631	836,746
2001	1,076,364	1,466,847	*436,424*	18,659	260,182	149,645	191,653	884,513	1,071,882
2002	1,176,401	1,700,686	*484,279*	19,810	294,479	158,149	225,711	993,678	1,261,022
2003	1,245,301	2,406,223	*561,236*	24,111	329,595	165,798	240,913	1,295,090	1,744,155
2004	1,495,514	3,393,792	*731,030*	27,709	446,140	219,064	330,130	1,835,256	2,186,480
2005	1,485,653	4,500,585	*871,293*	19,710	460,292	101,423	425,940	1,902,898	1,762,367
2006	1,729,158	5,723,147	*1,023,933*	24,667	554,404	130,601	568,973	2,415,858	2,244,949
2007	2,143,327	6,766,030	*1,301,807*	29,487	718,752	136,644	853,340	2,953,135	2,909,483
2008	2,656,042	8,255,428	*1,716,998*	34,393	794,515	156,883	1,009,618	3,294,771	3,424,219
2009	2,822,146	7,752,510	*1,436,623*	34,751	713,101	155,789	683,283	2,393,232	2,737,624
2010	3,262,199	9,740,125	*1,942,460*	43,722	900,524	205,457	827,329	3,423,982	3,814,550
2011	3,601,512	12,573,938	*2,383,985*	50,310	982,953	211,780	1,017,616	4,045,196	4,906,297
2012	4,000,508	14,169,183	*2,577,561*	49,490	1,097,497	212,382	1,158,987	4,010,152	5,587,959
2013	4,271,776	16,071,820	*2,556,569*	52,921	1,143,166	242,860	1,217,480	3,954,696	6,049,570
2014	4,840,024	17,591,512	*2,794,173*	50,179	1,219,605	264,007	1,253,870	4,564,876	6,268,977

Source: Own elaboration based on data taken from
http://www.gks.ru/wps/wcm/connect/rosstat_main/rosstat/ru/statistics/enterprise/industrial/#
http://stat.wto.org/StatisticalProgram/WSDBViewData.aspx?Language=E

During the analyzed period the highest increase in the market share of Russian producers was recorded in the market of Mineral products: from 75% in 2000 to 94% in 2014 that is +19%. The highest decline in the market share of domestic producers was recorded simultaneously in several internal markets: Machinery, equipment and vehicles - from 74% in 2005 to 50% in 2014 (–24%); Hides and skins, furs and products from them - from 63% in 2005 to 41% in 2014 (–22%); Textiles, textile products and footwear - from 49% in 2005 to 27% in 2014 (–22%). Such

a dramatic change in these sectors' position (and especially in Machinery, Equipment and Vehicles between 2000 and 2005) can be explained by a large-scale crisis that struck manufacturing in Russia even long before the financial shock of 2008-2009. The symptoms of this crisis, reflected by the average annual employment rate in industry, appeared in Machinery manufacturing still in 2003-2004. The reduction in employment recorded in this industry (excluding the production of arms and ammunition) was from 50.7% to 39.6% (Domnich, 2011).

Table 5.2.4: The estimated share of domestic producers in internal markets* (2000, 2005 – 2014), in %

HS Code	Commodity group	2000	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
01-24	Foodstuffs and agricultural raw materials (except textile)	74	75	74	74	75	76	74	74	74	74	73
25-27	Mineral products	87	77	86	91	73	95	93	95	92	96	94
28-40	Chemical products, rubber	59	52	51	54	54	54	54	55	52	50	49
41-43	Hides and skins, furs and products from them	*	63	60	57	52	57	50	47	41	41	41
44-49	Timber and pulp and paper products	*	73	75	76	77	77	78	78	81	80	77
50-67	Textiles, textile products and footwear	*	49	47	38	35	36	34	30	26	27	27
71	Precious metals, precious stones and products from them	*	97	98	98	98	98	98	97	97	96	95
72-83	Metals and products from them	*	83	83	82	82	83	83	84	80	80	81
84-90	Machinery, equipment and vehicles	74	55	52	50	46	52	52	52	50	52	50

NOTE: * — no data available.

Source: Own calculation based on raw data taken from: http://www.gks.ru, http://stat.wto.org, http://www.customs.ru, http://www.wiod.org

The matter is that still in 1998-1999 years after a sharp change in the ratio between the Russian ruble and the US dollar and consequent release of significant market niches by greatly risen in price imports, in Russia was recorded the rise in machinery production which was characterized by the following indicators: 2000 - 120%; 2001 - 107.2%; 2002 - 102% (in relation to the previous year). However, by 2002 the rate of production fell again below the average for the industry level. Other factors, such as the number of loss-making enterprises, the ratio of exports and imports etc. have returned to pre-crisis levels. In fact, a resource of positive impulse for the Machinery, equipment and vehicles received in 1998 was fully exhausted.

At the same time, in order to make a comprehensive estimate of any sector's competitive position the obtained results are not sufficient. The matter is that in practice if any sector aims to gain in the long-term view as sound position in a market as possible it should make emphasis on increasing its competitiveness in international dimension. For that reason import-substitution strategy is not reliable enough in contrast to export-oriented one. Thus, investigation of Russian producers' competitiveness in external markets is analyzed in the next subsection.

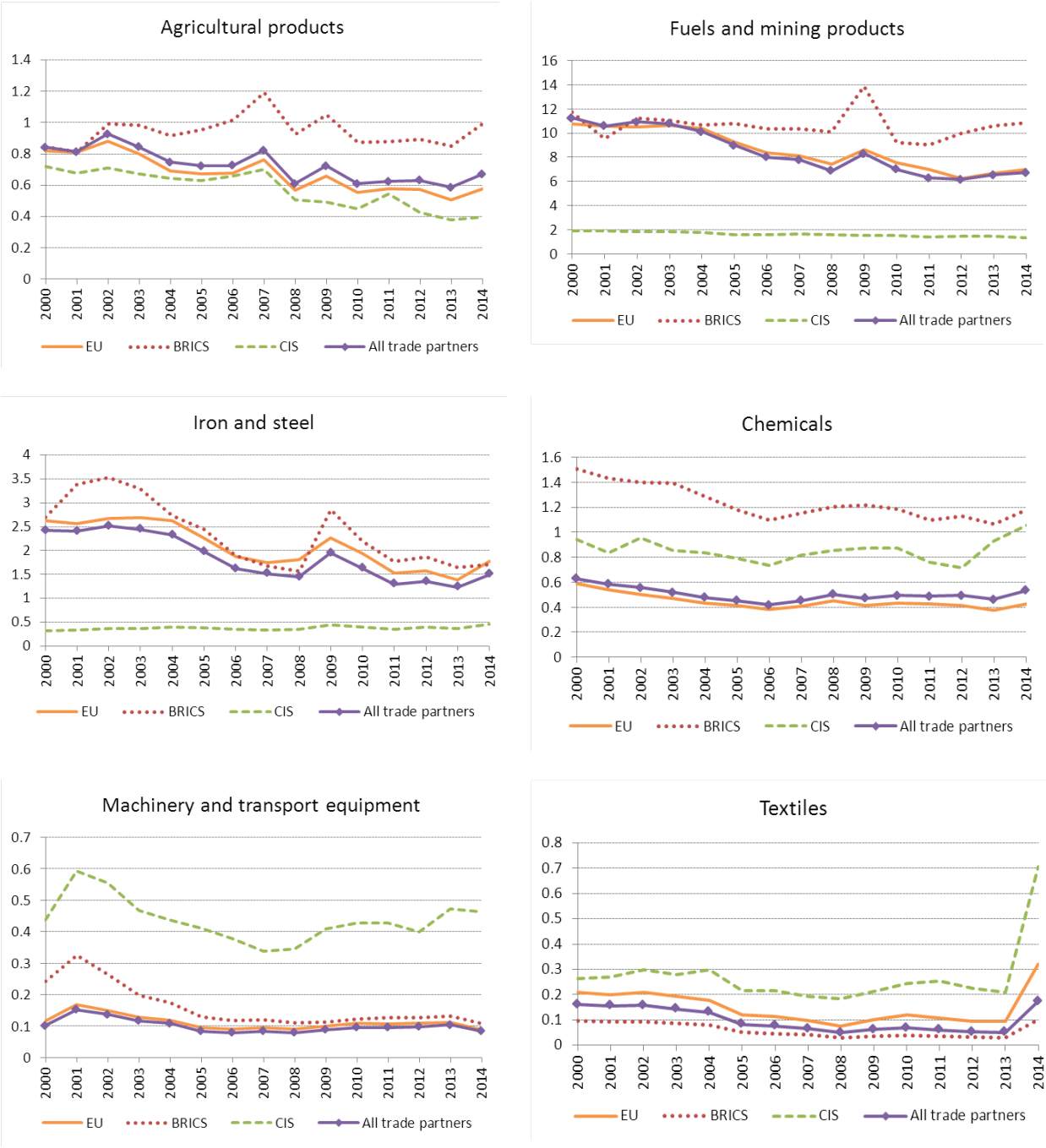
Competitiveness of Russian producers in external markets

The position of domestic producers in corresponding external markets is reflected in the present study by Balassa, Vollrath and Lafay indices that were calculated for the selected commodity groups on the basis of the Russian Federation's foreign trade flows. The logic behind applying all these three indices simultaneously is that each of them reflects different aspects of competitiveness. Balassa index, dealing with export flows, reveals absolute comparative advantage of a country in its foreign trade; Volrath index, taking into account not only exports but also imports flows, reveals in turn relative comparative advantage; Lafay index, calculation of which being based on overall normalized trade balance, points to a country's observed foreign trade specialization.

First, the Balassa RCA index was calculated with the use of formula (18) to compare export the share of the selected sector in the Russian Federation's foreign trade with export share of the corresponding sector in external markets. The latter was considered in the present study in the several ways: as the external market represented by all main foreign trade partners selected for the analysis together (all trade partners) and the external markets represented by the groups of these countries separately (see Table 5.2.1). As a result, the Balassa RCA index of Russian exports was calculated in relation to the European Union (EU), Commonwealth of Independent States (CIS), BRICS and to all these countries together. Figure 5.2.3 given below depicts graphically the obtained values of RCA within the frameworks of selected commodity groups.

In accord with the methodology, if RCA > 1, then a comparative advantage is revealed. From the Figure 5.2.4 it can be seen that RCA values of Russian exports differ significantly depending as on the commodity group and on the trade partner. However, the most evidently high values of RCA are observed for Fuels and mining products, at that it amounted for several times higher values in relation to EU, BRICS and All trade partners than it did for CIS.

Figure 5.2.4: Balassa index by commodity groups and groups of trade partners (2000 – 2014)



Source: Own calculation based on raw data taken from: http://stat.wto.org

Comparative advantage of Russian Iron and steel exports also appeared as revealed in relation to EU, BRICS and All trade partners, but in relation to CIS group RCA index was during the all analyzed period below the unity, demonstrating thus a comparative disadvantage. Comparative advantage of Russian Chemicals appeared as revealed in relation to BRICS only, but in 2014 greater than unity value of RCA was recorded in relation to CIS as well. The dynamics of RCA index for Agricultural products appeared varied in relation to different foreign trade partners: with regard to BRICS group RCA index achieved values greater than unity in 2006, 2007 and 2009, very close to unity values were achieved in 2002, 2003 and 2014; with regard to the rest partners Russian export was demonstrating comparative disadvantage, more over the dynamics of the RCA index is negative. Despite a sharp increase in RCA index for Russian Textiles was observed in 2014, all values of Balassa RCA index for Russian Textiles as well as for Machinery and transport equipment were less than unity through the all analyzed period demonstrating a decreasing trend in relation to all four groups of partners.

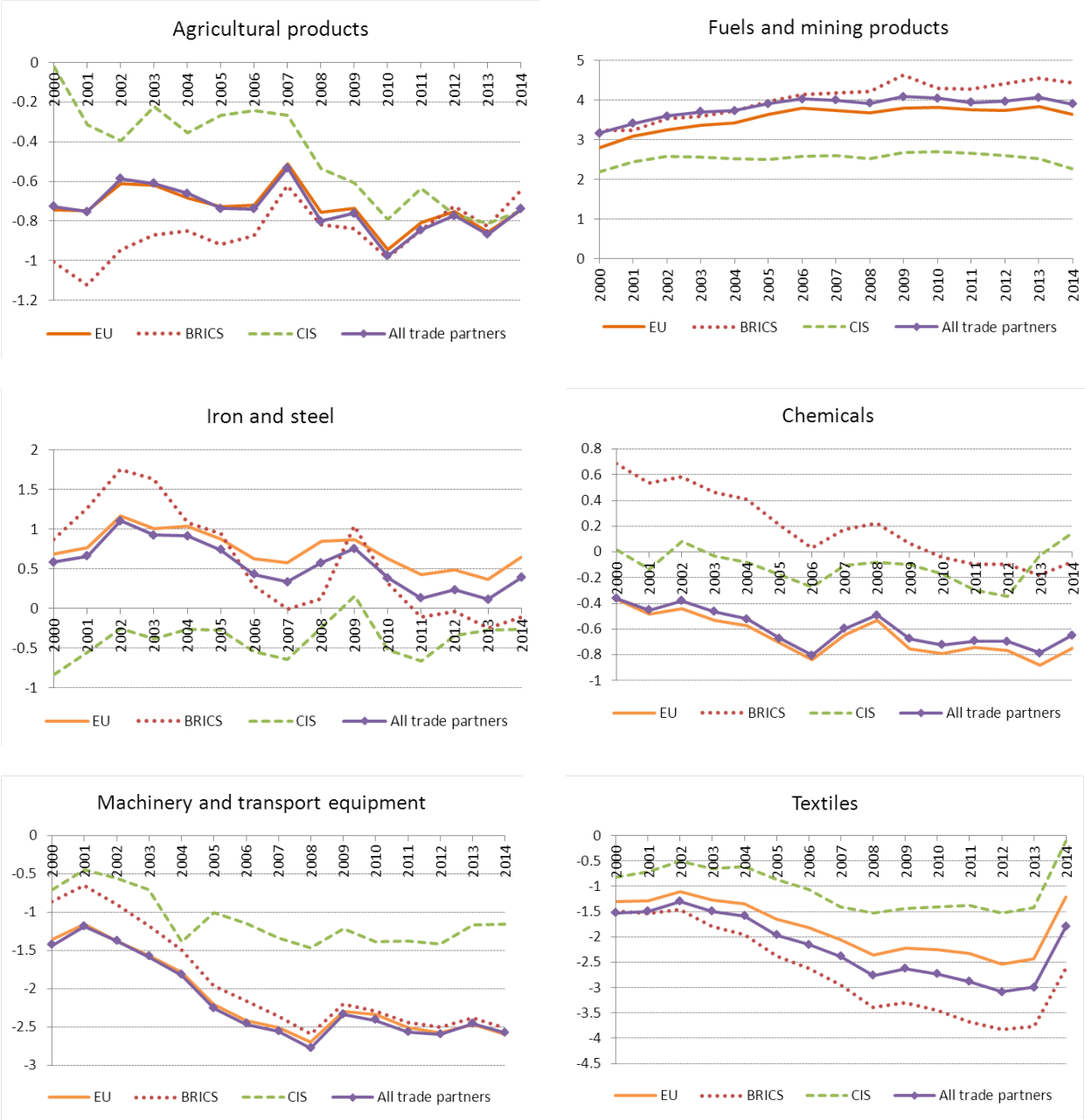
Then, employing formula (11), the Vollrath revealed competitiveness index was calculated for the same groups of commodities and in relation to the same four groups of partners. Figure 5.2.5 given below provides us with the graphical representation of these calculation's results. In accord with the methodology employed, values of VRC > 0 reveal a comparative advantage, correspondingly negative values reveal a comparative disadvantage.

As it can be seen from Figure 5.2.5, VRC index values differ significantly, as RCA values do, depending as on the commodity group and on the trade partner. According to Volltath index revealed competitiveness was recorded for the following groups of commodities: Fuels and mining products (during the entire analyzed period and in relation to all four groups of partners), Iron and steel (during the entire analyzed period in relation to EU, CIS and All trade partners, however in relation to BRICS after 2011 VRC reveal a comparative disadvantage) and Chemicals (during the period from 2000 to 2009 and in relation to BRICS and in 2002, 2013, 2014 in relation to CIS).

As for the other commodity groups – through the entire analyzed period all values of VRC index were negative revealing, thus, a comparative disadvantage of Russian producers in external markets. The upward dynamics of VRC indices was observed only for the following commodity groups: Fuels and mining products (except CIS, the VRC index values in relation to which were more or less stable), Iron adn steel (in relation to CIS only) and Agricultural products (in relation to BRICS only). Despite a sharp increase in VRC index for Russian Textiles that was observed

in 2014, the overall dynamics of VRC index values had a downward slope in relation to all four foreign trade partners.

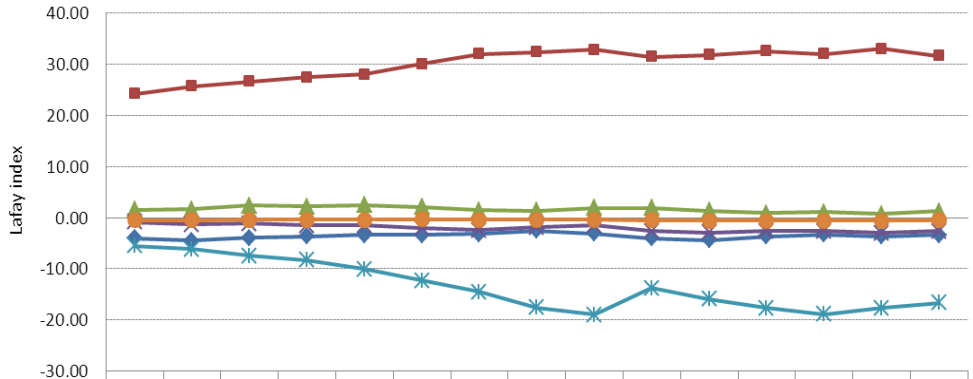
Figure 5.2.5: Volrath index by commodity groups and groups of trade partners (2000 – 2014)



Source: Own calculation based on raw data taken from: http://stat.wto.org/

Finally, the Lafay indices were calculated for the same as above groups of commodities, but in relation to all trade partners only. Employing the formula (12) we obtained the results that are depicted in the Figure 5.2.6.

Figure 5.2.6: Lafay RCA index by commodity groups in dynamics (2000 – 2014)



	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Agricultural products	-4.05	-4.50	-3.90	-3.61	-3.36	-3.37	-3.23	-2.56	-3.12	-3.98	-4.40	-3.67	-3.25	-3.66	-3.39
Fuels and mining products	24.23	25.69	26.58	27.48	27.99	30.09	31.98	32.34	32.86	31.49	31.79	32.58	32.02	33.01	31.59
Iron and steel	1.52	1.68	2.34	2.23	2.52	2.10	1.43	1.35	1.89	1.96	1.40	0.88	1.04	0.72	1.23
Chemicals	-0.84	-1.36	-1.19	-1.48	-1.54	-2.04	-2.41	-1.89	-1.55	-2.65	-2.88	-2.60	-2.59	-2.97	-2.66
Machinery and transport equipment	-5.54	-6.16	-7.50	-8.30	-10.04	-12.25	-14.49	-17.59	-19.00	-13.81	-15.92	-17.72	-18.88	-17.67	-16.62
Textiles	-0.47	-0.47	-0.37	-0.42	-0.38	-0.35	-0.39	-0.44	-0.43	-0.52	-0.61	-0.59	-0.61	-0.56	-0.45

Source: Own calculation based on raw data taken from: http://stat.wto.org/

If LFI > 0 then, in accord with the methodology, it indicates the existence of comparative advantages in a given commodity. More over the larger the LFI value is the higher is the degree of specialization, while negative values point to de-specialization in trade with corresponding sector's commodities. From Figure 5.2.6 we can see that positive and simultaneously high values of LFI are observed only for Fuels and mining products indicating the degree of specialization of Russian producers in this sector. Values that are slightly above zero belong to Iron and steel commodity group. LFI indices for other commodity groups are negative through the entire analyzed period. The upward dynamics of LFI values was observed for Fuels and mining products as well as for Agricultural products. It implies that the degree of specialization Russian producers in these sectors has increased during the period from 2000 to 2014. The LFI values for the rest commodity groups demonstrated downward trend. The most significant de-specialization of Russian producers was recorded in Machinery and transport equipment.

5.2.3. Price competitiveness: Real effective exchange rate of rouble calculation and analysis

According to the methodology, prior to calculation of the real effective exchange rate there is a need to collect monthly data on nominal exchange rate (direct quotations) of Russian ruble per

currencies of main Russian foreign trade partners. Since monthly data set represents a huge data massive, values provided in the Table 5.5.2 are given on quarterly basis.

Table 5.2.5: Nominal exchange rates (direct quotations) of Russian ruble per currencies of main Russian foreign trade partners (2000.Q1 – 2014.Q4), in LCU per 1 FCU**

Year	CNY	EUR	USD	UAH	BYR	JPY	PLN	GBP	KRW	TRY	KZT	CZK	INR	SEK	BRL	ZAR	AMD
2000_Q1	3.3907	28.1648	28.4784	5.1107	0.0750	0.2662	6.8097	45.7998	0.0249	50.7143*	0.2031	0.7773	0.6441	3.3140	15.7167	4.5060	0.0533
2000_Q2	3.4283	26.4979	28.3808	5.1399	0.0542	0.2663	6.6100	43.4939	0.0254	46.6010*	0.1994	0.7352	0.6462	3.2047	15.8333	4.1780	0.0534
2000_Q3	3.3667	25.2130	27.7941	5.1510	0.0331	0.2585	6.3917	41.0957	0.0250	43.1450*	0.1948	0.7246	0.6177	3.0010	15.4167	4.0377	0.0511
2000_Q4	3.3593	24.2410	27.8856	5.1368	0.0255	0.2541	6.0647	40.3519	0.0242	41.0903*	0.1941	0.6859	0.5964	2.8160	14.5767	3.6903	0.0508
2001_Q1	3.4330	26.3644	28.5463	5.2307	0.0232	0.2419	6.8943	41.6481	0.0227	37.1787*	0.1964	0.7513	0.6097	2.9322	14.2900	3.6733	0.0514
2001_Q2	3.4907	25.3513	28.9977	5.3546	0.0216	0.2365	7.1543	41.2355	0.0221	24.7003*	0.1985	0.7414	0.6170	2.7836	12.9233	3.6120	0.0526
2001_Q3	3.5337	26.1005	29.3320	5.5177	0.0205	0.2411	7.0873	42.1453	0.0226	21.1997*	0.1993	0.7587	0.6211	2.7767	12.0867	3.5690	0.0527
2001_Q4	3.5840	26.7045	29.8118	5.5732	0.0195	0.2414	7.2093	43.0093	0.0230	19.5637*	0.2002	0.7985	0.6188	2.8166	11.2333	3.1687	0.0529
2002_Q1	3.6951	26.9779	30.7809	5.7756	0.0186	0.2323	7.4627	43.9069	0.0232	22.5605*	0.2026	0.8348	0.6298	2.9426	12.8078	2.6402	0.0542
2002_Q2	3.7684	28.7480	31.2778	5.8572	0.0178	0.2466	7.7069	45.6954	0.0243	22.0962*	0.2045	0.9198	0.6374	3.1385	12.9927	2.9463	0.0539
2002_Q3	3.8039	31.0676	31.5653	5.8876	0.0172	0.2647	7.6628	48.9171	0.0262	19.0653*	0.2046	1.0186	0.6465	3.3634	10.2421	3.0312	0.0556
2002_Q4	3.8345	31.7925	31.7803	5.8929	0.0168	0.2596	7.8224	49.9641	0.0260	19.6033*	0.2053	1.0173	0.6565	3.4954	8.5374	3.1737	0.0545
2003_Q1	3.8332	33.9822	31.6561	5.9107	0.0162	0.2661	8.2658	50.8177	0.0268	19.0781*	0.2062	1.0737	0.6635	3.6977	8.8743	3.7600	0.0543
2003_Q2	3.7513	35.0665	30.8625	5.7107	0.0152	0.2605	7.9906	49.9610	0.0254	20.3345*	0.2049	1.0955	0.6561	3.8331	9.9885	3.9978	0.0529
2003_Q3	3.6692	34.2453	30.4360	5.6629	0.0146	0.2588	7.7642	48.9948	0.0256	21.7892*	0.2067	1.0655	0.6580	3.7330	10.3401	4.0746	0.0524
2003_Q4	3.6328	35.4514	29.8021	5.5320	0.0140	0.2737	7.6129	50.8124	0.0256	20.5590*	0.2032	1.1018	0.6582	3.9328	10.3413	4.3926	0.0532
2004_Q1	3.4818	35.8235	28.6276	5.3086	0.0133	0.2671	7.6430	52.6324	0.0244	21.4329*	0.2049	1.1030	0.6346	3.8991	9.9124	4.2360	0.0510
2004_Q2	3.4777	34.8514	28.9015	5.3979	0.0134	0.2637	7.3565	52.2701	0.0247	19.8519*	0.2106	1.0717	0.6448	3.8063	9.5948	4.3251	0.0521
2004_Q3	3.5167	35.6509	29.1744	5.4565	0.0135	0.2654	7.8774	53.0556	0.0251	19.6948*	0.2149	1.1047	0.6296	3.8894	9.5597	4.5326	0.0558
2004_Q4	3.4730	36.9167	28.5218	5.3016	0.0131	0.2693	8.5393	53.1320	0.0258	19.6742*	0.2172	1.1682	0.6308	4.0943	10.1887	4.6637	0.0566
2005_Q1	3.3672	36.5209	27.8770	5.2536	0.0129	0.2672	9.1738	52.6716	0.0272	20.9933	0.2140	1.2246	0.6377	4.0220	10.5117	4.7602	0.0579
2005_Q2	3.3715	35.3825	28.0865	5.4973	0.0131	0.2612	8.5716	52.1275	0.0276	20.5544	0.2125	1.1765	0.6387	3.8456	11.0396	4.4031	0.0623
2005_Q3	3.5086	34.7794	28.5181	5.6451	0.0133	0.2565	8.5234	50.9355	0.0278	21.2241	0.2111	1.1562	0.6554	3.7130	11.9460	4.3189	0.0648
2005_Q4	3.5314	34.1328	28.7101	5.6224	0.0133	0.2451	8.7399	50.2010	0.0275	21.1506	0.2144	1.1664	0.6346	3.6040	12.7598	4.3752	0.0635
2006_Q1	3.5176	33.8353	28.0988	5.4966	0.0131	0.2407	8.8651	49.3258	0.0288	21.0770	0.2146	1.1850	0.6357	3.6214	12.7230	4.5444	0.0631
2006_Q2	3.4004	34.1653	27.2002	5.3838	0.0127	0.2377	8.6912	49.6719	0.0286	18.7467	0.2213	1.1967	0.6037	3.6707	12.4243	4.3326	0.0619
2006_Q3	3.3643	34.1566	26.8080	5.3116	0.0125	0.2308	8.5742	50.2293	0.0282	17.8133	0.2192	1.2033	0.5810	3.7016	12.3608	3.7069	0.0668
2006_Q4	3.3803	34.2922	26.5909	5.2543	0.0124	0.2258	8.9417	50.9312	0.0283	18.2129	0.2081	1.2319	0.5923	3.7526	12.2836	3.6716	0.0715
2007_Q1	3.3924	34.4773	26.3260	5.2008	0.0123	0.2201	8.8489	51.4982	0.0279	18.6222	0.2109	1.2227	0.5969	3.7507	12.5071	3.6256	0.0733
2007_Q2	3.3677	34.8597	25.8572	5.1203	0.0121	0.2142	9.1994	51.3557	0.0278	19.2955	0.2130	1.2291	0.6328	3.7644	13.0971	3.6366	0.0738
2007_Q3	3.3731	35.0409	25.4995	5.0657	0.0119	0.2164	9.2157	51.5206	0.0273	19.7949	0.2071	1.2640	0.6268	3.7798	13.2585	3.5890	0.0753
2007_Q4	3.3159	35.7036	24.6454	4.8669	0.0115	0.2180	9.8347	50.4039	0.0265	20.6590	0.2041	1.3383	0.6221	3.8411	13.7386	3.5937	0.0791
2008_Q1	3.3873	36.3305	24.2626	4.7660	0.0113	0.2308	10.2649	47.9413	0.0251	20.1535	0.2014	1.4321	0.6055	3.8595	13.8995	3.1792	0.0783
2008_Q2	3.3953	36.9086	23.6253	4.8201	0.0111	0.2262	10.8906	46.5494	0.0231	18.7189	0.1959	1.4885	0.5641	3.9469	14.4190	3.0594	0.0771
2008_Q3	3.5443	36.4830	24.2571	5.1523	0.0115	0.2255	11.0253	45.8783	0.0223	20.0328	0.2021	1.5024	0.5488	3.8525	14.4858	3.1284	0.0808
2008_Q4	3.9867	35.9702	27.2805	4.2734	0.0127	0.2844	9.6666	42.9018	0.0202	17.7848	0.2269	1.4705	0.5672	3.5114	12.4172	2.8075	0.0913
2009_Q1	5.0153	44.4271	34.2879	4.2405	0.0123	0.3680	9.9869	49.0969	0.0245	20.6361	0.2469	1.6373	0.6948	4.0825	15.0902	3.5338	0.1071
2009_Q2	4.7151	43.7789	32.2059	4.1179	0.0115	0.3309	9.6382	49.7566	0.0245	20.4581	0.2140	1.6390	0.6517	4.0598	15.4401	3.8172	0.0866
2009_Q3	4.5861	44.7826	31.3289	3.8528	0.0111	0.3345	10.6550	51.4215	0.0253	20.8805	0.2078	1.7527	0.6416	4.2993	16.8407	4.0073	0.0824
2009_Q4	4.3115	43.5681	29.4364	3.6195	0.0106	0.3284	10.4618	48.1072	0.0253	19.7521	0.1966	1.6622	0.6337	4.2070	16.9727	3.9172	0.0776
2010_Q1	4.3720	41.3271	29.8496	3.7151	0.0103	0.3299	10.3565	46.6697	0.0261	19.7980	0.2021	1.5971	0.6500	4.1502	16.5218	3.9646	0.0778
2010_Q2	4.4341	38.5183	30.2563	3.8108	0.0101	0.3284	9.6285	45.0868	0.0260	19.6571	0.2061	1.5075	0.6629	3.9966	16.8798	4.0128	0.0787
2010_Q3	4.5213	39.5260	30.5196	3.8726	0.0102	0.3566	9.8504	47.4316	0.0259	20.1871	0.2077	1.5825	0.6585	4.2045	17.4749	4.1770	0.0837
2010_Q4	4.6147	41.7406	30.6811	3.8610	0.0102	0.3720	10.5208	48.5595	0.0271	21.0044	0.2083	1.6845	0.6846	4.5238	18.0859	4.4410	0.0853
2011_Q1	4.4473	40.0029	29.2616	3.6790	0.0097	0.3555	10.1600	46.9144	0.0261	18.5413	0.1998	1.6438	0.6458	4.5128	17.5283	4.1663	0.0800
2011_Q2	4.3071	40.2868	27.9702	3.5085	0.0076	0.3430	10.1759	45.6655	0.0258	17.8713	0.1923	1.6561	0.6261	4.4729	17.5353	4.1205	0.0750
2011_Q3	4.5285	41.1512	29.0180	3.6340	0.0057	0.3739	9.9247	46.7851	0.0268	16.7717	0.1982	1.6860	0.6356	4.4912	17.8716	4.0810	0.0781
2011_Q4	4.9106	42.0779	31.0668	3.8978	0.0040	0.4039	9.5214	49.0592	0.0273	16.9870	0.2111	1.6662	0.6145	4.6266	17.3408	3.8542	0.0821
2012_Q1	4.7759	39.5476	30.0989	3.7552	0.0037	0.3813	9.3596	47.3310	0.0267	16.8092	0.2035	1.5765	0.6023	4.4667	17.1210	3.8892	0.0776
2012_Q2	4.9031	39.8480	30.9359	3.8621	0.0038	0.3876	9.3496	49.1033	0.0269	17.1781	0.2094	1.5787	0.5740	4.4646	15.8313	3.8205	0.0773
2012_Q3	5.0373	39.9936	31.8685	3.9481	0.0038	0.4070	9.6719	50.5235	0.0282	17.7335	0.2137	1.5965	0.5796	4.7373	15.7804	3.8723	0.0778
2012_Q4	4.9787	40.3059	31.0257	3.8150	0.0036	0.3832	9.8038	49.9135	0.0285	17.3182	0.2066	1.6024	0.5741	4.6735	15.1026	3.5766	0.0765
2013_Q1	4.8848	40.1507	30.3529	3.7398	0.0035	0.3294	9.6693	47.1562	0.0280	17.0362	0.2017	1.5719	0.5618	4.7240	15.2232	3.3884	0.0742
2013_Q2	5.1432	41.3775	31.6058	3.8872	0.0036	0.3202	9.8294	48.5406	0.0282	17.1879	0.2094	1.5984	0.5665	4.8227	15.3071	3.3302	0.0762
2013_Q3	5.3523	43.4494	32.7635	4.0240	0.0037	0.3313	10.2252	50.8032	0.0296	16.6568	0.2143	1.6797	0.5280	5.0036	14.3406	3.2848	0.0802
2013_Q4	5.3450	44.3217	32.5157	3.9655	0.0035	0.3244	10.5848	52.7187	0.0307	16.0868	0.2116	1.6621	0.5246	4.9994	14.3087	3.2048	0.0803
2014_Q1	5.7491	48.0778	34.9892	3.8737	0.0036	0.3414	11.4826	58.0328	0.0328	15.7998	0.2067	1.7511	0.5680	5.4291	14.8244	3.2207	0.0854
2014_Q2	5.6126	47.9630	34.9591	2.9663	0.0035	0.3424	11.5127	58.8508	0.0340	16.5430	0.1914	1.7478	0.5851	5.3013	15.6740	3.3163	0.0847
2014_Q3	5.8733	48.0762	36.2112	2.8854	0.0035	0.3484	11.4959	60.4503	0.0353	16.7421	0.1984	1.7384	0.5977	5.2149	15.9530	3.3640	0.0886
2014_Q4	7.7205	59.9280	47.6973	3.2700	0.0044	0.4134	14.0647	75.0701	0.0436	20.9846	0.2616	2.1449	0.7659	6.3827	18.6053	4.2255	0.1101

NOTE: * - marked figures are multiplied by 10^6 because of denomination.
** - Currencies are listed in a decreasing order (from the left to the right) of corresponding country's share in total trade with the Russia in 2013.

Source: Own elaboration based on data taken from Russian Central Bank's archive of currencies nominal exchange rates: http://finance.rambler.ru/currencies/archive/

Along with nominal exchange rates, data upon inflation rates in corresponding countries were collected, as well, on monthly basis. Table 5.2.6 provides readers with average annual inflation rates in Russia and its main foreign trade partners.

Table 5.2.6: Average inflation rates in Russia and its main foreign trade partners*, 2000-2014, in %

Country	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Russia	20.13	18.82	15.06	11.99	11.74	10.91	9.00	11.87	13.28	8.80	8.78	6.10	6.58	6.45	11.36
China	0.35	0.73	-0.73	1.13	3.84	1.78	1.65	4.82	5.97	-0.72	3.17	5.53	2.62	2.57	2.06
Germany	2.00	1.61	1.14	1.12	2.22	1.41	1.39	3.17	1.13	0.81	1.31	1.98	2.04	1.43	0.19
USA	3.39	1.55	2.38	1.88	3.26	3.42	2.54	4.08	0.09	2.72	1.50	2.96	1.74	1.50	0.76
Ukraine	25.82	6.12	-0.57	8.24	12.31	10.35	11.62	16.59	22.31	12.31	9.10	4.56	-0.20	0.50	24.87
Italy	2.54	2.79	2.46	2.67	2.21	1.98	2.09	1.83	3.35	0.78	1.52	2.78	3.04	1.22	0.24
Belarus	107.50	46.12	34.79	25.37	14.44	7.94	6.62	12.07	13.30	10.11	9.93	108.69	21.78	16.47	16.22
Finland	3.04	2.58	1.57	0.88	0.19	0.62	1.57	2.51	4.07	0.01	1.19	3.42	2.81	1.48	0.35
Japan	-0.39	-1.27	-0.30	-0.40	0.20	-0.40	0.30	0.70	0.39	-1.67	-0.40	-0.20	-0.10	1.61	2.38
France	1.58	1.36	2.30	2.16	2.11	1.53	1.53	2.59	1.00	0.91	1.77	2.47	1.34	0.69	0.07
Poland	9.91	5.43	1.92	0.68	3.38	2.20	1.31	2.44	4.17	3.79	2.58	4.24	3.56	0.99	0.05
United Kingdom	0.75	1.07	1.69	1.25	1.64	1.92	2.97	2.12	3.11	2.83	3.73	4.20	2.71	2.00	0.55
South Korea	2.26	4.07	2.76	3.52	3.59	2.76	2.24	2.53	4.67	2.77	2.94	4.03	2.19	1.30	1.28
Turkey	56.43	53.46	47.20	21.94	8.60	8.19	9.59	8.78	10.43	6.28	8.58	6.45	8.94	7.49	8.85
Netherlands	2.31	4.16	3.29	2.11	1.24	1.67	1.17	1.61	2.49	1.19	1.28	2.34	2.47	2.53	0.98
Kazakhstan	10.00	6.58	6.69	7.00	6.80	7.87	8.40	18.77	9.48	6.38	7.97	7.43	6.06	4.90	7.54
Czech Republic	3.90	4.75	1.83	0.11	2.80	1.88	2.55	2.98	6.35	1.04	1.47	1.93	3.30	1.42	0.35
Spain	3.96	2.71	4.04	2.60	3.23	3.73	2.67	4.22	1.43	0.79	2.99	2.38	2.87	0.25	-1.04
India	3.48	5.16	3.20	3.72	3.78	5.57	6.72	5.51	9.70	14.97	9.47	6.49	11.17	9.13	5.86
Sweden	0.90	2.40	2.16	1.93	0.37	0.45	1.36	2.21	3.44	-0.48	1.16	2.96	0.89	-0.04	-0.18
Austria	2.34	2.65	1.81	1.36	2.06	2.30	1.44	2.17	3.22	0.51	1.81	3.29	2.49	2.00	1.61
Brazil	7.06	6.83	8.43	14.78	6.60	6.88	4.20	3.64	5.67	4.90	5.04	6.63	5.40	6.21	6.33
South Africa	5.33	5.73	9.47	5.84	-0.68	2.06	3.24	6.17	10.04	7.26	4.10	5.01	5.75	5.77	6.13
Armenia	2.95	3.15	1.07	4.67	6.97	0.60	2.90	4.39	9.00	3.40	8.20	7.70	2.60	5.80	3.00

NOTE: * - Countries are listed in a decreasing order (from the top to the down) of its share in total trade with Russia in 2013.

Source: Own elaboration based on data taken from Statbureau, National bank of Kazakhstan and Central bank of Russia.

Calculation of total trade weighted REER index of Russian ruble

At the first stage, average monthly index of Russian ruble *nominal* exchange rate relatively to a selected currency-*k* ($NERI_m^k$) was calculated. Values of that index are calculated as a ratio of average monthly Russian ruble nominal exchange rate per a selected currency in a given month-*m* to average monthly Russian ruble nominal exchange rate per a selected currency in previous month (see Formula (14)).

At the second stage, average monthly index of Russian ruble *real* exchange rate relatively to a selected currency-*k* in a given month-*m* was calculated with the use of Formula (15).

At the third final stage, the real *effective* exchange rate of Russian ruble in relation to all currencies was calculated on the basis of Formula (13). The results of the calculation are illustrated by Figure 5.2.7 given below.

Figure 5.2.7: REER of ruble to a basket of the main Russian foreign trade partners' currencies, CPI adjusted and total trade weighted (2000.01 – 2013.12), in p.p.

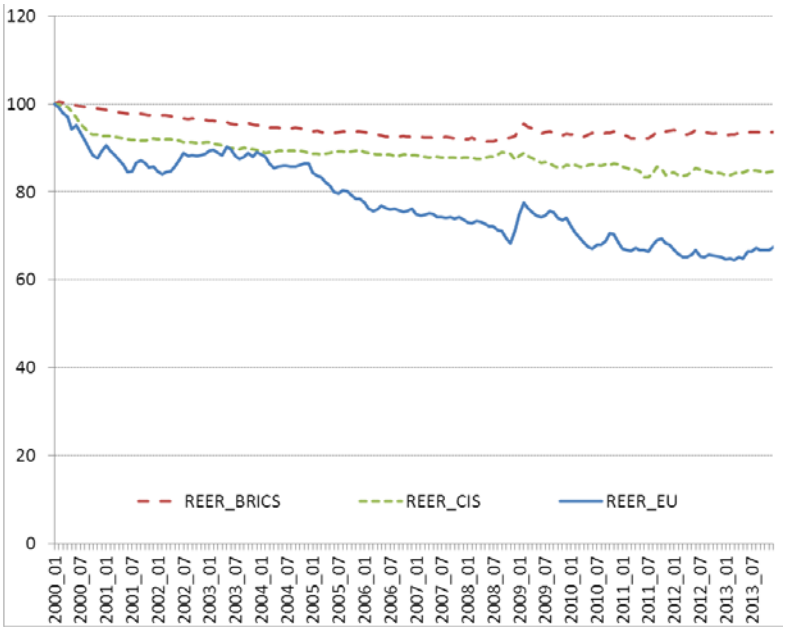
Source: Own calculation based on raw data taken from: www.micex.ru and https://www.statbureau.org.

The value of REER index corresponding to 2000_01 was taken as 100%. Downward slope of the REER index curve corresponds to the REER growth, i.e. RUR appreciation. According to the obtained results we can state that over the analyzed period that is from 2000 to 2013 the real exchange rate of Russian ruble has appreciated in relation to the basket of main Russian foreign trade partners' currencies by more than 80%. In order to see in relation to which group of countries (CIS, BRICS or EU) Russian ruble has appreciated most of all, it was decided to separate the basket of main Russian foreign trade partners' currencies into several corresponding parts. As a result, REER index was recalculated relatively to these separated baskets to distinguish the position of Russian ruble towards to currencies form mentioned groups.

Calculation of multilateral trade weighted REER index of Russian ruble constructed for selected groups of countries: CIS, BRICS and EU

The observed dynamics of REER indices in relation to CIS, BRICS and EU basket of currencies (see Figure 5.2.8) allow us to conclude that Russian ruble has appreciated the most significantly relatively to basket represented by trade partners from EU countries (that is in relation to EUR, CZK, PLN and GBP). In means that Russian producers' position in corresponding markets and towards to European producers has become less favorable in terms of price competitiveness.

Figure 5.2.8: Real effective exchange rate of ruble to currencies of selected groups of Russian foreign trade partners (2000.01 – 2013.12), in %



Source: Own calculation.

Appreciation of Russian ruble in relation to a basket of currencies represented by selected CIS countries (the list of these countries is given in Table 5.1.2.) was less than it was towards to EU basket, but more in comparison to BRICS basket. In other words, Russian products expose relatively better position in terms of price competitiveness in relation to BRICS partners.

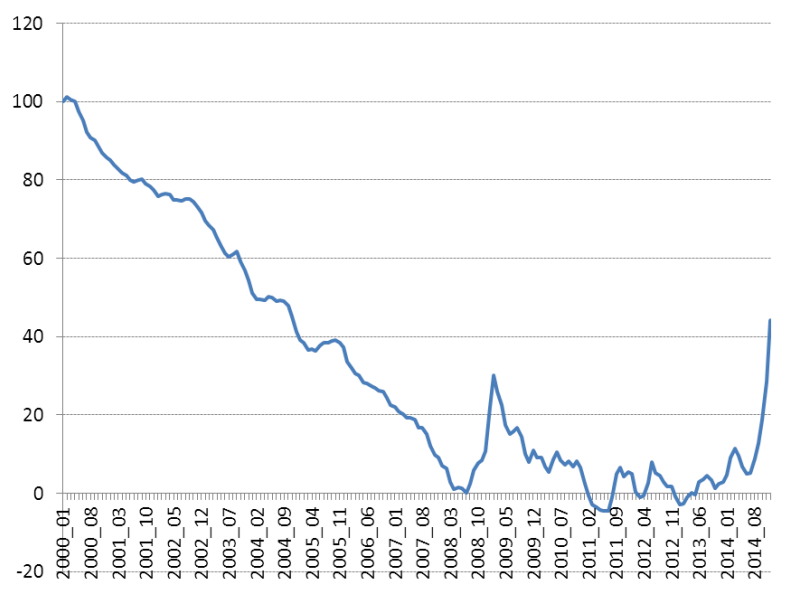
However, if we take a closer look at the dynamics of REER index in relation to EU-basket of currencies, we will see that it doesn't reflect the real situation in Russian currency exchange market. The matter is that the vast majority of these countries' currencies accounts for a very insignificant share in Russian currency market. For that reason the next subsection will be devoted to calculation and analysis of REER index of Russian ruble dynamics in relation to those currencies, which take a dominant position in Moscow Interbank Currency Exchange.

Calculation of REER index in relation to EUR-USD basket of currencies

Taking into account the fact that payment for the supply of main exported by Russia products is carried out in USD, namely the USD takes the dominating position on the Russian currency market. At the same time, the average total share of Euro in currencies turnover of Moscow Interbank Currency Exchange is around 3 %, whereas the share of Euro in the basket of foreign currencies accounts up to 45%. For these reasons, the construction of REER index in relation to both USD and EUR currencies is seen as worth pursuing. The corresponding weights will be

calculated as total turnover of USD/RUR and EUR/RUR in Moscow Interbank Currency Exchange.

Figure 5.2.9: REER of ruble to a basket of USD-EUR currencies* (2000 – 2014), in p.p.



NOTE: * - REER index is CPI adjusted and the total turnover of USD/RUR, EUR/RUR currency pairs weighted.
Source: Own calculation.

The first thing that deserves attention is that the observed dynamics of REER index curve confidently points to the real appreciation of the domestic currency. The observed dynamics of REER_EUR-USD index allows us to conclude that RUR was gradually appreciating from 2000_01 to 2008_07. The real appreciation of the RUR during that period amounted to approximately 97 %. However, in nominal terms the appreciation of RUR amounted to nearly 18 % at the end of the same period. In the next period RUR demonstrated depreciation; the latter lasted up 2009_02 and amounted to approximately 40 % relatively its value at the end of the previous period in nominal terms and around 28 % in real terms. After that the dynamics of REER_EUR-USD index curve can be characterized as turbulent with the declining overall trend. It implies that during this period RUR again began to appreciate in real terms. The real appreciation of RUR in III–period approximately amounted to 25 % relatively its value at the end of the II–period; however values of the nominal effective exchange rate of RUR were at the end of the same period almost identical to those in the beginning. The next IV–period (after mid. of 2014) demonstrates a sharp growth of REER_EUR-USD index, which means RUR real depreciation.

Thus, the results of the real effective exchange rate of Russian ruble calculation has shown that its influence in accordance with the theory is expected to be on average not favorable in relation to domestic producers since real appreciation affects price competitiveness of the latter negatively. According to Brodsky (2006), real appreciation of the national currency reduces competitiveness of all domestic producers and entails a number of other negative consequences. In particular, REER appreciation reduces gross outputs as well as exports of manufacturing industries. It eventually leads to unemployment growth, increase in imports, declining net exports and, ultimately, a drop in the volume of the gross domestic product. This predetermined relatively low price competitiveness of Russian producers, which was mostly confirmed by calculated values of RCA, VRC and LFI indices.

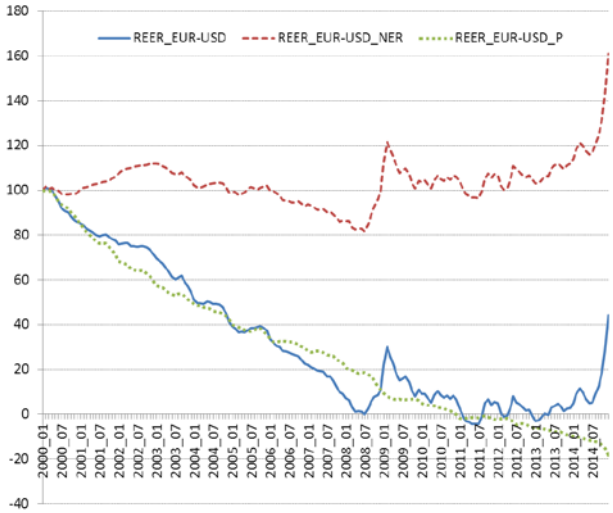
In order to understand what was the reason behind such a dramatic real appreciation of Russian ruble exchange rate next subsections will be devoted, first, to the analysis of separate influences of inflation and nominal exchange rates on REER index and, second, to the analysis of main monetary parameters in the Russian economy.

Decomposition analysis of inflation and nominal exchange rate influences on REER

Figure 5.2.10 illustrates changes in REER (REER_EUR-USD) of ruble at constant inflation REER_NER (REER_EUR-USD_NER) and constant nominal exchange rate REER_P (REER_EUR-USD_P) which in fact reflect separate influences of inflation rate changes and nominal exchange rate changes on REER index.

Figure 5.2.10: Changes in REER index of ruble at constant inflation (REER_NER) and constant nominal exchange rate (REER_P) (2000.01 – 2013.12), in p.p.

a) REER to EUR-USD basket



b) REER to multi-currency basket

Source: Own calculation.

Table 5.2.7 provides readers with the results of decomposition analysis of inflation' and NER' influences on REER given in percentages. As we can see, in both cases the strongest influence on REER (REER_EUR-USD) index was exerted from the side of inflation. In other words, the increasing difference between consumer price index in Russia and its main foreign trade partners led to such a dynamics of Russian REER index.

Table 5.2.7: Contributions of inflation rate (REER_P) and NER (REER_NER) to change in REER*, in %

b) REER to EUR-USD basket

Year	REER_EUR-USD	REER_EUR-USD_NER	REER_EUR-USD_P
2000	15.10	8	92
2001	8.64	30	70
2002	5.99	31	69
2003	18.48	47	53
2004	13.89	42	58
2005	3.94	29	71
2006	15.80	61	39
2007	14.24	50	50
2008	-1.94	51	49
2009	-1.59	56	44
2010	4.27	23	77
2011	0.63	41	59
2012	6.08	38	62
2013	-3.69	66	34
2014	-35.55	82	18

b) REER to multi-currency basket

Year	REER	REER_NER	REER_P
2000	27.95	75	25
2001	8.73	17	83
2002	-1.01	50	50
2003	5.28	21	79
2004	5.96	13	87
2005	10.46	27	73
2006	7.65	28	72
2007	5.41	9	91
2008	3.55	35	65
2009	-2.70	59	41
2010	5.87	15	85
2011	3.11	75	25
2012	5.14	42	58
2013	-2.59	63	37

NOTE: * - Values of REER index, calculated as it average change in corresponding year relatively to the previous one, are also given in %. Positive values correspond to REER index growth (i.e. rouble appreciation).

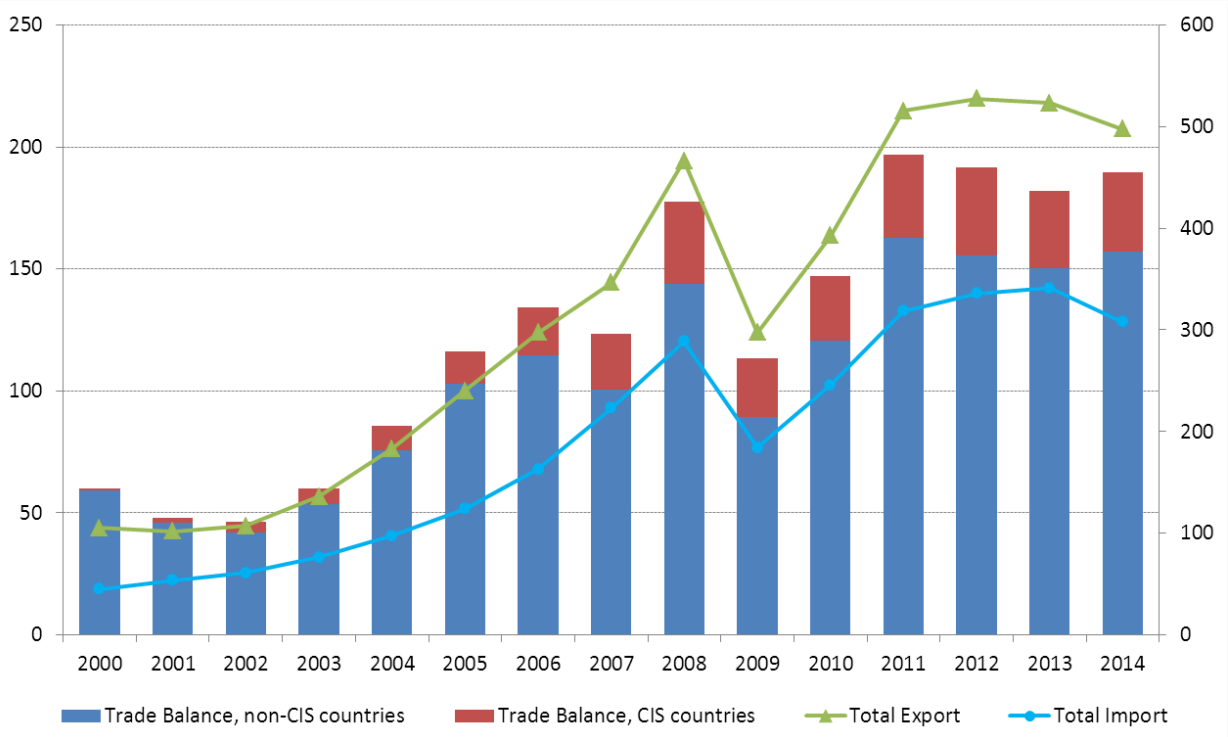
Source: Own calculation.

Decomposition of inflation and NER influences on REER has shown that the greatest impact on REER appreciation was exerted by the difference in inflation rates in Russia and its main foreign trade partners. Nominal exchange rate fluctuations affected REER to much lower extent than it inflation rate did.

The Analysis of the obtained results in the light of monetary policy

The obtained results revealed that starting from 2000 a constant appreciation of the real exchange rate of ruble was observed. This fact can be explained by several reasons. As it is well known, energy resources compound the principal part of Russian exports. Therefore, a growth in their price (primarily crude oil price, see Figure 3.3.2) along with the volumes of their export resulted in Russian Foreign trade surplus, i.e. increase in the balance of trade (see Figure 2.5.11).

Figure 5.2.11: Russian balance of trade (2000 – 2014), in billions of USD

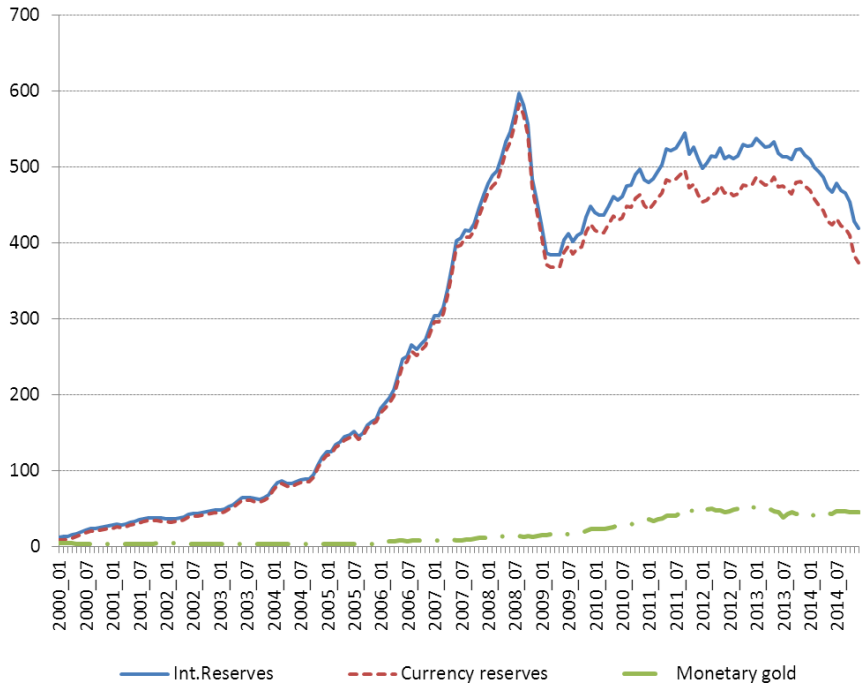


NOTE: Total Export and Total Import values are measured by right axis.

Source: Author's processing.

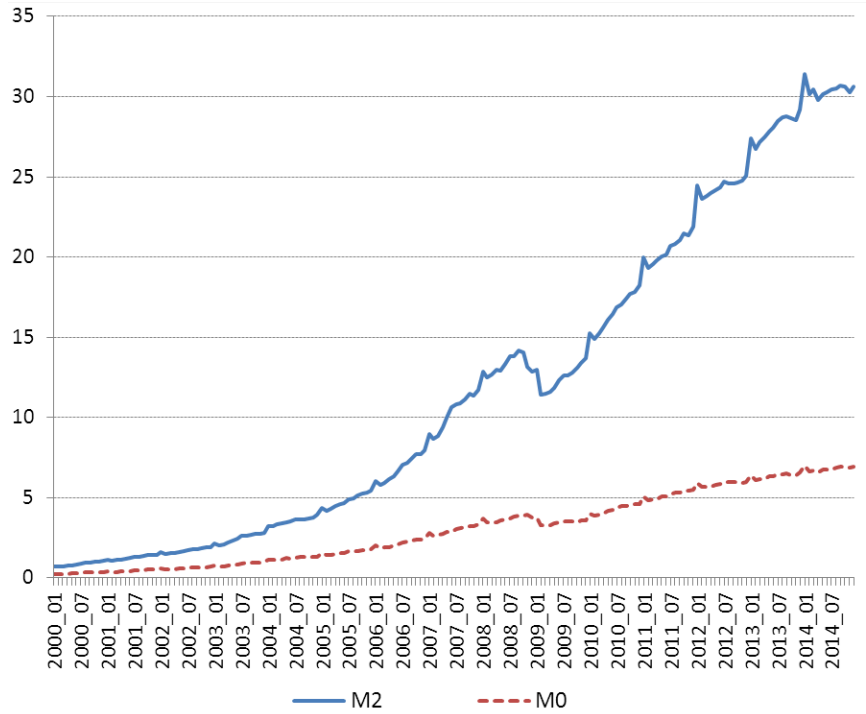
As a result, the inflow of foreign currencies into the country has increased, whereupon the leadership of the Russian Central Bank had to choose whether to strengthen the nominal and real exchange rate of ruble or to make a purchase of foreign currencies in its own reserves. The last variant is connected to the necessity to increase the emission of Russian ruble, and namely this variant was chosen by the Central Bank of Russia. The dynamics of main monetary parameters reflected in Figure 5.2.11 and Figure 5.2.12 confirms this fact.

Figure 5.2.12: The International reserves of Russia (2000.01 – 2014.12), in billions of USD



Source: Author's processing of data taken from: http://www.cbr.ru/hd_base/Default.aspx?Prtid=mrrf_m

Figure 5.2.13: Monetary aggregates M0* and M2 (2000.01 – 2014.12), in billions of RUR**



NOTE: * - M0 money aggregate includes cash in circulation outside the banking system.

** - M2 money aggregate is money supply by national definition that includes money aggregate M1 and remainders on accounts of term deposits and other borrowed on term funds of the population in the domestic currency, non-financial and financial (excluding credit) organizations which are residents of the Russian Federation.

Source: Author's processing of data taken from: http://www.cbr.ru/statistics/?PrtID=ms&Year=2015

Since REER dynamics is influenced by NER and inflation rate values and depends on fluctuations of both, it becomes interesting so see how NER of ruble and inflation rate in Russia are interconnected with regulated parameters of Russian monetary policy, i.e. money supply, international reserves and interest rate. Table 5.2.8 provides readers with the results of correlation analysis among all mentioned indicators.

Table 5.2.8: Correlation coefficients between Inflation rate (Inf), Real Effective exchange rate (REER) and regulated parameters of monetary policy*

	REER	M2	Res	IntR	Inf
REER	1				
M2	**-0.809628413**	1			
Res	**-0.944723111**	0.883985155	1		
IntR	**0.917608999**	-0.722974687	-0.798645806	1	
Inf	0.440419278	**-0.334865792**	**-0.370860154**	**0.440476315**	1

NOTE: * - M2 – Money supply; Res – International reserves; IntR – Interest rate.

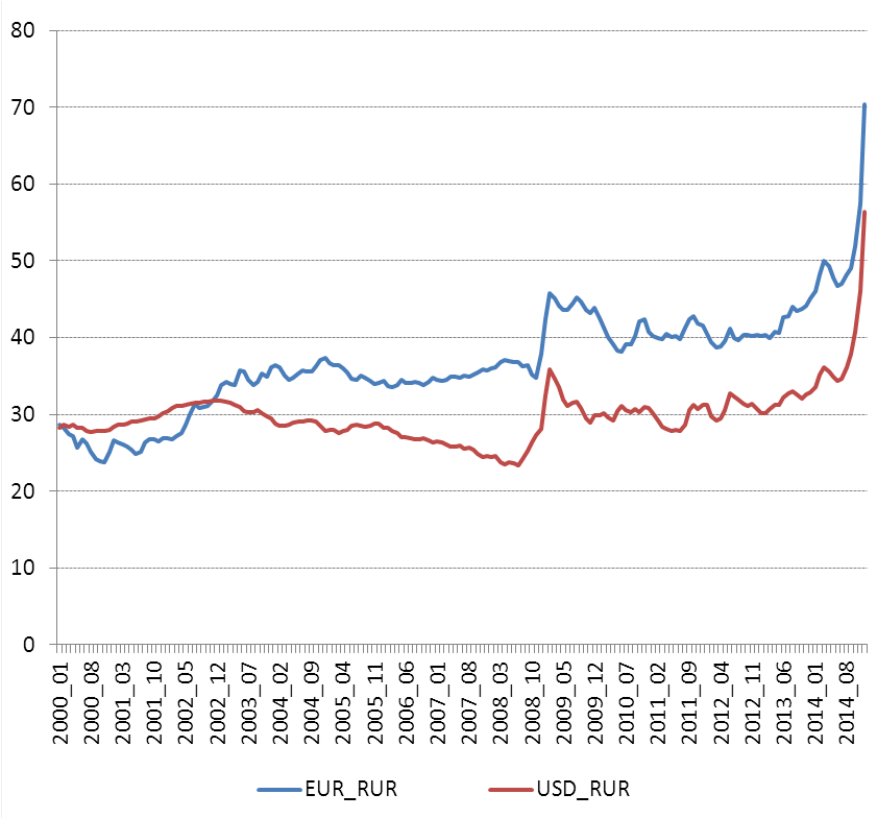
Source: Author's calculation.

The conducted analysis has shown that inflation targeting aimed at decreasing its level with the use of selected monetary parameters (money supply, international reserves and interest rate) will not be effective, because of weak links among them. The obtained values indicate that the link between the dynamics of REER and main monetary parameters, considered with the use of correlation coefficients, is much stronger than between the dynamics of the latter and inflation rate. This allows us to make a conclusion that, on the one hand, the effect from changes in foreign exchange policy on inflation rate will be more significant than in case of regulating selected monetary parameters (except interest rate) due to stronger links between inflation and REER; on the other – if we aim at decreasing inflation, the influence on exchange rate via regulation of money supply, international reserves and interest rate may occur more noticeable than in case of influencing the very inflation because of weak links among inflation and selected monetary parameters. Thus, the focus of the further analysis will be done of regulating nominal exchange rate of Russian ruble.

As we can see from the Figure 5.2.14 nominal exchange rate of Russian ruble was relatively stable in relation to main foreign trade partners' currencies. This stability at the same time was

accompanied by growth of foreign exchange reserves (Russian international reserves consisted of monetary gold and currency reserves) and money supply (see Figures 5.2.12 and 5.2.13).

Figure 5.2.14: Nominal exchange rate of Russian ruble, in RUR per FCU



Source: Author's processing of data taken from the Central Bank of Russia official webpage.

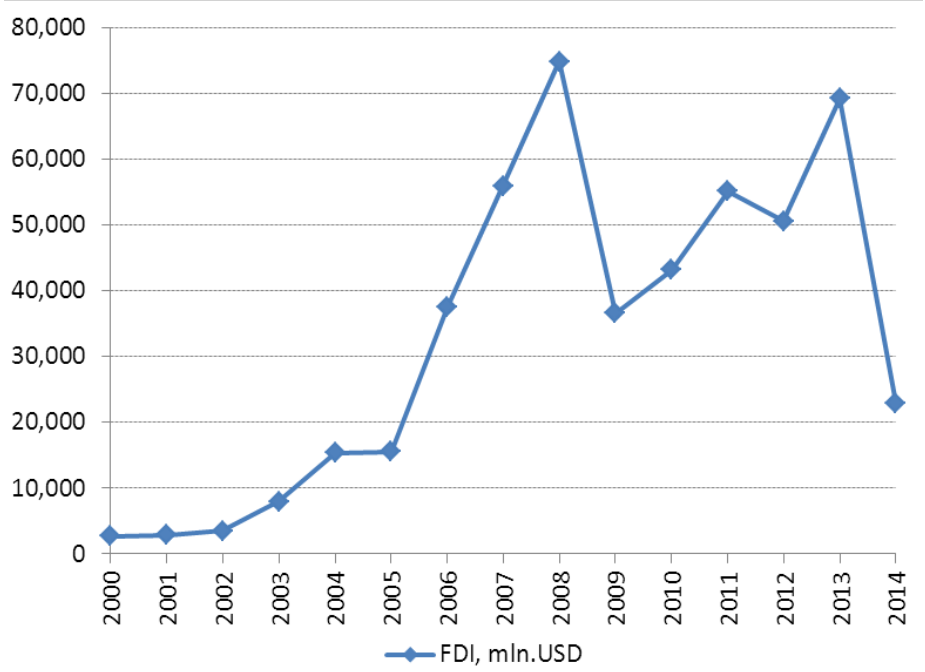
In order to prevent natural consequences of that process manifested in inflation growth, Russian government carried out monetary sterilization. However, despite the corresponding measures were taken, growth rate of money supply increased the demand for money from the real sector's side. Namely because of these reasons the growth rate of inflation rate has increased, which was in fact the main determinant of the Russian ruble real appreciation.

Before 2003 the Central Bank of Russia did not impede the natural appreciation of the real effective exchange rate of ruble. After year 2003 Russian Central Bank confronted the problem of sharp increase in export revenues. Under these circumstances, willing to meet the stated target of 10-12 % inflation rate per year, the Central Bank's government preferred to allow nominal exchange rate of ruble to strengthen (see Figure 5.2.14).

As a result of Russian ruble exchange rate strengthening, the growth in foreign direct investments into Russian actives and financial assets was recorded (see Figure 5.2.15). The increased money inflow enhanced the gap between the supply and demand for national currency

and led to a stronger appreciation of Russian ruble. Thus, a self-sustaining mechanism of exchange rate appreciation has triggered. The most painful for Russian economy consequences of ruble appreciation were growth of consumer imports' volumes (see Figure 5.2.11) along with reduction in revenues of domestic export-oriented producers.

Figure 5.2.15: Foreign direct investments in Russia (2000 – 2014), mln. USD



Source: Author's processing of data taken from the Central Bank of Russia official webpage.

As it follows from the equations (13) and (26) in order to decrease the REER of ruble, which will correspondingly contribute to increase in price competitiveness of Russian products, it is necessary either to reduce inflation or to devaluate the national currency. With regard to the latter variant - if the Russian Central Bank doesn't want to admit the Russian ruble appreciation it should devaluate nominal exchange rate by value which equals to the difference between inflation rate abroad and Russian inflation rate. In case if inflation rate in abroad countries exceeds Russian inflation rate Russian Central Bank should vice versa appreciate nominal exchange rate by appropriate value.

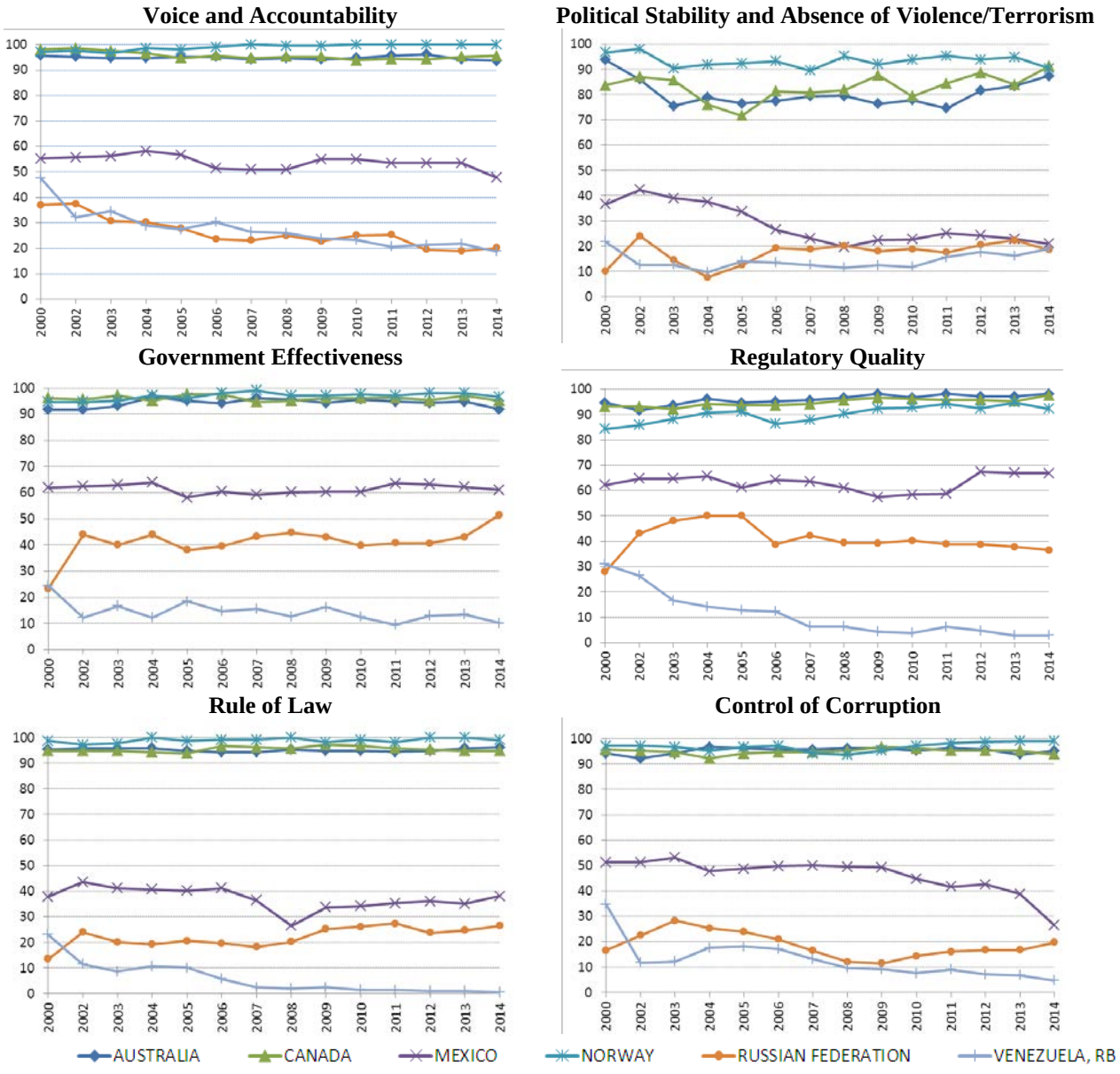
5.3. Investigation of the Russian economy for the presence of Natural resource curse and Dutch disease symptoms

5.3.1. Institutional quality gap across resource abundant countries: comparative analysis

Institutional quality analysis for selected group of resource abundant countries: legal, regulatory, economic coordination, risk-sharing institutions and institutions of human capital development. The summary analytical table upon all six aspects for the sample of resource abundant countries is presented below.

Legal and Regulatory institutions

Table 5.3.1: WGI values for a sample of resource abundant countries, in percentiles*

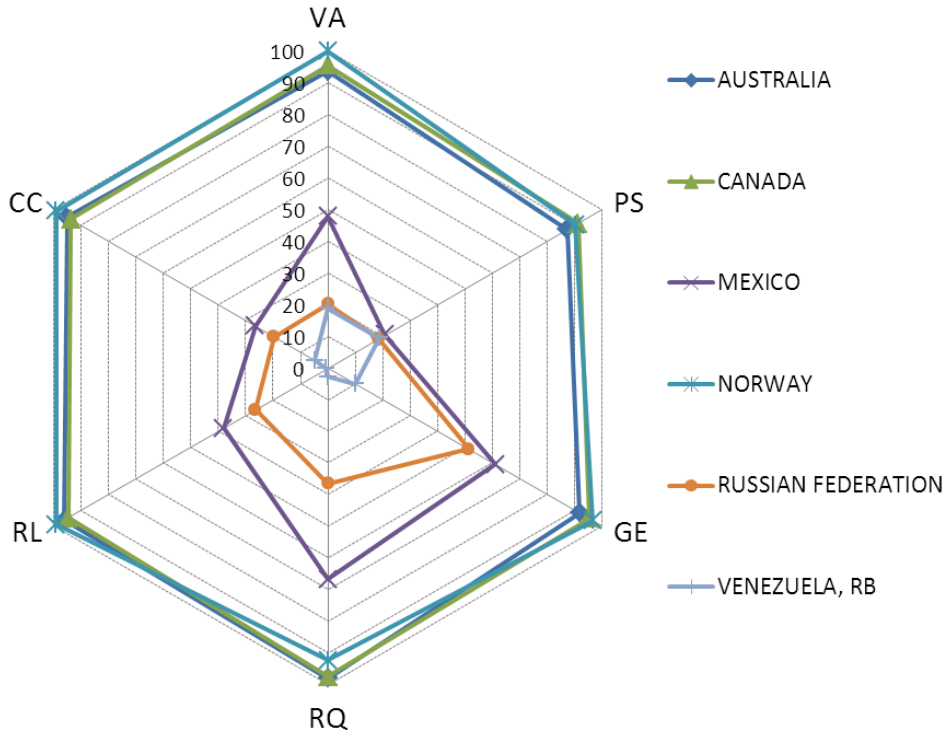


NOTE: * - Percentile rank among all countries (215): ranges from 0 (lowest) to 100 (highest) rank.

Source: The World Bank Group: http://info.worldbank.org/governance/wgi/index.aspx#home, authors' graphical representation.

Higher values of indicators correspond to a more effective system of government. As we can see form the Table 5.3.1 weak position is revealed by Russian Legal and Regulatory institutions, specifically values of Voice and accountability and Control of Corruption indicators demonstrated negative dynamics with insignificant exceptions over the analyzed period. However, Political stability has slightly increased. If we compare values of others Russian indicators from that group at the beginning and the end of the analyzed period we see either no or very little change. As a result, with regard to Legal and Regulatory institutions Russia is still below the threshold level as well as the country's positions towards to each other has not changed.

Figure 5.3.1: Institutional quality* gap across resource abundant countries in 2014



NOTE: * - VA – Voice and Accountability; PS – Political stability and absence of violence/terrorism; GE – Government Effectiveness; RQ – Regulatory Quality; RL – Rule of Law; CC – Control of Corruption.

Source: authors' graphical representation of the data given in the Table 5.3.2.

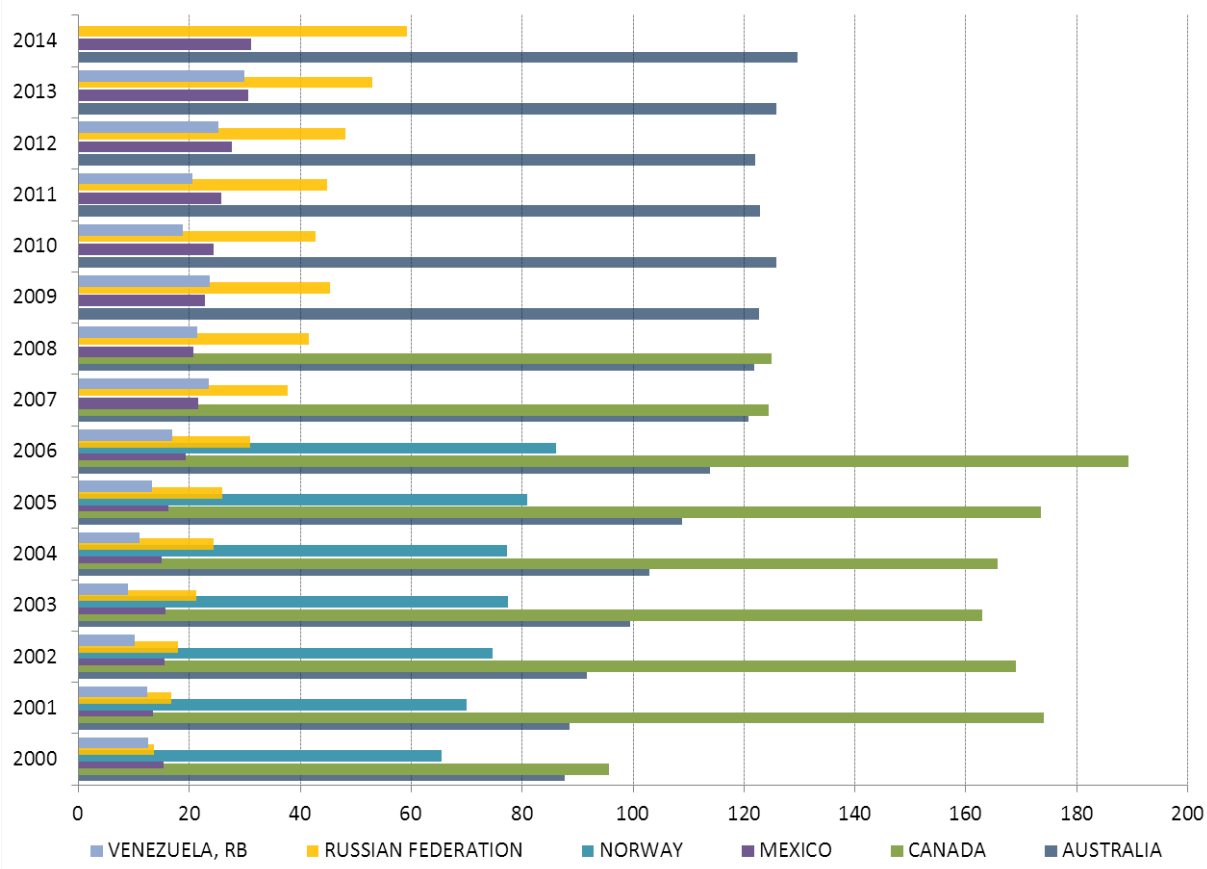
On the basis of the latest data (2014) we construct the radar chart representing institutional quality gap upon governance aspect across selected resource abundant countries. The results are given in the Figure 5.3.1.

Institutions of Economic Coordination and Risk-sharing

One of the examples for this group is an indicator developed by the World Bank, which is represented by Domestic credit to private sector (% of GDP). Domestic credit to private sector refers to financial resources provided to private sector through loans, purchases of nonequity securities, and trade credits and other accounts receivable that establish a claim for repayment. For some countries these claims include credit to public enterprises.

Unfortunately, not all indices values that we consider are published on a regular basis. Therefore, the analysis of some of the ratings is carried out only on the latest available data.

Figure 5.3.2: Domestic credit to private sector (% of GDP) in a sample of countries*



NOTE: * - Percentile rank among all countries: ranges from 0 (lowest) to highest rank.

Source: Author's graphical representation on the basis of data taken from the World Bank's official webpage.

As we can see from Figure 5.3.1, Russia's position among the selected countries changed after 2000 so it moved from the last place to the third one leaving behind both Venezuela and Mexico. Russian values of this indicator has been showing stable and increasing trend. However, it is still far from the values of institutionally developed leaders as Australia, Canada and Norway

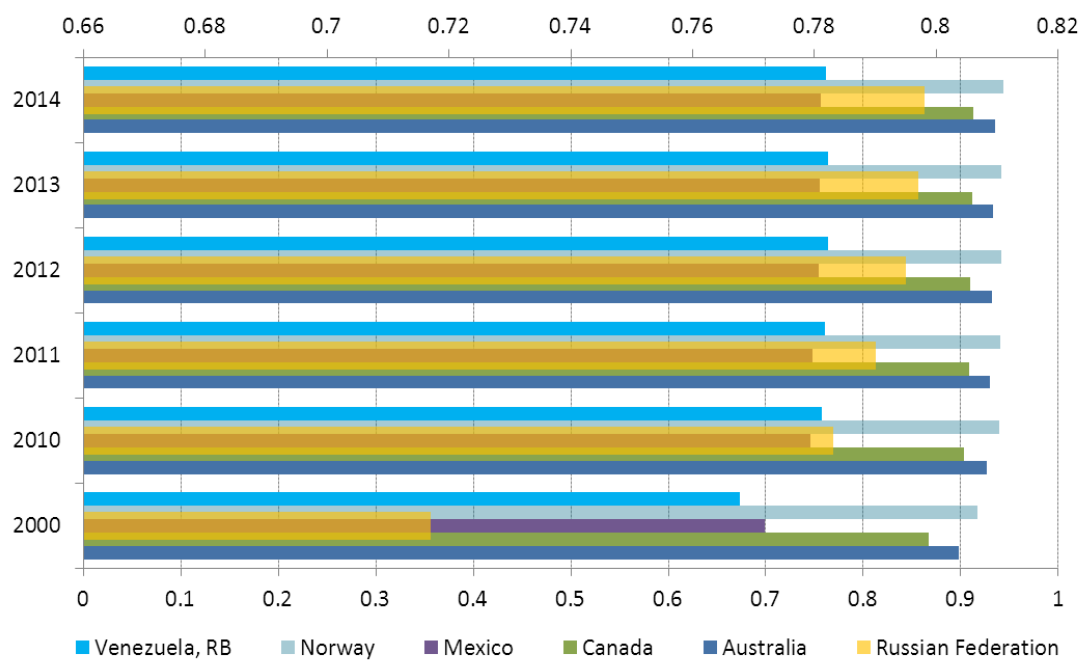
(the most recent data upon Norway and Canada are, unfortunately, absent at the source). Since the value of the Russian indicator at the end of the analyzed period is approximately 2 times higher than Mexican one and 2.5 times less than the Australian one (countries that represent close values to the threshold level from both sides below and above respectively), we can conclude that Russia at the moment is steadily moving towards countries enjoying curse-free positions as, for instance, Norway.

So, with regard to Institutions of Economic Coordination and Risk-sharing, the group of which is represented by indicator expressed as Domestic credit to private sector (% of GDP), we came to a conclusion that in this part Russia demonstrates positive dynamics and its position towards to the threshold level has all chances to be changed very soon.

Institutions of Human Capital Development

Quality of Institutions from that group can be accessed along with others by a Human Development Index (HDI), which is elaborated by UN's specialists. The HDI is a composite statistic of life expectancy, education, and income indices used to rank countries into four tiers of human development (low, medium, high and very high). In our sample countries refer to a high (Russia, Venezuela, Mexico) or very high (Canada, Norway, Australia) level of human capital development.

Figure 5.3.3: Human Development Index values development



Source: UN's Human Development Index trends: http://hdr.undp.org/en/composite/trends, the author's graphical representation.

This figure, representing development of HDI for each country, revealed a very positive dynamics of Russian Human Development.

Discussion of the obtained results

A number of authors employing econometric models investigated this problem earlier with attempt to define a certain level of institutional development, achieving which resource abundant countries are able to overcome negative effect of so called "natural resource curse" and to move from an embezzlement mode with grabber-friendly institutions to a production mode with correspondingly producer-friendly institutions. With the aim to identify the position of Russia among resource abundant countries (selected countries besides Russia are Venezuela, Mexico, Australia, Canada and Norway) regarding to the quality of institutions and its influence on economic performance, we analyzed the dynamics of selected key institutional indicators and made a series of intragroup comparisons. The research was done on the basis of the most authoritative indexes of institutional development representing each of the four main pillars of institutional system (legal institutions, regulatory institutions, institutions of economic coordination and risk-sharing, and institutions of human capital development), namely the following indexes have been employed: family of WGI indexes, which represents both legal and regulatory institutions and provides complex perspective on the institutional framework evaluating such areas as voice and accountability, political stability, government effectiveness, regulatory quality, rule of law and control of corruption, the World Bank indicator "Domestic credit to private sector (% of GDP)", which reflects the performance of economic coordination and risk-sharing institutions, and finally Human Development Index.

The analytical table of intragroup institutional indexes comparison over 2000-2014 time-period reveals weak position of Russian Legal and Regulatory institutions, specifically values of Voice and accountability and Control of Corruption indicators demonstrated negative dynamics with insignificant exceptions over the analyzed period. However Political stability has slightly increased. If we compare values of others Russian indicators from that group at the beginning and the end of the analyzed period we see either no or very little change. As a result with regard to Legal and Regulatory institutions Russia is still below the threshold level as well as the countries' positions towards to each other has not changed. Then we constructed a radar chart reflecting values of 2014, the latest year of the available data, and visualize an institutional quality gap (governance aspect) across selected resource abundant countries. Russia's values still had been lying below the threshold level, which can tentatively be determined on this graph upon

countries that are in immediate proximity from the threshold level (according to econometric models of Kartashov and Mehlum-Moene-Torvik), namely Mexico and Australia. In fact, in order to overcome so called NRC and enjoy economic growth owing to producer-friendly institutions Russia should pay considerable attention on improving all six sides of governance quality, especially Regulatory Quality, Government Effectiveness, Voice and Accountability and Control of Corruption respectively because of theirs extremely law values comparing to WGI values of Mexico and Australia. Institutional quality gap among Norway, Canada and Russia according to received data is much higher. Venezuela has the worst position in a sample.

Institutions of Human Capital Development represented by HDI revealed a very positive dynamics over the time period from 2000 to 2014 in Russia.

The positive development can be seen also in the field of Domestic credit to private sector (% of GDP), which indicates some progress of Russia in the sphere of Economic Coordination and Risk-sharing. Russia's position among the selected countries had changed after 2000 so it moved from the last to the third from the end place leaving behind both Venezuela and Mexico. Russian values of this indicator has been showing practically stable increasing trend. However it is still far from the values of institutionally developed leaders as Australia, Canada and Norway (the most recent data upon Norway and Canada are, unfortunately, absent at the source). Since the value of the Russian indicator at the end of the analyzed period is approximately 2 times higher than Mexican one and 2.5 times less than the Australian one (countries that represent close values to the threshold level from both sides, below and above respectively), we can conclude that Russia at the moment is steadily moving towards countries enjoying curse-free positions as, for instance Norway.

Overall the results show a huge disproportion between the first group of states with producer-friendly institutions (Norway, Australia and Canada) and the second group of states that are under embezzlement mode (Mexico, Russia and Venezuela). This analysis allows to conclude that Russian institutions are still far from "production friendly" ones, which eventually doesn't contribute to effective use of its natural resources and to a robust economic progress. Thus, Russia remains under embezzlement mode.

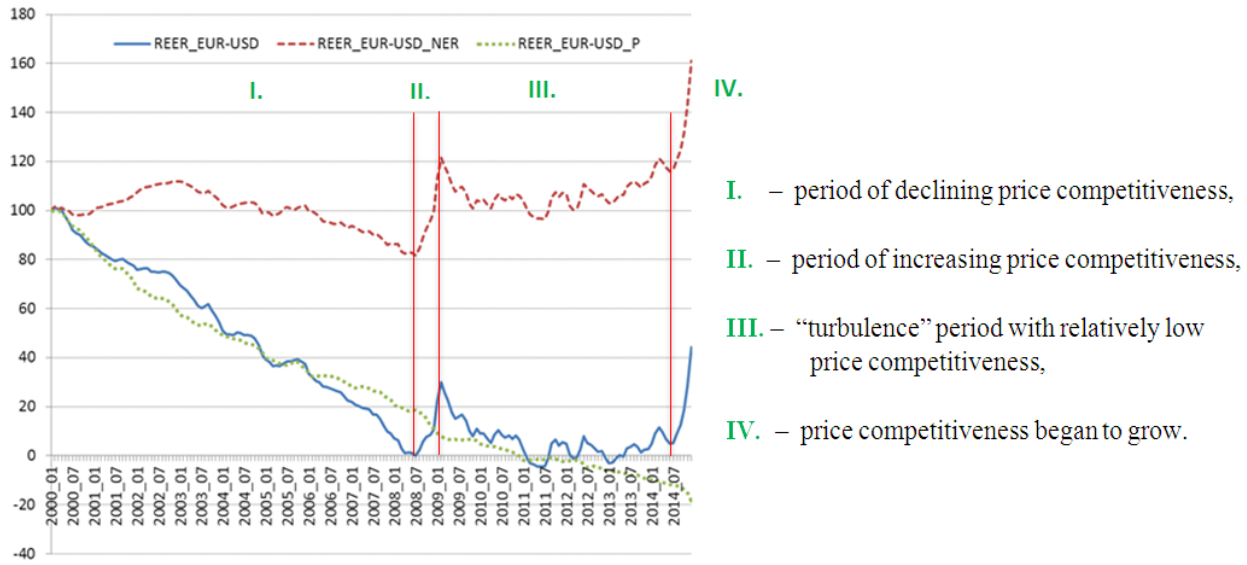
5.3.2. Dutch Disease symptoms analysis

Appreciation of REER

The obtained above results point to a significant appreciation of Russian ruble over the analyzed period in relation to currencies of the main foreign trade partners (see Figures 5.2.6, and 5.3.4).

The observed dynamics of REER_EUR-USD index allows us to conclude that RUR was gradually appreciating from 2000_01 to 2008_07. The real appreciation of the RUR during that period amounted to approximately 97 % (I–period). However, in nominal terms the appreciation of RUR amounted to nearly 18 % at the end of the same period. In the next II–period RUR demonstrated a depreciation; the latter lasted up 2009_02 and amounted to approximately 40 % relatively its value at the end of the previous period in nominal terms and around 28 % in real terms. After that the dynamics of REER_EUR-USD index curve can be characterized as turbulent with the declining overall trend (III–period). It implies that during this period RUR again began to appreciate in real terms. The real appreciation of RUR in III–period approximately amounted to 25 % relatively its value at the end of the II–period; however values of the nominal effective exchange rate of RUR were at the end of the same period almost identical to those in the beginning.

Figure 5.3.4: REER of ruble to a basket of USD-EUR currencies[1)] (2000 – 2014), in p.p.



NOTE: 1) REER index is CPI adjusted and the total turnover of USD/RUR, EUR/RUR currency pairs weighted.

Source: Author's calculation, raw data taken from: www.micex.ru and https://www.statbureau.org.

The last IV–period demonstrates a sharp growth of REER_EUR-USD index, which means RUR real depreciation. According to Brodsky (2006) real appreciation of the national currency leads to an increase in imports, net exports decline and, ultimately, drop in volumes of the gross domestic product. Increase in imports indeed is another alarming symptom of Dutch disease. In the next subsection namely interrelation between production volumes and volumes of imports will be analyzed.

Rate of increase in industrial manufacturing in Russia comparing to that in corresponding Russian imports

Table 5.3.2 given below presents the results of the calculations of average annual growth rates of industrial manufacturing in comparison to average growth rates of corresponding imports (formulas (21) and (22) were used).

According to the obtained results we can conclude that during the analyzed period the average annual growth rates of production volumes in almost all sectors (except Mineral products) were much lower in comparison to average growth rates of corresponding imports. Negative difference (Dif) between corresponding values of gross outputs and imports emphasizes high rate of import volumes' growth which exceeds growth rate of corresponding gross output volumes. It may imply an increasing dependency of the Russian economy on imports. Similar assertion was made by Kudrin (2006) that was based on the results of the regression analysis of the data for the period from 1996 to 2006. The highest difference between output and import growth rates was observed in the following markets (they are listed in descending order): Textiles, textile products and footwear, Hides and skins, furs and products from them, Machinery, equipment and vehicles.

Table 5.3.2: Average annual growth rates of industrial manufacturing in comparison to average growth rates of corresponding imports for the period from 2000 to 2014*

	Foodstuffs and agricultural raw materials (except textile)	Mineral products	Chemical products, rubber	Hides and skins, furs and products from them	Timber and pulp and paper products	Textiles, textile products and footwear	Precious metals, precious stones and products from them	Metals and products from them	Machinery, equipment and vehicles
GRA^i_{GO}	2.31	8.38	4.13	-1.36	2.02	-3.96	0.32*	-1.71*	4.00
GRA^i_{IM}	3.57	-3.11	9.33	11.69	3.86	10.00	7.95*	2.73*	11.86
Dif	**-1.26**	11.49	**-5.2**	**-13.05**	**-1.84**	**-13.96**	**-7.63***	**-4.44***	**-7.86**

NOTE: Figures marked with "*" were calculated for the period from 2005 to 2014 due to data availability issue.

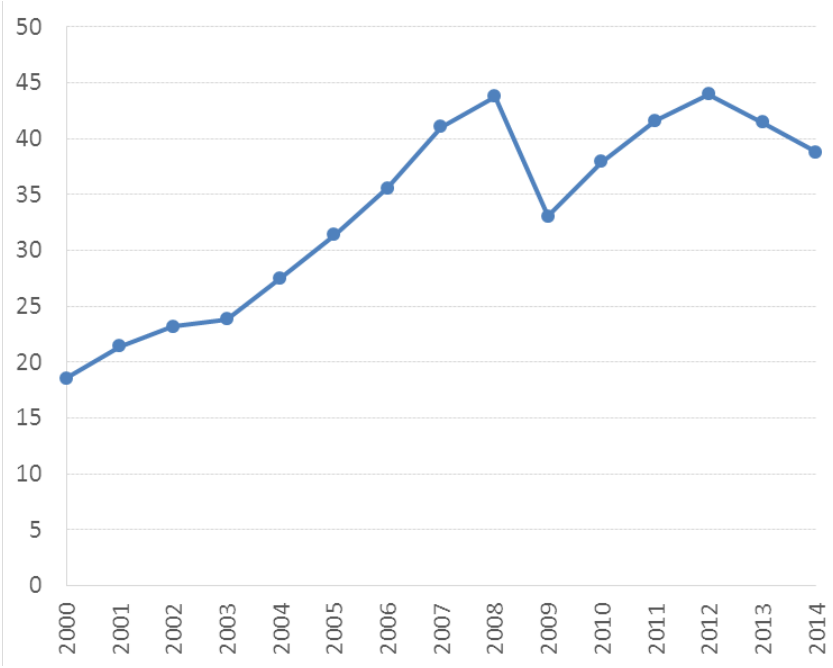
Source: Author's calculations, raw data taken from: http://www.gks.ru/, http://stat.wto.org, http://www.customs.ru and http://www.wiod.org.

However, despite negative Dif value, relatively good results in comparison to all other sectors were revealed for "Foodstuffs and agricultural raw materials (except textile)", that is namely for Agro-producers. In other words, the position of Agro-producers among other selected sectors' producers in domestic markets is one of the best (however, after Mineral products).

The share of equipment in total Russian imports in dynamics

As we can see from the above Figure 5.3.5, the share of equipment in total Russian imports has significantly increased during the analyzed period.

Figure 5.3.5: The share of equipment in total Russian imports (2000-2014), in %



Source: Author's compilation.

Thus, we can conclude that all main symptoms of Dutch disease were found in the Russian economy. Now we are in the position to investigate the existence of long term causality among crude oil prices, GDP growth, REER of Russian ruble and structure of Russian exports. In what follows we proceed in this analysis.

5.4. Multivariate time-series analysis: investigation of export structure dependence on the selected macroeconomic parameters

The aim of the present subchapter is to find the answer to the question - does an interrelationship exist among the structure of Russian export basket (expressed as the ratio of Russian "non-oil" export to "oil" export, EXN_EXO), the real effective exchange rate of Russian ruble (REER), gross domestic product growth (GDPG) and price of crude oil (POIL)? If yes, what influences Russian export basket more: price of crude oil, which is an exogenous parameter for the Russian economy, or REER, which can be regulated by appropriate monetary policy? GDP growth was included into the model as additional explanatory variable to investigate its interconnection with the structure of Russian export basket. As it was discussed in the methodology, since VAR/VEC models are especially useful in a description of macroeconomic time series because of the possibility of combining short-run and long-run information in the data by exploiting the co-integration property, namely this approach will be employed in what follows.

5.4.1. Verification of the time series stationarity

Prior to model estimation it is needed to verify statistical properties of the series: whether or not they are stationary. Figure 5.4.1 given below depicts the graphs of the studied series. All series were logged. According to the graphs we can preliminary conclude that all the series are non-stationary. Before applying the ADF and HEGY tests to our data, first we need to identify the lag order for each of the studied series. Table 5.4.1 provides an example of this test for lnEXN_EXO series. All the commands were conducted in STATA/MP 13.0.

Table 5.4.1: Lag order selection for lnEXN_EXO series in levels

```
. varsoc lnexnexo

   Selection-order criteria
   Sample:  2001q1 - 2014q4                  Number of obs      =        56
```

lag	LL	LR	df	p	FPE	AIC	HQIC	SBIC
0	19.2382				.030524	-.651364	-.637342	-.615197
1	43.6344	48.792	1	0.000	.013236*	-1.48694*	-1.4589*	-1.41461*
2	44.4305	1.5923	1	0.207	.013334	-1.47966	-1.4376	-1.37116
3	44.4437	.0264	1	0.871	.013814	-1.44442	-1.38833	-1.29975
4	46.4616	4.0356*	1	0.045	.013324	-1.48077	-1.41066	-1.29994

```
Endogenous:  lnexnexo
 Exogenous:  _cons
```

Source: Author's calculation in STATA/MP 13.0.

Optimum lag length was chosen on the basis of minimized Akaike's information criterion (AIC), Schwarz's Bayesian information criterion (SBIC) and the Hannan and Quinn information criterion (HQIC).

Figure 5.4.1: The graphs of the analyzed series: logged input data

Source: Author's compilation in STATA/MP 13.0.

According to the obtained results the optimum lag for this series is 1 since it is recommended by the vast majority of the selection criteria. The results of the lag order selection procedure for the remaining series are given above in the Table 5.4.2.

Table 5.4.2: Lag order for all the studied series

Series	Lag
In levels	
lnEXN_EXO	1
lnGDPG	2
lnREER	1
lnPoil	3
First differences	
dlnEXN_EXO	3
dlnGDPG	2
dlnREER	1
dlnPoil	2

Source: Author's calculation in STATA/MP 13.0.

Then applying the recommended lag we checked the presence of unit roots in each series both in levels and first differences with the use of the ADF-test. Table 5.4.3 provides an example of this test in its basic form with a constant in the model for lnEXN_EXO series in levels.

Table 5.4.3: The results of the ADF-test for lnEXN_EXO series: with constant in the model

```
. dfuller lnexnexo, lags(1)

Augmented Dickey-Fuller test for unit root         Number of obs   =        58

                                 ------------ Interpolated Dickey-Fuller ------------
                    Test         1% Critical       5% Critical      10% Critical
                  Statistic           Value             Value            Value
------------------------------------------------------------------------------
 Z(t)              -2.197            -3.569            -2.924           -2.597
------------------------------------------------------------------------------
MacKinnon approximate p-value for Z(t) = 0.2073
```

NOTE: H_0: variable contains a unit root, H_1: variable was generated by a stationary process.

Source: Author's calculation in STATA/MP 13.0.

According to the obtained results ($t_{st.} > t_{cr.}$) we cannot reject the null hypothesis that the analyzed series lnEXN_EXO does have a unit root. In order to check the stability of the obtained results two other modifications of the ADF-test (no constant and no trend, with a constant and trend) were conducted as well. As an example, Table 5.4.4 and Table 5.4.5 provide the results of the corresponding ADF-test modifications for lnEXN_EXO series in levels.

Table 5.4.4: ADF-test for lnEXN_EXO series: no constant and no trend in the model

```
. dfuller lnexnexo, lags(1) noconst

Augmented Dickey-Fuller test for unit root         Number of obs   =        58

                                 ———— Interpolated Dickey-Fuller ————
                    Test         1% Critical       5% Critical      10% Critical
                Statistic           Value             Value            Value
————————————————————————————————————————————————————————————————————————————
 Z(t)             -0.363            -2.617            -1.950           -1.610
————————————————————————————————————————————————————————————————————————————
```

NOTE: H_0: variable contains a unit root, H_1: variable was generated by a stationary process.

Source: Author's calculation in STATA/MP 13.0.

According to the results obtained ($t_{st.} > t_{cr.}$) we can conclude that lnEXN_EXO series does have a unit root.

Table 5.4.5: ADF-test for lnEXN_EXO series: with constant and trend in the model

```
. dfuller lnexnexo, lags(1) trend regress

Augmented Dickey-Fuller test for unit root         Number of obs   =        58

                                 ———— Interpolated Dickey-Fuller ————
                    Test         1% Critical       5% Critical      10% Critical
                Statistic           Value             Value            Value
————————————————————————————————————————————————————————————————————————————
 Z(t)             -3.532            -4.132            -3.492           -3.175
————————————————————————————————————————————————————————————————————————————
MacKinnon approximate p-value for Z(t) = 0.0361

——————————————————————————————————————————————————————————————————————————————
D.lnexnexo |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
——————————————————————————————————————————————————————————————————————————————
    lnexnexo |
         L1. |  -.5609424   .1588306    -3.53   0.001    -.8793785   -.2425063
         LD. |   .0082222   .1443576     0.06   0.955    -.2811973    .2976417
      _trend |  -.0040944   .0015132    -2.71   0.009    -.0071282   -.0010607
       _cons |  -.2843437   .0818486    -3.47   0.001    -.4484404   -.1202471
——————————————————————————————————————————————————————————————————————————————
```

NOTE: H_0: variable contains a unit root, H_1: variable was generated by a stationary process.

Source: Author's calculation in STATA/MP 13.0.

According to the results obtained ($t_{st.} < t_{cr.}$) we can reject the null hypothesis that this series contains a unit root. Thus, lnEXN_EXO series with included constant and trend is stationary. Since the value of L1 coefficient is negative in sign and statistically significant (L1 = -0.56, p = 0.001), these results are valid. Thus, it becomes clear that not all three ADF-tests came to the same decision whether EXN_EXO is stationary or not. For that reason there is a need to conduct

an additional test. In what follows HEGY test will be applied to the same data. Other series were tested the same way as it was shown above. The results of the ADF-test for all series both in levels and first differences are summarized in the Table 5.4.6.

Table 5.4.6: The summary results of the ADF-test for all input data

Data	Type	Test stat.	Critical value	p-value	Reject H_0	Conclusion
lnEXN_EXO						
In levels	N	-0.363	-1.950	x	No	I(1)
	C	-2.197	-2.924	0.2073	No	
	CT	-3.532	-3.492	0.0361	Yes	
First differences	N	-4.456	-1.950	x	Yes	
	C	-4.424	-2.926	0.0003	Yes	
	CT	-4.330	-3.495	0.0028	Yes	
lnPOIL						
In levels	N	0.776	-1.950	x	No	I(1)
	C	-1.229	-2.925	0.6610	No	
	CT	-1.939	-3.494	0.6344	No	
First differences	N	-4.675	-1.950	x	Yes	
	C	-4.762	-2.925	0.0001	Yes	
	T	-4.751	-3.494	0.0006	Yes	
lnGDPG						
In levels	N	-1.377	-1.950	x	No	I(1)
	C	-1.170	-2.924	0.2218	No	
	CT	-3.693	-3.493	0.0228	Yes	
First differences	N	-5.058	-1.950	x	Yes	
	C	-5.033	-2.925	0.0000	Yes	
	CT	-4.975	-3.494	0.0002	Yes	
lnREER						
In levels	N	-1.914	-1.950	x	No	I(1)
	C	-1.945	-2.924	0.3111	No	
	T	0.360	-3.492	0.9965	No	
First differences	N	-4.469	-1.950	x	Yes	
	C	-4.469	-2.924	0.0002	Yes	
	CT	-4.887	-3.493	0.0003	Yes	

NOTE: N = model without constant and trend, C = model with constant, CT = model with constant and trend.
H_0: variable contains a unit root, H_1: variable was generated by a stationary process.

Source: Author's calculation in STATA/MP 13.0.

The conducted ADF-test has shown that all the series are integrated of the same order I(1) since all of them are stationary in first differences. However, according to the results of this test for series in levels, precisely for lnEXN_EXO series, there is no consensus among the test modifications with regard to the presence of unit roots. It means that we cannot strictly say

whether or not this series is stationary. This situation may be associated with the presence of seasonal unit roots, which is quite logical taking into account the very nature of this series.

Since lnEXN_EXO series demonstrate clear seasonal properties (see Figure 5.4.1) and the results of individual ADF-test modifications are not in consensus, checking the presence of seasonal unit roots was seen as justified. For this purpose the HEGY-test was conducted in STATA/MP 13.0 using the following command: *sroot (varlist)*[1]. The results of the HEGY-test in its modification with constant, trend and seasonal dummies for lnEXN_EXO series in levels are presented below in the Table 5.4.7.

Table 5.4.7: HEGY-test for lnEXN_EXO with constant, trend and seasonal dummies

```
. sroot lnexnexo, l(1) trend seas( dum1 dum2 dum3 dum4) res(res1)

HEGY test for SEASONAL unit roots                 Number of obs   =        55
                 Test         1% Critical       5% Critical      10% Critical
               Statistic           Value             Value            Value
------------------------------------------------------------------------------
 Z(t) - Fr 0      -3.187           -4.090            -3.530           -3.320
 Z(t) - Fr 1/2    -2.447           -3.600            -2.940           -2.630
 Z(t) - L.Ann.    -3.909           -4.120            -3.480           -3.140
 Z(t) - Annual    -1.923           -2.760            -1.940           -1.510
 Joint Annual      9.414            8.790             6.600            5.520
 All SEAS. fr.     7.930                .             5.990            5.130
 All freq.        12.184                .             6.470            5.680
```

NOTE: H_0: variable contains a unit root, H_1: variable was generated by a stationary process. L.Ann, Annual, All SEAS. fr. and All freq. are F-type statistics.

Source: Author's calculation in STATA/MP 13.0.

According to the obtained results lnEXN_EXO series in levels does contain a conventional unit root at zero frequency and one seasonal unit root at 2 quarters per cycle frequency. In order to check whether or not the recommended lag order was chosen correctly in the next step we conduct a Portmanteau test for white noise in lnEXN_EXO series or for autocorrelation in the residuals obtained after conducting the HEGY test (see Table 5.4.8). We cannot reject the null hypothesis that the residuals of lnEXN_EXO series remained after HEGY test are a white noise. Thus, we can conclude that the lag order was chosen properly.

In order to check the stability of the HEGY test results upon various modification of the test, all available in STATA four modifications of the test (basic with a suppressed constant term (intercept) in the model, with a constant, with a constant and seasonal dummies, with a constant and trend) were conducted for all the series both in levels and first differences.

[1] Hereinafter Stata commands will be given in italic font.

Table 5.4.8: Portmanteau test for white noise in lnEXN_EXO series

```
. wntestq res1, lags(1)

Portmanteau test for white noise
---------------------------------------
 Portmanteau (Q) statistic =     0.1287
 Prob > chi2(1)            =     0.7198
```

NOTE: H_0: res1 – is a white noise.

Source: Author's calculation in STATA/MP 13.0.

The summary of HEGY-test results for all test modifications is given below in the Table 5.4.9. As we can see from the below given Table, according to HEGY-test results all raw series are non-stationary since all of them contain at least one unit root. All four modifications of the HEGY-test revealed that lnEXN_EXO series contain both conventional unit root at zero frequency and one seasonal unit root at 2 quarters per cycle frequency. LnGDPG, lnREER and lnPOIL series have conventional unit roots at zero frequency only. Since not all specifications of the ADF-test for lnEXN_EXO series shown the same result it was interesting to see what HEGY-test would reveal. As a result, two types of unit roots were found both conventional and seasonal ones. Thus, it was proved that EXN_EXO series is non-stationary.

According to the methodology, if all the series under analysis in levels are non-stationary and in first differences are stationary it gives us all necessary preconditions to detect a cointegration among them. As it is known, in order to check the presence of seasonal cointegration among the studied variables all of them must have at least one seasonal unit root. In our case only lnEXN_EXO series has seasonal unit roots. It means that seasonal cointegration cannot be found. Moreover, further investigation of seasonal pattern between mentioned variables is not worth pursuing and lies out of the main interest of the present thesis.

Table 5.4.9: The summary results of the HEGY-test for all input data in levels

Modif.	Unit root(s)	Test stat.	Critical value	Reject H_0	Conclusion
lnEXN_EXO					
B	Fr. 0 Fr. ½ JA	-0.590 -2.560 12.943	-1.970 -1.920 3.120	No No Yes	Conv. unit root (0) Seas. unit root (π)
C	Fr. 0 Fr. ½ JA	-1.028 -1.530 12.095	-2.880 -1.950 3.080	No No Yes	Conv. unit root (0) Seas. unit root (π)

Modif.	Unit root(s)	Test stat.	Critical value	Reject H_0	Conclusion
lnEXN_EXO					
CT	Fr. 0 Fr. ½ JA	-3.280 -1.588 7.221	-3.470 -1.940 2.980	No No Yes	Conv. unit root (0) Seas. unit root (π)
CTS	Fr. 0 Fr. ½ JA	-2.987 -1.889 9.369	-3.530 -2.940 6.600	No No Yes	Conv. unit root (0) Seas. unit root (π)
lnPOIL					
B	Fr. 0 Fr. ½ JA	-0.002 -5.024 12.950	-1.970 -1.920 3.120	No Yes Yes	Conv. unit root (0)
C	Fr. 0 Fr. ½ JA	-1.216 -2.779 5.479	-2.880 -1.950 3.080	No Yes Yes	Conv. unit root (0)
CT	Fr. 0 Fr. ½ JA	-2.187 -2.484 6.024	-3.470 -1.940 2.980	No Yes Yes	Conv. unit root (0)
CTS	Fr. 0 Fr. ½ JA	-2.149 -3.008 7.990	-3.530 -2.940 6.600	No Yes Yes	Conv. unit root (0)
lnGDPG					
B	Fr. 0 Fr. ½ JA	-1.649 -3.749 14.587	-1.970 -1.920 3.120	No Yes Yes	Conv. unit root (0)
C	Fr. 0 Fr. ½ JA	-2.221 -3.854 14.985	-2.880 -1.950 3.080	No Yes Yes	Conv. unit root (0)
CT	Fr. 0 Fr. ½ JA	-2.899 -3.933 15.426	-3.470 -1.940 2.980	No Yes Yes	Conv. unit root (0)
CTS	Fr. 0 Fr. ½ JA	-2.955 -4.581 16.496	-3.530 -2.940 6.600	No Yes Yes	Conv. unit root (0)
lnREER					
B	Fr. 0 Fr. ½ JA	-1.905 -3.827 8.640	-1.970 -1.920 3.120	No Yes Yes	Conv. unit root (0)
C	Fr. 0 Fr. ½ JA	-1.849 -3.755 8.268	-2.880 -1.950 3.080	No Yes Yes	Conv. unit root (0)
CT	Fr. 0 Fr. ½ JA	1.286 -3.944 9.996	-3.470 -1.940 2.980	No Yes Yes	Conv. unit root (0)
CTS	Fr. 0 Fr. ½ JA	1.241 -3.876 10.228	-3.530 -2.940 6.600	No Yes Yes	Conv. unit root (0)

B = basic modification of the test; C = model with constant; CT = model with constant and trend; CTS = model with constant, trend and seasonal dummies; CS = model with constant and seasonal dummies.
H_0: variable contains a unit root, H_1: variable was generated by a stationary process.

Source: Author's calculation in STATA/MP 13.0.

In fact, the question in focus is the presence of long-run and short-run relationships among REER, which manifests the success of Russian monetary policy, and the structure of Russian export basket. And taking into account (having institutional analysis done) the significance of natural resources in Russian economic performance, the price of crude oil will be included in the analysis as well.

Since the detection of seasonal cointegration became irrelevant, further analysis will be focused on identifying conventional cointegration on zero-frequency. Prior to constructing a VAR/VECM and in order to avoid a multicollinearity problem the correlation analysis among all the studied series will be done. The results are given below in the Table 5.4.10.

Table 5.4.10: Correlation coefficients between the analyzed series

	lnExnExo	lnGDPG	lnPoil	lnREER
lnExnExo	1			
lnGDPG	0.235031	1		
lnPoil	-0.80951	-0.26271	1	
lnREER	0.755851	0.365888	**-0.95394**	1

Source: Author's calculation.

Since the dependent variables lnPoil and lnREER are highly correlated, their simultaneous presence in the single model will lead to multicollinearity problems. For that reason it was decided to investigate their influence on lnExnExo separately. Thus, in further analysis instead of one (see equation (46)) two models of the following type will be built:

$$\text{Model-1: } \ln ExnExo = f(\ln GDPG; \ln Poil); \quad (47)$$

$$\text{Model-2: } \ln ExnExo = f(\ln GDPG; \ln REER). \quad (48)$$

5.4.2. Testing for cointegration: Johansen methodology

Having all the preliminary tests done we can estimate whether or not data under analysis have a cointegration vector(s). First, the lag-order for series from both models was estimated (see Table 5.4.11 and Table 5.4.12 correspondingly).

Table 5.4.11: Lag-order selection statistics: model-1

```
. varsoc lnexnexo lngdpg lnpoil

Selection-order criteria
Sample:  2001q1 - 2014q4                        Number of obs      =        56
```

lag	LL	LR	df	p	FPE	AIC	HQIC	SBIC
0	99.8484				6.3e-06	-3.45887	-3.41681	-3.35037
1	220.999	242.3	9	0.000	1.2e-07	-7.46426	-7.296	-7.03026
2	257.694	73.39	9	0.000	4.3e-08*	-8.45336*	-8.1589*	-7.69385*
3	260.857	6.3265	9	0.707	5.3e-08	-8.24491	-7.82425	-7.1599
4	270.16	18.604*	9	0.029	5.4e-08	-8.2557	-7.70885	-6.84519

```
Endogenous:  lnexnexo lngdpg lnpoil
 Exogenous:  _cons
```

Source: Author's calculation in STATA/MP 13.0.

According to a final prediction error (FPE), Akaike's information criterion (AIC), the Hannan–Quinn information criterion (HQIC), Schwarz Bayesian information criterion (SBIC) and sequential likelihood-ratio (LR) test the recommended lag is two, as indicated by the "*" in the output. Thus, in further analysis namely two lags will be specified for the model-1.

Table 5.4.12: Lag-order selection statistics: model-2

```
. varsoc lnexnexo lngdpg lnreer

Selection-order criteria
Sample:  2001q1 - 2014q4                        Number of obs      =        56
```

lag	LL	LR	df	p	FPE	AIC	HQIC	SBIC
0	156.319				8.4e-07	-5.47568	-5.43361	-5.36718
1	295.187	277.74	9	0.000	8.1e-09	-10.1138	-9.94555	-9.67981
2	323.797	57.22*	9	0.000	4.1e-09*	-10.8142*	-10.5197*	-10.0547*
3	327.889	8.1847	9	0.516	4.9e-09	-10.6389	-10.2182	-9.55389
4	329.846	3.9143	9	0.917	6.3e-09	-10.3874	-9.84052	-8.97686

```
Endogenous:  lnexnexo lngdpg lnreer
 Exogenous:  _cons
```

Source: Author's calculation in STATA/MP 13.0.

As we can see from the obtained results the best lag recommended by the vast majority of criteria is two. Thus, in further analysis namely two lags will be specified for the model-2.

Since all the series are integrated of the same order I(1) (see Table 5.4.6) the next step is to estimate whether the analyzed series have a cointegration vector. The tests for cointegration implemented in *vecrank* are based on Johansen's method. If the log likelihood of the

unconstrained model that includes the cointegrating equations is significantly different from the log likelihood of the constrained model that does not include the cointegrating equations, we reject the null hypothesis of no cointegration. The results of the test for both models are given below in the Table 5.4.13 and Table 5.4.14 correspondindly.

These tables present the test statistics and their critical values of the null hypotheses of no cointegration (line 1) and one or fewer cointegrating equations (line 2). The eigenvalue shown in the last line is used to compute the trace statistic in the line above it. Johansen's testing procedure starts with the test for zero cointegrating equations (a maximum rank of zero) and then accepts the first null hypothesis that is not rejected.

Table 5.4.13: Cointegration test based on Johansen's maximum likelihood method: model-1

```
. vecrank lnexnexo lngdpg lnpoil, lags(2) trend(rtrend)

                    Johansen tests for cointegration
Trend: rtrend                                        Number of obs =      58
Sample:  2000q3 - 2014q4                                   Lags =       2
```

maximum rank	parms	LL	eigenvalue	trace statistic	5% critical value
0	12	244.62832	.	51.2134	42.44
1	18	260.52412	0.42197	19.4218*	25.32
2	22	266.2013	0.17779	8.0674	12.25
3	24	270.23502	0.12985		

NOTE: H_0: r = 0. If it rejects, repeat for H_0: r = 1 etc.

Source: Author's calculation in STATA/MP 13.0.

Due to the fact the graphs of the studied variables indicate that all the series are trending processes (see Figure 5.4.1) *rtrend* option will be specified in the cointegration test. A restricted trend in model implies that the cointegrating equations are assumed to be trend stationary. The null hypothesis is that the number of cointegrating relationships is equal to *r*, which is given in the "maximum rank" column of the output. The alternative is that there are more than *r* cointegrating relationships. The null hypothesis is rejected if the trace statistic is greater than the critical value. When a test is not rejected, stop testing there, and that value of r is the commonly-used estimate of the number of cointegrating relations.

Table 5.4.14: Cointegration test based on Johansen's maximum likelihood method: model-2

```
. vecrank lnexnexo lngdpg lnreer, lags(2) trend(rtrend)

                    Johansen tests for cointegration
Trend: rtrend                                        Number of obs =      58
Sample:  2000q3 - 2014q4                                    Lags =       2
------------------------------------------------------------------------------
                                                           5%
maximum                                          trace     critical
  rank     parms       LL       eigenvalue     statistic     value
    0       12      171.07819           .        50.4665     42.44
    1       18      184.64167      0.37356       23.3396*    25.32
    2       22       191.9026      0.22149        8.8177     12.25
    3       24      196.31147      0.14104
------------------------------------------------------------------------------
```

NOTE: H_0: r = 0. If it rejects, repeat for H_0: r = 1 etc.

Source: Author's calculation in STATA/MP 13.0.

As we can see from the results given above in Table 5.4.13, H_0: $r = 1$ is not rejected at the 5% level of significance since 10.63 < 18.17. In other words, this trace test result does not reject the null hypothesis that our four variables are cointegrated. In what follows (see Table 5.4.15) the results of another test are given. The same conclusion may be drawn from the value of maximum trace statistics.

Table 5.4.15: Alternative Johansen cointegration test: model-1

```
. vecrank lnexnexo lngdpg lnpoil, lags(2) trend(rconst) notrace max

                    Johansen tests for cointegration
Trend: rconstant                                     Number of obs =      58
Sample:  2000q3 - 2014q4                                    Lags =       2
------------------------------------------------------------------------------
                                                           5%
maximum                                           max     critical
  rank     parms       LL       eigenvalue     statistic     value
    0        9      243.08101           .        33.4949     22.00
    1       15      259.82846      0.43870       11.0269     15.67
    2       19      265.34192      0.17314        3.1090      9.24
    3       21      266.89644      0.05219
------------------------------------------------------------------------------
```

NOTE: H_0: r = 0. If it rejects, repeat for H_0: r = 1 etc.

Source: Author's calculation in STATA/MP 13.0.

According to the output given in the Table 5.4.15, we strongly reject the null hypothesis of no cointegration (H_0: $r = 0$ is rejected at the 5% level (31.79 > 25.54)), but we fail to reject the null hypothesis of at most one cointegrating equation (H_0: $r = 1$ is not rejected at the 5% level since

11.35 < 18.96)). Thus, we accept the null hypothesis that there is one cointegrating equation in the model-1.

Table 5.4.16: Alternative Johansen cointegration test: model-2

```
. vecrank lnexnexo lngdpg lnreer, lags(2) trend(rconst) notrace max

                     Johansen tests for cointegration
Trend: rconstant                                         Number of obs =      58
Sample:  2000q3 - 2014q4                                       Lags =       2
------------------------------------------------------------------------------
                                                              5%
maximum                                           max     critical
  rank     parms       LL         eigenvalue  statistic    value
    0        9       170.91203           .     27.0369    22.00
    1       15       184.43048      0.37259    13.6629    15.67
    2       19       191.26192      0.20988     4.2720     9.24
    3       21       193.39791      0.07101
------------------------------------------------------------------------------
```

NOTE: H_0: r = 0. If it rejects, repeat for H_0: r = 1 etc.

Source: Author's calculation in STATA/MP 13.0.

According to the output given in the Table 5.4.16, we reject the null hypothesis of no cointegration (H_0: $r = 0$ is rejected at the 5% level (27.12 > 25.54)), but we fail to reject the null hypothesis of at most one cointegrating equation (H_0: $r = 1$ is not rejected at the 5% level since 14.52 < 18.96)). Thus, we accept the null hypothesis that there is only one cointegrating equation in the model-2.

5.4.3. VECM estimation

Having determined the number of cointegrating equations in the analyzed models, now we are in the position to carry out the estimation of VECM parameters. The output of the estimation is provided below in the Table 5.4.17 for the model-1 and in the Table 5.4.18 for the model-2. The header contains information about the sample, the fit of each equation, and overall model fit statistics. The first estimation table contains the estimates of the short-run parameters, along with their standard errors, z-statistics, and confidence intervals. The two coefficients on *L.ce1* are the parameters in the adjustment matrix α for this model. The second estimation table contains the estimated parameters of the cointegrating vector for this model, along with their standard errors, z-statistics, and confidence intervals.

Table 5.4.17: Vector error correction model-1 (VECM-1)

Vector error-correction model

Sample: 2000q3 - 2014q4 — No. of obs = 58
AIC = -8.398493
Log likelihood = 257.5563 — HQIC = -8.204766
Det(Sigma_ml) = 2.79e-08 — SBIC = -7.901145

Cointegrating equations

Equation	Parms	chi2	P>chi2
_ce1	2	632.3169	0.0000

Identification: beta is exactly identified

Johansen normalization restriction imposed

beta	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
_ce1						
lnexnexo	1	.	.	.	.	.
lngdpg	-3.337231	.6152568	-5.42	0.000	-4.543112	-2.131349
lnpoil	.2045265	.0094262	21.70	0.000	.1860514	.2230016

Adjustment parameters

Equation	Parms	chi2	P>chi2
D_lnexnexo	1	3.843172	0.0499
D_lngdpg	1	21.66847	0.0000
D_lnpoil	1	1.292715	0.2555

alpha	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
D_lnexnexo						
_ce1						
L1.	-.1722135	.0878461	-1.96	0.050	-.3443886	-.0000384
D_lngdpg						
_ce1						
L1.	.0546138	.0117324	4.65	0.000	.0316187	.077609
D_lnpoil						
_ce1						
L1.	.1468465	.1291553	1.14	0.256	-.1062932	.3999862

Source: Author's calculation in STATA/MP 13.0.

In accordance with the methodology, the following information was obtained:

$$\hat{\alpha} = (-0.172; 0.054; 0.146)$$

$$\hat{\beta} = (1; -3.337; 0.204)$$

Overall, the output indicates that the model fits well. The coefficients on GDPG and POIL in the cointegrating equation are statistically significant. The most important outcome is that since the error correction term (ECT), or speed of adjustment towards to equilibrium, of lnEXN_EXO is negative in sign and statistically significant (L1=-0.172, p = 0.050) it implies the existence of adjustment towards equilibrium and means that there *does exist* a long-run causality running from lnGDPG and lnPOIL to lnEXN_EXO.

As for the next model-2, the estimations of the VECM parameters are given below in the Table 5.4.18.

Table 5.4.18: Vector error correction model-2 (VECM-2)

```
Vector error-correction model

Sample:  2000q3 - 2014q4                        No. of obs      =        58
                                                AIC             =  -5.84243
Log likelihood =  184.4305                      HQIC            = -5.634866
Det(Sigma_ml)  =  3.47e-07                      SBIC            = -5.309557

Cointegrating equations

Equation           Parms    chi2     P>chi2
──────────────────────────────────────────────
_ce1                   2   40.54324   0.0000
──────────────────────────────────────────────

Identification:  beta is exactly identified

                Johansen normalization restriction imposed
```

beta	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
_ce1						
lnexnexo	1	.	.	.	.	.
lngdpg	-3.342654	.698175	-4.79	0.000	-4.711052	-1.974256
lnreer	-.0682004	.0281252	-2.42	0.015	-.1233247	-.0130761
_cons	1.079113	.0886685	12.17	0.000	.9053259	1.2529

Adjustment parameters

Equation	Parms	chi2	P>chi2
D_lnexnexo	1	4.677798	0.0306
D_lngdpg	1	25.10566	0.0000
D_lnreer	1	.2569381	0.6122

alpha	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
D_lnexnexo						
_ce1						
L1.	-.1993963	.0921927	-2.16	0.031	-.3800906	-.018702
D_lngdpg						
_ce1						
L1.	.0645415	.0128811	5.01	0.000	.039295	.089788
D_lnreer						
_ce1						
L1.	-.1953525	.3853938	-0.51	0.612	-.9507105	.5600055

Source: Author's calculation in STATA/MP 13.0.

According to the results given above, the following information was obtained:

$$\hat{\alpha} = (-0.199; 0.064; -0.195);$$

$$\hat{\beta} = (1; -3.342; -0.068; 1.079).$$

Overall, the output indicates that the model fits well. The coefficients on GDPG and REER in the cointegrating equation are statistically significant. The error correction term (ECT), or speed of adjustment towards to equilibrium, of lnEXN_EXO is negative in sign and statistically significant (L1=-0.199, p = 0.031) that implies the existence of adjustment towards equilibrium and means that there *does exist* a long-run causality running from lnGDPG and lnREER to lnEXN_EXO.

The existence of such causality was confirmed by Granger causality test, the results of which are given below in the Table 5.4.19.

Table 5.4.19: Granger causality test

```
. vargranger

   Granger causality Wald tests
```

Equation	Excluded	chi2	df	Prob > chi2
dlnexnexo	dlngdpg	7.2254	2	0.027
dlnexnexo	dlnreer	1.9773	2	0.372
dlnexnexo	ALL	8.4277	4	0.077
dlngdpg	dlnexnexo	1.1281	2	0.569
dlngdpg	dlnreer	2.028	2	0.363
dlngdpg	ALL	4.0352	4	0.401
dlnreer	dlnexnexo	4.188	2	0.123
dlnreer	dlngdpg	1.0262	2	0.599
dlnreer	ALL	6.2516	4	0.181

NOTE: H0: Lagged dependent var. does not cause independent one.

Source: Author's calculation in STATA/MP 13.0.

Now we consider the results of the tests for the first equation. The first is a Wald test that the coefficients on the two lags of dlnGDPG that appear in the equation for dlnEXN_EXO are jointly zero. The null hypothesis that dlnGDPG does not Granger-cause dlnEXN_EXO can be rejected (0.027 < 0.050). At the same time, we cannot reject the null hypothesis that the coefficients on the two lags of dlnREER in the equation for dlnEXN_EXO are jointly zero, so dlnREER does not a Granger cause of dlnEXN_EXO (0.372 > 0.050).

The last third test deals with the null hypothesis that the coefficients on the two lags of all the endogenous variables are jointly zero. This null hypothesis can be rejected at 10 present level of significance since 0.077 < 0.100. Thus, dlnGDPG and dlnREER, jointly, do Granger-cause dlnEXN_EXO.

The models proved the existence of a long-term joint causality running from all dependent variables to the independent one. Now we consider whether or not a short-run causality exists. In what follows (see Table 5.4.20) tests of linear hypotheses are presented along with the results.

Table 5.4.20: Tests of linear hypotheses: bivariate short-run causality

```
. test ([D_lnexnexo]: LD.lngdpg)

 ( 1)  [D_lnexnexo]LD.lngdpg = 0

           chi2(  1) =    3.95
         Prob > chi2 =    0.0469


. test ([D_lnexnexo]: LD.lnpoil)

 ( 1)  [D_lnexnexo]LD.lnpoil = 0

           chi2(  1) =    1.45
         Prob > chi2 =    0.2288


. test ([D_lnexnexo]: LD.lnreer)

 ( 1)  [D_lnexnexo]LD.lnreer = 0

           chi2(  1) =    0.03
         Prob > chi2 =    0.8691
```

NOTE: H0: There is no short-run causality between analyzed variables.

Source: Author's calculation in STATA/MP 13.0.

According to the obtained results (see Table 5.4.20 given above) we can say that in the constructed models a short-run causality was found running from lnGDPG to lnEXN_EXO only since the corresponding p-value is less than 5% (p=0.0469). Thus, we reject the null hypothesis of no short-run causality between mentioned variables. At the same time there is no short-run causality running from lnPOIL to lnEXN_EXO and from lnREER to lnEXN_EXO.

5.4.4. Post-estimation analysis

Stability of VECMs

Having estimated VECM parameters we have to check stability condition of VECM estimates. For our 3-variable models with 1-cointegrating relationships, the companion matrixes will have (3 – 1) unit eigenvalues. For stability, the moduli of the remaining *r* eigenvalues should be strictly less than unity. In STATA the stability of the estimated VECM is conducted with the use of command *vecstable*. The results are given below in the Table 5.4.21 and Figure 5.4.2 for model-1 and in the Table 5.4.22 and Figure 5.4.3 for model-2.

Table 5.4.21: VECM-1 Eigenvalues

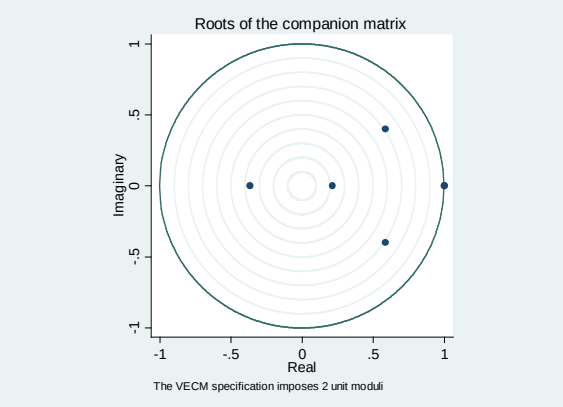
```
. vecstable, graph

   Eigenvalue stability condition

+-------------------------------------+
|              Eigenvalue             |  Modulus  |
|-------------------------------------+-----------|
|                    1                |         1 |
|                    1                |         1 |
|     .5861516 +   .3992279i          |   .709194 |
|     .5861516 -   .3992279i          |   .709194 |
|    -.3669031                        |   .366903 |
|     .2137584                        |   .213758 |
+-------------------------------------+-----------+

   The VECM specification imposes 2 unit moduli
```

Figure 5.4.2: Roots of the comp. matrix-1



Source: Author's calculation in STATA/MP 13.0.

Table 5.4.22: VECM-2 Eigenvalues

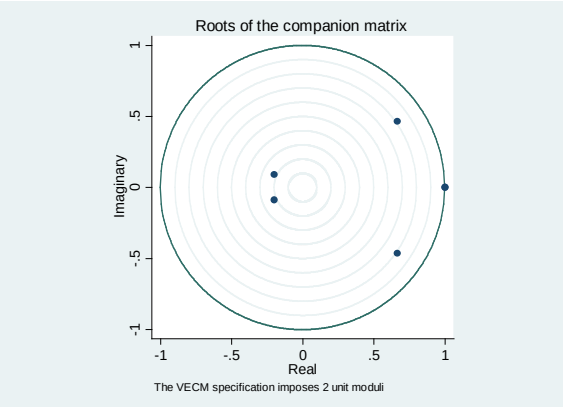
```
. vecstable, graph

   Eigenvalue stability condition

+-------------------------------------+
|              Eigenvalue             |  Modulus  |
|-------------------------------------+-----------|
|                    1                |         1 |
|                    1                |         1 |
|     .6652913 +   .4640482i          |   .811143 |
|     .6652913 -   .4640482i          |   .811143 |
|    -.2005517 +  .08871153i          |   .219296 |
|    -.2005517 -  .08871153i          |   .219296 |
+-------------------------------------+-----------+

   The VECM specification imposes 2 unit moduli
```

Figure 5.4.3: Roots of the comp. matrix-2



Source: Author's calculation in STATA/MP 13.0.

If VEC model-1 was specified correctly and the number of cointegrating equations was correctly identified it is expected that cointegrating equations are supposed to be stationary. The command *vecstable* provides indicators of whether the number of cointegrating equations is misspecified or whether the cointegrating equations, which are assumed to be stationary, are not stationary. It uses the coefficient estimates from the previously fitted VECM to back out estimates of the coefficients of the corresponding VAR and then compute the eigenvalues of the companion matrix. The presence of the integrated variables (and unit moduli) in the VECM representation implies that shocks may be permanent as well as transitory. The output contains a table showing the eigenvalues of the companion matrix and their associated moduli. The Table 5.4.20 shows that three of the roots are equal to 1, as it should be since (3 – 1 = 2). The table footer reminds us that the specified VECM imposes exactly 2 unit modulus on the companion matrix. If any of the remaining moduli are too close to one it means that either the cointegrating equations are not stationary or there is another common trend and the rank that was specified in VEC is too high. In our case the remaining moduli are fairly far from one implying correct VEC ranks of both models and overall stability of VECM estimates.

Autocorrelation diagnostics

The next diagnostic that has to be done with respect to the obtained VECM-1 and VECM-2 is test for autocorrelation in the residuals of both models. Table 5.4.23 and Table 5.4.24 provide the result of that test.

Table 5.4.23: Lagrange multiplier test for autocorrelation in the residuals of VECM-1

```
. veclmar, mlag(4)

  Lagrange-multiplier test
```

lag	chi2	df	Prob > chi2
1	3.7446	9	0.92740
2	10.0956	9	0.34280
3	16.0460	9	0.06593
4	13.8430	9	0.12802

```
  H0: no autocorrelation at lag order
```

Source: Author's calculation in STATA/MP 13.0.

Table 5.4.24: Lagrange multiplier test for autocorrelation in the residuals of VECM-2

```
. veclmar, mlag(4)

  Lagrange-multiplier test
```

lag	chi2	df	Prob > chi2
1	8.1150	9	0.52260
2	8.6037	9	0.47463
3	9.4955	9	0.39284
4	7.1420	9	0.62234

```
  H0: no autocorrelation at lag order
```

Source: Author's calculation in STATA/MP 13.0.

Regardless the lag order that was chosen for both VECMs (i.e. lag 2) we tested for the presence of autocorrelations up to four lags in order to exclude their presence even at higher lag orders. As Tables 5.4.23 and 5.4.24 show, we cannot reject H_0 that there is no autocorrelation in the residuals for any of the lags tested. Thus, the LM test revealed no evidence that our VECMs were misspecified.

Normality of disturbances

The next diagnostic that has to be done with respect to the VECMs is the normality test. In STATA the command *vecnorm* computes and reports a series of statistics against H_0 that the disturbances in a VECM are normally distributed. For each equation in the model and all equations jointly, three statistics were computed: skewness, kurtosis, and the Jarque–Bera statistic. The results of the test are provided below in the Table 5.4.25 and Table 5.4.26.

Table 5.4.25: Test for distribution of the error terms: VECM-1

```
. vecnorm
```

Jarque-Bera test

Equation	chi2	df	Prob > chi2
D_lnexnexo	0.014	2	0.99286
D_lngdpg	71.930	2	0.00000
D_lnpoil	2.410	2	0.29976
ALL	74.354	6	0.00000

Skewness test

Equation	Skewness	chi2	df	Prob > chi2
D_lnexnexo	.03416	0.011	1	0.91541
D_lngdpg	-1.012	9.900	1	0.00165
D_lnpoil	-.35118	1.192	1	0.27489
ALL		11.104	3	0.01118

Kurtosis test

Equation	Kurtosis	chi2	df	Prob > chi2
D_lnexnexo	2.9644	0.003	1	0.95590
D_lngdpg	8.0663	62.030	1	0.00000
D_lnpoil	3.7097	1.217	1	0.26988
ALL		63.250	3	0.00000

NOTE: H_0 the disturbances in a VECM are normally distributed.

Source: Author's calculation in STATA/MP 13.0.

Judging by low p-values we may reject H_0 of normality in corresponding equations except for dEXN_EXO and dGDPG at conventional significance level. According to the theory, if test of Jarkue-Bera fails, it may be an indicator of insufficient number of lags chosen for the model. However, when we increased the lag-order it has not solved the problem of residuals' normality (three and four lags were tested and in these cases in addition to not resolved problem of normality problem of autocorrelation appeared). Thus, we can conclude that this is the property of the data and having a limited number of observations (60), we are not able to do much to improve upon this defect.

In general, as regards the failed Jarque-Bera test and especially in case of close to small data samples, it should be noticed that this is a quite common phenomenon, which will not crucially distort the final results (Sukati, 2013).

Table 5.4.26: Test for distribution of the error terms: VECM-2

```
. vecnorm
```

Jarque-Bera test

Equation	chi2	df	Prob > chi2
D_lnexnexo	0.044	2	0.97816
D_lngdpg	33.755	2	0.00000
D_lnreer	28.602	2	0.00000
ALL	62.402	6	0.00000

Skewness test

Equation	Skewness	chi2	df	Prob > chi2
D_lnexnexo	-.03661	0.013	1	0.90939
D_lngdpg	-1.2156	14.284	1	0.00016
D_lnreer	.08055	0.063	1	0.80224
ALL		14.360	3	0.00245

Kurtosis test

Equation	Kurtosis	chi2	df	Prob > chi2
D_lnexnexo	2.8863	0.031	1	0.85976
D_lngdpg	5.8385	19.471	1	0.00001
D_lnreer	6.4365	28.540	1	0.00000
ALL		48.042	3	0.00000

NOTE: H_0 the disturbances in a VECM are normally distributed.

Source: Author's calculation in STATA/MP 13.0.

The very fact that we have no autocorrelation in the residuals and the obtained one stationary equilibrium (statistically significant) is more important. This means that the obtained estimates of the cointegration relationship between lnEXN_EXO, lnGDPG, lnPOIL and lnREER are valid. As a result, confirmed by both models the long-term statistically significant causalities among the studied variables are as follows:

$$\text{Model-1: lnEXN\_EXO} = 3.337*\text{lnGDPG} - 0.205*\text{lnPOIL} + \varepsilon_t \quad (49)$$

$$\text{Model-2: lnEXN\_EXO} = 3.342*\text{lnGDPG} + 0.068*\text{REER} + \varepsilon_t \quad (50)$$

The first obtained coefficient tells us that in case of 1 % GDP growth the ratio of "non-oil" export to "oil" export will grow by 3.337 % according to the Model-1 and by 3.342 % according to the Model-2. The very fact that both models suggest practically the same coefficients only

confirms the obtained results emphasizing their robustness. At the same time taking into account the fact that during the analyzed period the share of "oil" export was constantly growing (see Figure 5.1.7), we can conclude that the found coefficients implicitly support the idea that further economic growth in Russia is not possible just on the basis of exploitation its natural resources, i.e. mineral products. Thus, a belief that Russia does need to diversify its economy away from oil and gas dependency was confirmed by both models, implying that further economic growth in Russia is only possible at the expense of export-oriented development of "non-oil" sectors.

The next coefficient, which describes a long-run relationship between the ratio of "non-oil" export to "oil" export and price of crude oil, predicts that a 1 % increase (decrease) in the latter is associated with a 0.205 % decrease (increase) in the ratio of "non-oil" export to "oil" export. In other words, the obtained coefficient tells us that high crude oil prices adversely affect "non-oil" exports. This result is perfectly in line with the observed state of affairs in Russia (see Figure 5.4.1): growing crude oil prices make "oil" exports very attractive in contrast to "non-oil" ones. However, in the light of what was stated above (i.e. the declining EXN_EXO ratio is associated with the decelerating economic growth) the periods of high crude oil prices should be used as a "window of opportunity". The revenues obtained from "oil" exports can be then redistributed among other sectors in the form of direct government support or subsidies.

The last coefficient, which describes a long-run relationship between the ratio of "non-oil" export to "oil" export and the real effective exchange rate of Russian ruble, predicts that 1 % growth of REER index will cause 0.068 % increase in ratio between "non-oil" and "oil" exports. According to the methodology employed in the research and as it was explained in the text beneath the Figure 5.2.7, downward slope of the REER index curve corresponds to the REER growth, i.e. RUR appreciation. It means that 1 % growth of REER index implies a 1 % real depreciation of Russian ruble. As a result, the revealed by the Model-2 relationship between REER index and "non-oil" exports complies with the economic theory, according to which real depreciation of domestic currency leads to an increase in price competitiveness of national producers, which, ceteris paribus, affects positively their exporting possibilities (according to the Model-2, if REER depreciates by 1% - EXN_EXO ratio will grow by 0.068 %).

If we compare now the cointegration coeficients of REER and POIL showing the ties with EXN_EXO ratio, it will appear that price of crude oil influences export structure three times stronger that the real effective exchange rate of ruble does.

This result allows us to conclude that crude oil prices will continue to play, at least in foreseeable future, a dominant role in further development of the Russian economy.

5.5. Results and discussion of the research findings

Because of multiple-aspect and high interdependence among related issues the analysis of Russian economic performance in the light of competitiveness and natural resource curse phenomenon was based on the following several semantic parts:

1. The analysis of Russian macroeconomic indicators;
2. The analysis of the Russian economy and its sectors competitiveness;
3. The investigation of the Russian economy for the presence of natural resource curse and Dutch disease symptoms, including institutional quality gap analysis along with calculation of the real effective exchange rate of Russian rouble and analysis of its dynamics;
4. The investigation of interrelation among the structure of Russian export basket (expressed as the ratio of Russian "non-oil" export to "oil" export), GDP growth, crude oil price and the real effective exchange rate of Russian ruble.

The results of the analysis upon each part are given in corresponding subsections (see subsections 5.1, 5.2, 5.3 and 5.4) and discussed in detail in what follows.

The analysis of Russian macroeconomic indicators

Brief overview of the Russian economy and its macro indicators over the period under analysis, i.e. from 2000 to 2014, revealed the following main aspects. The structure of the Russian economy by type of economic activity expressed as their shares of GDP remained mostly the same. The biggest changes (growth) in shares' values were recorded in Wholesale and Retail trade as well as financial activities. The noticeable decline was recorded in the share of Manufacturing. Despite the fact that the very dynamics of GDP values in nominal terms demonstrated an upward trend, the entire analyzed period can be characterized by a slowdown in economic growth. Index of labor productivity points to its decline in the Russian economy through the analyzed period. The analysis of macroeconomic policies' success by means of the magic quadrangle revealed that the most successful among analyzed outcomes appeared the reduction of unemployment rate along with achieving the current account balance. At the same time, high inflation rate is still present in Russia, which may indirectly signalize about the presence of Dutch disease in the Russian economy. Accordingly to the observed values upon Russian foreign trade flows, the first thing that deserves our attention is that the share of Mineral Products in total Russian exports has increased significantly, that is from 53.8 % in 2000 to 70.4 % in 2014, which is almost by 20.0% or by one fifth of the total Russian exports! This fact is accompanied by a sharp increase of Machinery share in total Russian imports. Thus, having

done the analysis within the first semantic part of the research, we can conclude that Russian economy definitely reveals every reason to suppose the presence of Dutch disease. However, since Dutch disease is primarily related to the problem of real appreciation of national currency the further investigation was needed. On the other hand, real effective exchange rate can serve as a macro indicator of price competitiveness, which determines relative position of domestic producers in external markets. For that reason, prior to a detailed analysis of the Russian economy for the presence of other Dutch disease and natural resource curse symptoms we first investigated competitiveness issue.

The analysis of the Russian economy and its sectors competitiveness

The analysis of Russian economic competitiveness reflected in WEF Global Competitiveness Reports and IMD World Competitiveness Yearbooks gave us an objective insight to the assessment of the Russian Federation's position in international dimension. The annual data taken from their rankings were used to construct respective graphs representing Russian position in dynamics from 2000 till 2014 year upon various indicators-pillars (see Figures 5.2.1 and 5.2.2). The highest (the best) ratings were observed for Russian Market Size (WEF) and Macroeconomic Environment (WEF), the worst – for Financial Market Development (WEF), Institutions (WEF) and Business Efficiency (IMD). Relatively good results were recorded for indicators of Infrastructure (WEF and IMD). The latter in addition showed steadily positive development dynamics. Also positive trends in evolution were recoded for indicators reflecting Technological Readiness (WEF). Macroeconomic Environment and Market Size are referred to as the strongest sides of Russian competitiveness in accordance with WEF, whilst IMD reveals no steadily strong aspects. With regard to Russian competitiveness in general (total index), WEF and IMD rankings are unanimous in their assessments: Russian competitiveness has on average increased over the analyzed period (see Figure 5.2.3).

Since WEF and IMD reports are silent about the roots of one or another ranking, the next step was devoted to the narrower analysis focused on foreign trade performance that is one of the cornerstones of any country's economic competitiveness genesis. Relative position of Russian producers representing key economic sectors (Chemical products, rubber; Foodstuffs and agricultural raw materials (except Textile); Hides and skins, Furs and Products from them; Machinery, equipment and vehicles; Metals and products from them; Mineral products; Precious metals, Precious stones and Products from them; Textiles, textile products and footwear; Timber and pulp and paper products) in relation to their foreign competitors in corresponding internal markets was analyzed by means of market share indicator as proposed by Blank, Gurvich and

Ulyukaev (2006). Within the selected commodity groups the vast majority of Russian producers' market shares demonstrated on average the declining tendency, except market shares of domestic producers of Timber, pulp and paper products as well as Mineral products. The highest increase in market shares of Russian producers was recorded in the market of Mineral Products: from 75% in 2000 to 94% in 2014 that is +19%. The highest decline in the market share of domestic producers was recorded simultaneously in several internal markets: Machinery, equipment and vehicles - from 74% in 2005 to 50% in 2014 (–24%); Hides and skins, furs and products from them - from 63% in 2005 to 41% in 2014 (–22%); Textiles, textile products and footwear - from 49% in 2005 to 27% in 2014 (–22%). Such a dramatic change in these sectors' positions (and especially in Machinery, equipment and vehicles between 2000 and 2005) can be explained by a large-scale crisis that struck manufacturing in Russia long before the financial shock of 2008-2009. The symptoms of this crisis, reflected by the average annual employment rate in industry, appeared in Machinery manufacturing already in 2003-2004. The reduction in employment recorded in this industry (excluding the production of arms and ammunition) was from 50.7% to 39.6% (Domnich, 2011). The matter is that still in 1998-1999 years after a sharp change in the ratio between the Russian ruble and the US dollar and consequent release of significant market niches by greatly risen in price imports, in Russia was recorded the rise in machinery production which was characterized by the following indicators: 2000 - 120%; 2001 - 107.2%; 2002 - 102% (in relation to the previous year). However, by 2002 the rate of production again fell below the average for the industry. In fact, a resource of positive impulse for the Machinery, equipment and vehicles received in 1998 was fully exhausted.

The best on average results (except producers of Mineral products, Metals and products from them; these producers have the highest market shares in corresponding domestic markets) were shown by Agro-producers and producers of Timber, pulp, paper, Precious metals, precious stones and products from them. It means that producing of raw materials and commodities with low degree of processing is organized in Russia quite effectively and at least in terms of achieving food security Russian economic performance can be characterized positively.

At the same time, in order to make a comprehensive estimate of any sectors' competitive position the obtained results upon its internal position are not sufficient. The matter is that in practice if any sector aims to gain in the long-run view as sound position in a market as possible it should make emphasis on increasing its competitiveness in international dimension. For that reason import-substitution strategy is not reliable enough in contrast to export-oriented one (Popov, 2006). Thus, Russian producers' competitiveness in external markets was analyzed in

the further step by means of revealed comarative advantage indices proposed by Balassa (RCA), Vollrath (VRC) and Lafay (LFI). More over, the position of Russian producers was estimated in relation to four groups of main Russian foreign trade partners: European Union, BRICS, Commonwealth of Independent States and all selected countries together. The summary Table 5.5.1 that provides the calculation results of all the indices for all trade partners and all types of commodity groups is given below. The dynamics of calculated indices for Russian foreign trade flows differs significantly depending as on the commodity group and on the trade partner. High values of all three indices (RCA, VRC and LFI) were recorded for Fuels and mining products only. Nevertheless, comparative advantage of Russian Iron and steel exports also appeared as revealed in relation to EU, BRICS and All trade partners, but in relation to CIS group the RCA index was during the all analyzed period below the unity, demonstrating, thus, a comparative disadvantage. At the same time the dynamics of VRC index, that along with exports takes into account import flows, for the same commodity group points to Russian comparative advantage in relation to all partners, except CIS, during the entire period and BRICS after 2011. Comparative advantage of Russian exports of Chemicals appeared as revealed in relation to BRICS only, but in 2014 greater than unity value of the RCA index was recorded in relation to CIS as well. As we can see from the pivot Table 5.5.1, Russian producers' position in corresponding external markets can be characterized as competitive only in terms of raw materials and products with relatively low degree of processing. Neither light manufacturing nor heavy industry reveals a sustainable comparative advantage during the analyzed period. It should be noted that Arms industry was not included into the analysis due to issues of data availability and compatibility with the available data for other countries included into the analysis. Regardless the absence of comparative advantage, nevertheless, a positive dynamics (that is increasing trend in the values of some indices) is observed for the following groups of commodities: Agricultural products in relation to BRICS (RCA and VRC indices), Chemicals in relation to CIS (RCA and VRC indices), Iron and steel in relation to CIS (VRC index). A slight increase of Russian producers' international specialization in Agricultural products was confirmed by positive dynamics of LFI values. The most significant de-specialization of Russian producers was recorded in Machinery and transport equipment, which again signalizes about Dutch disease.

Table 5.5.1: Summary table of the RCA, VRC and LFI indices values in relation to all groups of foreign trade partners for the period from 2000 to 2014

Comparative advantage is revealed	EU	CIS	BRICS	All trade partners
Agricultural products				
RCA > 1	NO	NO	YES (2006, 2007, 2009)[1]	NO
VRC > 0	NO	NO	NO	NO
LFI > 1	-	-	-	NO
Fuels and mining products				
RCA > 1	YES	YES	YES	YES
VRC > 0	YES	YES	YES	YES
LFI > 1	-	-	-	YES
Iron and steel				
RCA > 1	YES	NO	YES	YES
VRC > 0	YES	YES (2009)	YES (2000-2010)	YES
LFI > 1	-	-	-	YES
Chemicals				
RCA > 1	NO	YES (2014)	YES	NO
VRC > 0	NO	YES (2000, 2002, 2014)	YES (2000-2009)	NO
LFI > 1	-	-	-	NO
Machinery and transport equipment				
RCA > 1	NO	NO	NO	NO
VRC > 0	NO	NO	NO	NO
LFI > 1	-	-	-	NO
Textiles				
RCA > 1	NO	NO	NO	NO
VRC > 0	NO	NO	NO	NO
LFI > 1	-	-	-	NO

NOTE: 1) – figures in parentheses imply years in which corresponding comparative advantage index was revealed, for other years there was NO comparative advantage.

Source: Author's calculation.

After that, the dynamics (from 2000 to 2014) of the real effective exchange rate of Russian rouble was analyzed both in relation to a basket of main foreign trade partners and EUR-USD currency pair. In order to see in relation to which group of countries, CIS, BRICS or EU, Russian ruble has appreciated most of all, it was decided to separate the basket of main Russian foreign trade partners' currencies into several corresponding smaller baskets.

As a result, REER index was recalculated relatively to these separated baskets to distinguish the position of Russian ruble towards to currencies form the mentioned groups. The analysis has shown that Russian ruble has appreciated most significantly relatively to EU-basket that is in relation to EUR, CZK, PLN and GBP currencies. It means that Russian producers' position in corresponding markets and towards to European producers in general has become less favorable in terms of price competitiveness. The first thing that deserves our attention is that the observed dynamics of REER index curves in all cases confidently points to the real appreciation of the domestic currency. In relation to EUR-ESD currency pair Russian ruble has appreciated most of all. Recovering of the REER of RUR (its depreciation) in the last analyzed year, 2014, was due to a sharp decline in the nominal exchange rate of RUR in relation to EUR-USD currency pair (see Figure 5.2.9). The decomposition of inflation and NER influences on REER has shown that the greatest impact on REER appreciation was exerted by the difference in inflation rates in Russia and its main foreign trade partners. Nominal exchange rate fluctuations affected REER to much lower extent than it inflation rate did. According to Brodsky (2006) real appreciation of the national currency reduces competitiveness of domestic products and entails a number of other negative consequences. In particular, REER appreciation reduces gross outputs as well as exports of manufacturing industries. It eventually leads to unemployment growth, increase in imports, net exports decline and, ultimately, drop in volumes of the gross domestic product. Increase in imports is indeed another alarming symptom of a declining national competitiveness. In accord with the calculations (the results are given in the Table 5.3.2) the average annual growth rates of industrial manufacturing in almost all sectors (except Mineral products) were significantly lower in comparison to average growth rates of corresponding imports. It may imply an increasing dependency of the Russian economy on imports. Similar assertion was made by Kudrin (2006) that was based on the results of the regression analysis of the data for the period from 1996 to 2006.

As it is well known, depreciation of the national currency is supposed to influence positively the competitiveness of domestic products in external markets (Klvačová, 2005). However, the short-term real depreciations of rouble in 2008, 2009 and 2014 did not have any expected substantially

positive impact on competitive position of Russian producers. The most intuitive juxtaposition analysis of all the obtained results let us to conclude that contrary to popular belief, devaluation of RUR did not lead to an immediate increase in domestic producers' competitiveness both in external and internal markets. Although, taking into the account the fact that the periods of real depreciation of Russian ruble were not continuous, the possible beneficial effect on Russian competitiveness may not be observable by the selected indices directly. For that reason, further investigation of interrelation among the structure of Russian export basket, expressed as the ratio of Russian "non-oil" export to "oil" export, GDP growth, crude oil price and the REER of Russian ruble can be suggested with the use of VAR model that has proven to be especially useful for describing the dynamic behavior of macroeconomic and financial time series. The possibility of combining long-run and short-run information in the data by exploiting the cointegration property (VECM) is the most important reason why namely VAR/VECM model will be utilized in the final part of the analysis.

The investigation of the Russian economy for the presence of natural resource curse and Dutch disease symptoms

Having analyzed the dynamics of REER, which is one of the cornerstones of Dutch disease investigation, in addition two other important symptoms were analyzed: rate of increase in industrial manufacturing in Russia comparing to that in corresponding Russian imports and the dynamics of equipment share in total Russian imports. According to the obtained results all main symptoms (Algieri, 2004), including REER appreciation, were recorded in the Russian economy, which allows us to conclude: despite numerous and long lasted proclamations regarding diversification of the Russian economy away from heavy dependence on oil, Russia is still suffering from Dutch disease in its classic form.

At the same time, when analyzing Russian economic performance the phenomenon of natural resource curse (NRC) should not be overlooked, which is consistent with Gaddy (2004). The strongest interpretation of NRC, as the literature review of the present study shown, is represented by institutional theory. Analysis of institutional quality indicators in accord with Mehlum, Moene, and Torvik (2006) and Kartashov's (2006) methodology helped to come to a conclusion whether Russian natural resource endowments are currently blessing or brake for economic growth and associated with it competitiveness rise. To identify the position of Russia among other resource abundant countries (the selected countries besides Russia were Venezuela, Mexico, Australia, Canada and Norway) regarding to the quality of institutions and its influence on economic performance, we analyzed the dynamics of key selected institutional indicators and

made a series of intragroup comparisons. The research was done on the basis of the most authoritative indexes of institutional development representing each of four main pillars of institutional system: legal, regulatory, institutions of economic coordination and risk-sharing, and institutions of human capital development. As a result, the following indices have been employed: family of WGI indexes, which represents both legal and regulatory institutions and provides a complex perspective on the institutional framework evaluating such areas as voice and accountability, political stability, government effectiveness, regulatory quality, rule of law and control of corruption, the World Bank indicator "Domestic credit to private sector (% of GDP)", which reflects the performance of economic coordination and risk-sharing institutions, and finally Human Development Index. According to the obtained results we can conclude that having passed a radical change in the very nature of Russian economic system (a closed mode earlier – an opened one afterwards) and implemented corresponding institutional transformations we now observe almost zero change in the quality of the latter. The only conclusion that may be derived from this fact is that conducted in Russia institutional transformations during the liberalization reforms appeared a formalistic adoption (importing) of institutions from economically developed countries without taking into account *informal component* of any institution and the necessity to adjust them to the Russian reality. Huge financial profits and reforms in some areas of the business environment go hand in hand with enormous unresolved problems in entrepreneurial activity, as well as increasing government intervention into the market. The results have shown that both the institutional transformation and market liberalization in Russia were not deep enough and were not adjusted to the Russian conditions. That's why Russia still belongs to the "embezzlement mode" and no significant improvement of the situation can be observed.

The investigation of interrelation among the structure of Russian export basket, GDP growth, crude oil price and the real effective exchange rate of Russian ruble

Having analyzed Russian economic performance in its dynamics along with main determinants of Russian economic competitiveness and surrounding circumstances, the analysis of interrelations among selected endogenous and exogenous factors influencing the state of both, i.e. the structure of Russian export basket, expressed as the ratio of Russian "non-oil" export to "oil" export, the real effective exchange rate of RUR, GDP growth and price of crude oil correspondingly, was conducted with the use of VAR/VECM approach and cointegration technique. Since the dependent variables lnPoil and lnREER appeared highly correlated (see Table 5.4.10), their simultaneous presence in a single is not recommended because of

multicollinearity. For that reason their influence on lnExnExo was investigated separately. As a result, the econometric modeling revealed the existence of long-term statistically significant causality among the studied variables of the following nature:

$$\text{Model-1: lnEXN\_EXO} = 3.337*\text{lnGDPG} - 0.205*\text{lnPOIL} + \varepsilon_t;$$

$$\text{Model-2: lnEXN\_EXO} = 3.342*\text{lnGDPG} + 0.068*\text{REER} + \varepsilon_t.$$

The coefficients of both error-correction terms (ECT) carry the correct negative sign and they are statistically significant at conventional 5 percent level. The estimated ECT coefficients equal to -0.172 (p = 0.050) and -0.199 (p = 0.031) correspondingly. Thus, the speed of convergence to equilibrium in Model-1 equals to 17.2 percent of the past quarter's deviation from equilibrium (because of quarterly data) and 19.9 percent in Model-2. Not big absolute values of the coefficients on the ECT indicate that equilibrium agents remove not big percentage of disequilibrium in each period, since the speed of adjustment is relatively low. Conducted afterwards the post-estimation analysis (stability of VECMs accessed by the roots of the companion matrix, Lagrange multiplier test for autocorrelation in the residuals of VECMs and normality of disturbances) shown that the obtained estimates of the cointegration relationships among lnEXN_EXO, lnGDPG, lnPOIL and lnREER are valid.

In addition to confirmed by both models long-run joint causality running from all dependent variables to independent one, according to linear hypothesis tests' results (see Table 5.4.20) we can say that a short-term causality was found running from lnGDPG to lnEXN_EXO only.

According to the results of econometric modelling conducted in the present research if we compare now the cointegration coeficients of REER and POIL, showing the ties with EXN_EXO ratio, it will appear that price of crude oil influences export structure three times stronger that the real effective exchange rate of ruble does. This result allows us to conclude that crude oil prices will continue to play, at least in foreseeable future, a dominant role in further development of the Russian economy.

6. CONCLUSION

The analysis of Russian economic performance in the light of competitiveness and natural resource curse phenomenon was conducted in this research with the use of the following theoretical and empirical methods: deduction, comparison, analogy, index analysis, synthesis, correlative examination and multivariate time-series analysis with cointegration techniques.

Based on the study findings the following conclusions can be stated with regard to each of the research question stated at the beginning of the study.

Among the main strongest sides of Russian economic competitiveness can be mentioned the stability of macroeconomic environment, market size, rapidly developing infrastructure along with highly skilled and relatively cheap labor force. On the other hand, there are a number of factors impeding realization of Russian competitive advantages: low institutional quality, undeveloped financial markets and inefficient markets of goods with low or not adequate availability of information that provides maximum opportunities both to buyers and sellers to conduct transactions with minimum transaction costs.

The analysis of Russian economic performance in the light of competitiveness was seen as justified since the results of that analysis may shed some light on the existence of perspective "points of growth" in the Russian economy. The position of Russian producers towards their foreign rivals in internal markets was evaluated by means of market share indicator. The conducted analysis has shown that the highest decline in market share of domestic producers was recorded simultaneously in several internal markets: Machinery, equipment and vehicles; Hides and skins, furs and products from them; Textiles, textile products and footwear. The best on average results (except producers of Mineral products, Metals and products from them - these producers have the highest market shares in corresponding domestic markets) were shown by Agro-producers and producers of Timber, pulp, paper, Precious metals, Precious stones and products from them. It means that production of raw materials and commodities with low degree of processing is organized in Russia quite effectively and at least in terms of achieving food security Russian economic performance can be characterized positively.

At the same time, in order to make a comprehensive estimate of any sectors' competitive position the obtained results upon its internal position are not sufficient. The matter is that in practice if any sector aims to gain in the long-run view as sound position in a market as possible it should make emphasis on increasing its competitiveness namely in international dimension. In this light import-substitution strategy is not reliable enough in contrast to export-oriented one.

For that reason, the next step of the research was to analyze Russian producers' competitiveness in external markets by means of revealed comparative advantage indices as proposed by Balassa (RCA), Vollrath (VRC) and Lafay (LFI). More over, the position of Russian producers was estimated in relation to four groups of main Russian foreign trade partners: European Union, BRICS, Commonwealth of Independent States and All selected countries together. The dynamics of the calculated indices for Russian foreign trade flows differs significantly depending both on the commodity group and on the trade partner. Having done the analysis of Russian producers' position in external markets the following conclusion may be drawn: steadily stable and competitive position of Russian producers was recorded in the markets of raw materials and mineral products only. However, slightly positive dynamics in the development of trade performance indicators was observed in Agricultural products and Textile. The reason behind this may be associated with the adoption of the national project "Development of Agricultural Complex" (2006-2007), the Food Security Doctrine of the Russian Federation (2010) and Russia's accession to the World Trade Organization (2012), which established a new formal framework for agricultural business and created a space for emerging possibilities to change the situation in the country's agriculture in particular and manufacturing as a whole.

The analysis of the real effective exchange rate of Russian ruble, which was considered in the present study from two different standpoints – REER as an indicator of price competitiveness and REER growth as an important symptom of Dutch disease – has proved the obtained earlier results of low and in some cases significantly decreased competitiveness of Russian producers. In order to see in relation to which group of countries, CIS, BRICS or EU, Russian ruble has appreciated the most, it was decided to separate the basket of main Russian foreign trade partners' currencies into several corresponding parts. As a result, it was revealed that again in relation to partners from BRICS Russian producers occupy a relatively better position in terms of price competitiveness. The most significant real appreciation of Russian ruble was recorded against EU currencies (GBP, CZK, PLN, SEK and EUR) and EUR-USD currency pair revealing, thus, a relatively worse position of Russian producers towards producers from corresponding countries. The decomposition of inflation and nominal exchange rate influences on REER has shown that the greatest impact on REER appreciation was exerted by the difference in inflation rates in Russia and its main foreign trade partners. Nominal exchange rate fluctuations affected REER to much lower extent than it inflation rate did. As it is known, the roots of growing inflation rate in Russia are associated with the increased inflow of foreign currencies into the country resulted from selling of energy resources which constitute the principal part of Russian

exports. Moreover, a growth in their price (primarily crude oil price and linked to it price of natural gas) along with the volumes of their export resulted in surplus of Russian International Trade Balance. In this situation the Russian Central Bank had to choose whether to strengthen the nominal and the real exchange rate of ruble (which would adversely affect already low price competitiveness) or to make a purchase of foreign currencies in its own reserves. The last variant is connected to the necessity to increase the emission of Russian ruble, and namely this variant was chosen by the Central Bank of Russia. In order to prevent natural consequences of that process manifested in inflation growth, Russian government carried out monetary sterilization. However, despite these measures had been taken, growth rate of money supply exceeded the demand for money from the real sector's side. Namely because of these reasons the growth rate of inflation has increased, which eventually was the main determinant of the Russian ruble real appreciation and one of the main signs of Dutch disease.

As it was discussed in the theoretical part of the study, real appreciation of the national currency may lead to a number of unfavorable consequences that are associated with Dutch disease problem. Since one of the main signs of Dutch disease – real ruble appreciation – was confirmed by the calculations, further analysis of the Russian economy for the presence of other important Dutch disease symptoms was done in the next steps. These are: the average annual growth rates of production volumes in all sectors (except Mineral products) that were much lower in comparison to average growth rates of corresponding imports and the share of equipment in total Russian imports, which has significantly increased, proved the presence of Dutch disease in the Russian economy. This allows us to conclude that despite numerous and long lasted proclamations regarding diversification of the Russian economy away from heavy dependence on oil, Russian economy is still suffering from the Dutch disease, being because of that highly vulnerable. The analysis of macroeconomic policies' success by means of the magic quadrangle revealed that the most successful among analyzed outcomes appeared the reduction of unemployment rate along with achieving the current account balance.

Since Dutch disease concept itself, being a particular case of natural resource curse phenomenon, is silent about the very roots of the problem and the possibilities of way out, we appealed to the institutional theory that provides the strongest interpretation of "paradox of plenty". As a result, the research done on the basis of the most authoritative indexes of institutional development representing four main pillars of institutional system (legal, regulatory, institutions of economic coordination and risk-sharing, and institutions of human capital development) has shown that both the institutional transformation and market liberalization in Russia were not successful

since they have not allowed Russia to overcome the threshold of "embezzlement mode". In fact, low institutional quality could not be very effective in nullifying so called "natural resource curse" since rent-seeking behavior exists in Russia. Thus, more accurately we would have talking about the "curse of underdeveloped economy" because of low institutional quality in Russia.

These results allow us to observe how closely competitiveness and Dutch disease (natural resource curse) issues are interconnected in the Russian economy. As we know, in accord with another opinion, that exists in some economic communities in Russia mainly represented by those who involved in redistribution of oil revenues, production of hydrocarbons has to remain the cornerstone of Russian economic development being supported and invested in as long as possible until the oil era does not end. In order to see whether Russian economy has an opportunity to grow at the expense of its natural resource endowments and how the structure of Russian export basket, expressed as the ratio of Russian "non-oil" export to "oil" export, is influenced by the real effective exchange rate of Russian ruble on the one hand and price of crude oil on the other, the multivariate time series analysis was conducted at the final stage of this research. As a result of the econometric analysis based on cointegration technique, the existence of a long-run and statistically significant causality among the studied variables was confirmed. The cointegrating interrelations found are of the following nature: in case of 1 % GDP growth the ratio of "non-oil" export to "oil" export will grow by 3.337 % according to the Model-1 and by 3.342 % according to the Model-2 (the very fact that both models suggest practically the same coefficients only confirms this result emphasizing its robustness); the next coefficient predicts that 1 % increase (decrease) in price of crude oil is associated with a 0.205 % decrease (increase) in the ratio of "non-oil" export to "oil" export; a 1 % growth of REER index will cause 0.068 % increase in the ratio between "non-oil" and "oil" exports.

The revealed relationship between REER index and "non-oil" exports fully complies with the economic theory, according to which real depreciation of domestic currency leads to an increase in price competitiveness of national producers, which, ceteris paribus, positively affects their exporting possibilities. At the same time, the coefficient in front of the GDP growth implicitly does not support the idea of further economic growth in Russia on the basis of hydrocarbons only. Thus, an opposite assertion that Russia needs to diversify its economy away from oil and gas dependency was confirmed by both models, implying that further economic growth in Russia is possible only on the basis of export-oriented development of "non-oil" sectors. Moreover, the coefficient in front of POIL tells us that high crude oil prices adversely affect "non-oil" exports.

This result is perfectly in line with the observed state of affairs in Russia (see Figure 5.4.1): growing crude oil prices make "oil" exports very attractive in contrast to "non-oil" ones. At the same time, significant volumes of "oil" exports are not favorable to the economy in terms of its strategic development, since declining EXN_EXO ratio is associated with degradation of the Russian economy and decelerating economic growth (see Figure 5.1.3 and Figure 5.1.7). Taking into account the ongoing pattern of the Russian economy in the light of attractiveness of "oil" exports, the periods of high crude oil prices should be used as a "window of opportunity" so that the revenues obtained from "oil" exports can then be redistributed among other sectors in the form of direct government support or subsidies.

Consequently, Russian government needs to find an optimum ratio between "oil" and "non-oil" exports so that "oil" revenues would have supported "non-oil" exports. Since the very searching of that optimum ratio is beyond the scope and focus of the present thesis we just state that direct copying of foreign experience in this aspect is difficult and hardly applicable because of the specifics of the Russian economy. It is necessary to ensure balanced development of both export-oriented and import-substituting industries. In encouraging of export-oriented industries the emphasis should be done on those industries and enterprises, which have conquered and retained their niche on foreign markets. In fact, there are basically two ways of future development and diversification of the Russian economy: the first one is based on adaptation of already developed and mastered abroad technologies (the strategy of modernization), the second one will focus on the development of sectors and industries belonging to the emerging sixth technological order (the strategy of technological breakthrough). By any manner of means, in order to restructure and diversify the Russian economy it is necessary to implement a comprehensive policy, based on a synergic development of all competitiveness determinants that will allow Russia to participate in the world economic activities more successfully.

7. List of abbreviations

ADF	Augmented Dickey–Fuller test
AIC	Akaike information criterion
AMD	The Armenian Dram (the currency of Armenia)
APEC	Asia-Pacific Economic Cooperation
BCA	The current account balance
BKA	The capital account balance
BRA	The reserves account balance
BRICS	Brazil, Russia, India, China and South Africa
BRL	The Brazilian Real (the currency of Brazil)
BYR	The Belarusian Ruble (the currency of Belarus)
CIS	Commonwealth of Independent States
CNY	The Chinese Yuan Renminbi (the currency of China)
CZK	The Czech Koruna (the currency of Czech Republic)
EU	European Union
EUR	Euro
EXN_EXO	The variable: the ratio of Russian “non-oil” export to “oil” export
FCU	Foreign currency unit
FPE	Final prediction error
GBP	The British Pound (the currency of United Kingdom)
GDPG	The variable: Gross Domestic Product growth
GLS	Feasible generalized least squares
GO	Gross output
GRA	The average growth rate
HDI	Human Development Index
H–O	The Heckscher-Ohlin factor-proportions theory
HQ	Hannan-Quinn information criterion
IFE	International Fisher Effect
IMD	International Institute of Management Development
INR	The Indian Rupee (the currency of India)
JPY	The Japanese Yen (the currency of Japan)

KRW	The South Korean Won (the currency of Korea (South))
KZT	The Kazakhstani Tenge (the currency of Kazakhstan)
LCU	Local currency unit
LFI	Lafay index of specialization
LM	Lagrange multiplier
LTV	The outdated labor theory of value
NER	Nominal exchange rate
NRC	Natural resource curse
OECD	The Organisation for Economic Co-operation and Development
PLC	The concept of product life cycle
PLN	The Polish Zloty (the currency of Poland)
POIL	The variable: price of URALS crude oil
RCA	Balassa Revealed Comparative Advantage Index
REER	Real effective exchange rate
RMA	Relative import advantage
RUR	The Russian Ruble (the currency of Russia)
RXA	Relative export advantage
SC	Schwarz information criterion
SEK	The Swedish Krona (the currency of Sweden)
UAH	The Ukrainian hryvnia (the currency of Ukraine)
USD	United States Dollar
VAR	Vector autoregressive model
VECM	Vector error correction model
VRC	Vollrath Revealed Competitiveness Index
WEF	World Economic Forum
WGI	Worldwide Governance Indicators
ZAR	The South African Rand (the currency of South Africa)

8. List of tables

9. List of figures

10. List of appendices

11. References

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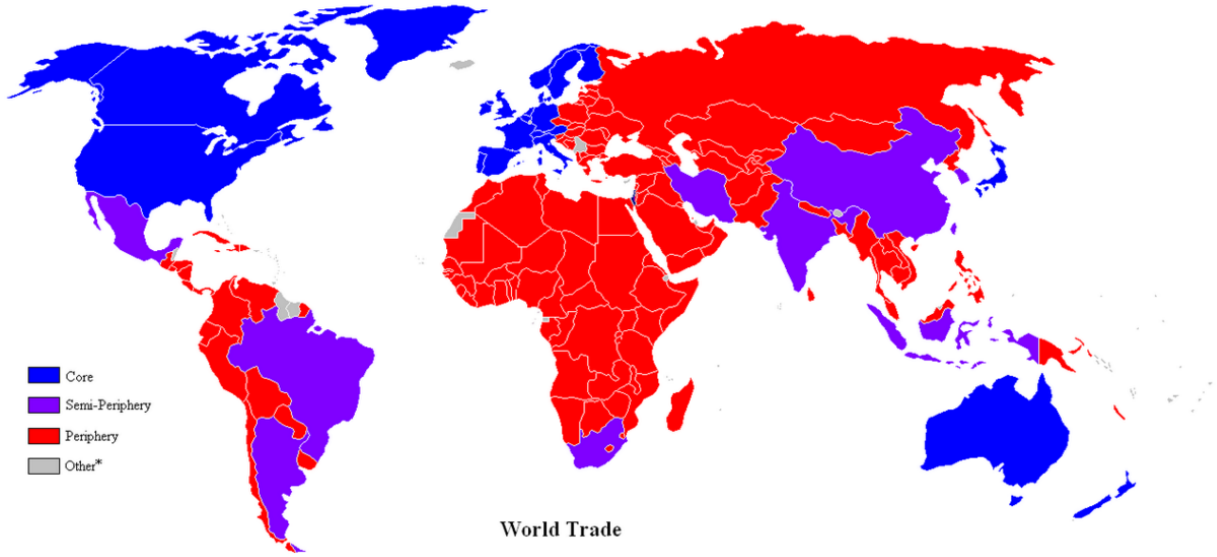
12. APPENDICES

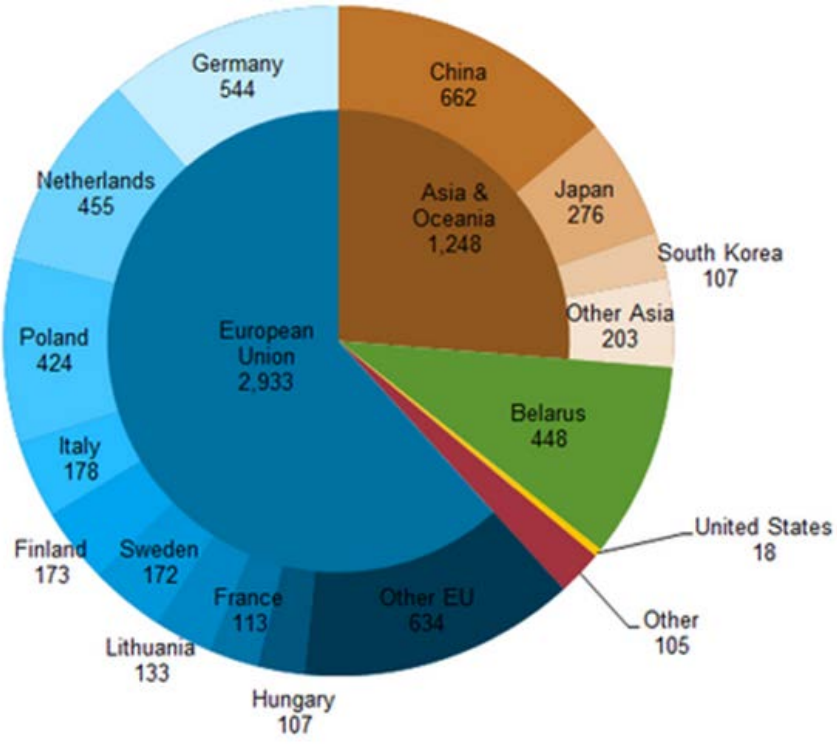
Figure A-1: A world map of countries by trading status, late XX century



NOTE: using the world-systems differentiation core countries are marked in blue color, semi-periphery countries - purple and periphery countries – red.

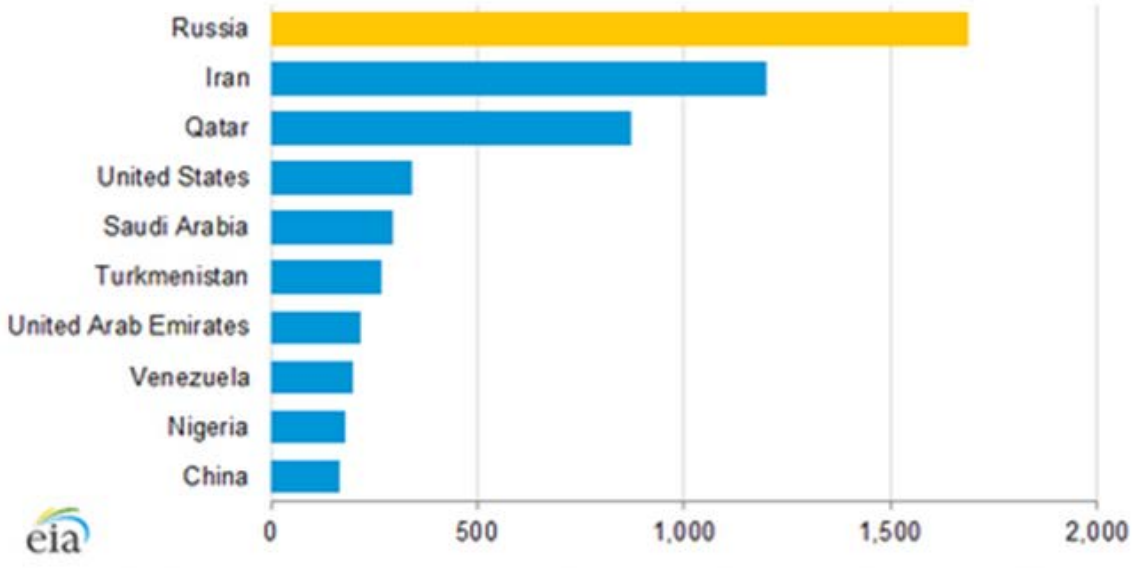
Source: Based on the list in Chase-Dunn, Kawano, Brewer (2000).

Figure A-2: Russia's crude oil and condensate exports by destination in 2014



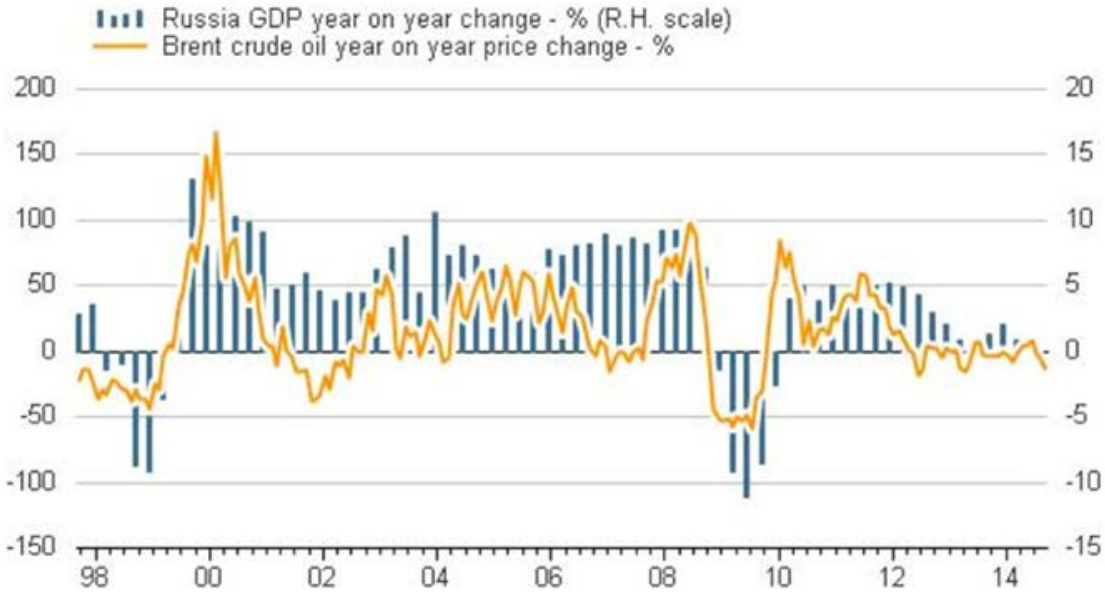
Source: Federal Customs Service of Russia and reporting countries' import statistics, Global Trade Information Service.

Figure A-3: Estimated proved natural gas reserves, as of December 1, 2014



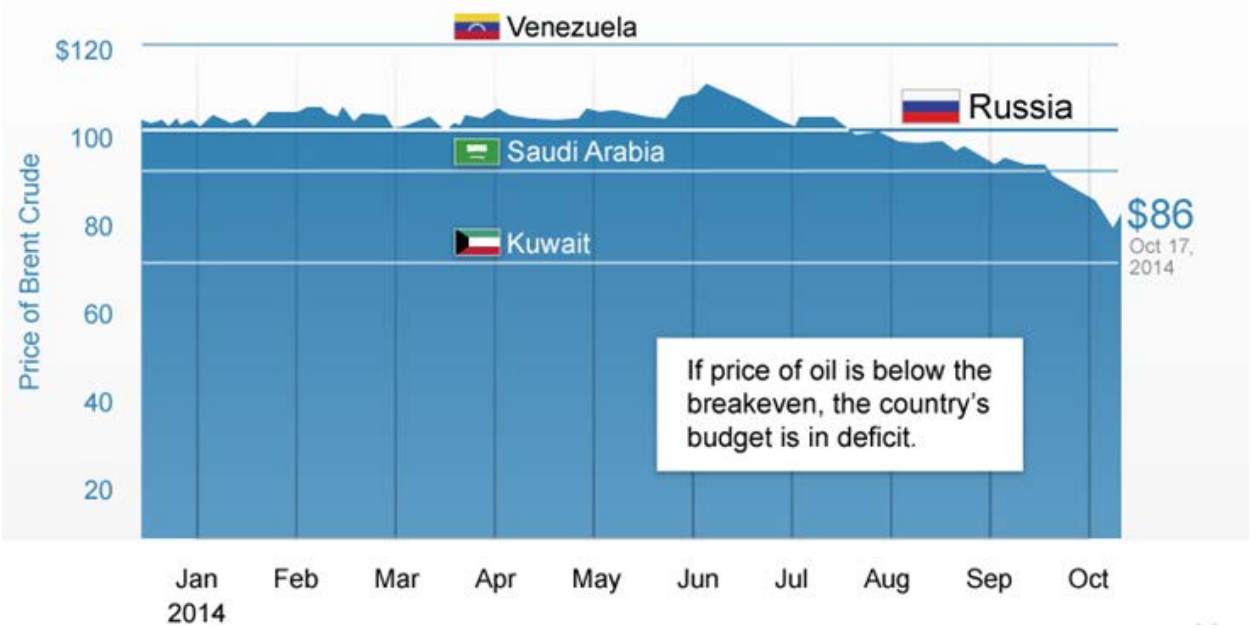
Source: Oil & Gas Journal, „Worldwide Look at Reserves and Production“ (2014).

Figure A-4: Russian GDP and the oil price



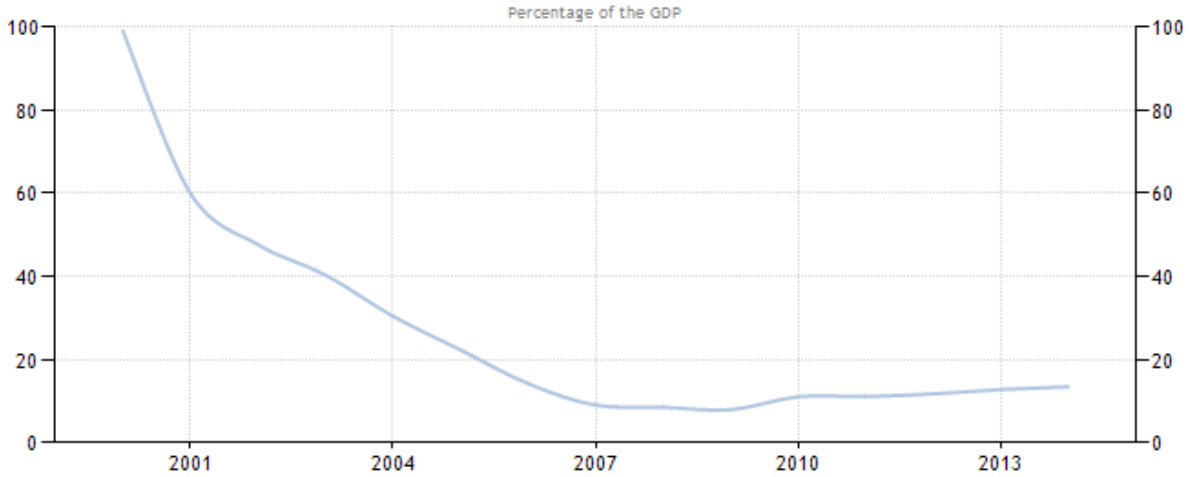
Source: Thomson Reuters Datastream.

Figure A-5: Break-even point for national budgets



Source: Bloomberg, Deutsche Bank.

Figure A-6: Russian government debt to GDP



Source: Russian Federal state statistics service.

Table A-1: Gross value added by economic activity in 2008 prices (2002 – 2014), bln. RUR

codes		2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014*
	GDP at market prices	**27,312.3**	**29,304.9**	**31,407.8**	**33,410.5**	**36,134.6**	**39,218.7**	**41,276.8**	**38,048.6**	**39,762.2**	**41,457.8**	**42,869.6**	**43,444.4**	**43,722.7**
	including:													
	Gross value added at basic prices	23,521.3	25,283.1	26,952.7	28,567.8	30,835.4	33,438.3	35,182.7	32,809.6	34,150.3	35,459.5	36,684.8	37,204.1	37,472.8
	including:													
Section A	Agriculture, hunting and forestry	1,348.5	1,324.3	1,338.1	1,342.6	1,379.1	1,397.3	1,486.6	1,508.6	1,325.6	1,520.9	1,465.5	1,528.3	1,551.6
Section B	Fishing, fish farming	69.5	70.7	72.4	64.6	67.2	66.6	62.7	66.2	60.1	62.6	64.0	65.7	63.0
Section C	Mining and quarrying	2,687.7	2,976.7	3,374.1	3,425.5	3,325.6	3,253.5	3,284.6	3,207.1	3,419.8	3,535.9	3,593.8	3,456.9	3,480.9
Section D	Manufacturing	4,476.1	4,870.1	5,262.3	5,495.8	5,857.0	6,297.6	6,163.9	5,263.0	5,716.1	6,075.2	6,247.7	6,490.4	6,652.0
Section E	Production and distribution of electricity, gas and water	926.0	934.5	1,008.1	1,016.9	1,063.0	1,026.5	1,034.0	985.6	1,025.4	1,025.7	1,037.5	1,015.2	1,014.6
Section F	Constructing	1,152.2	1,298.0	1,426.4	1,572.1	1,772.9	2,003.5	2,225.3	1,898.2	1,982.3	2,133.8	2,189.2	2,159.3	2,049.8
Section G	Wholesale and retail trade; repair of motor vehicles, motorcycles, household goods and personal items	3,740.5	4,237.9	4,669.4	5,096.4	5,815.7	6,496.9	7,137.7	6,720.6	7,110.2	7,336.9	7,583.1	7,617.3	7,661.5
Section H	Hotels and restaurants	226.1	229.8	242.8	265.3	286.2	325.3	358.0	304.5	324.2	345.5	360.7	372.4	364.8
Section I	Transport and communications	2,237.0	2,399.2	2,540.9	2,691.3	2,953.0	3,096.0	3,258.3	2,978.9	3,142.1	3,345.3	3,482.2	3,587.2	3,599.2
Section J	Financial activities	437.6	564.7	647.8	837.1	1,049.4	1,354.5	1,537.8	1,561.5	1,566.1	1,621.1	1,927.5	2,163.9	2,353.4
Section K	Real estate operations, rent and services	2,422.9	2,490.0	2,399.9	2,687.7	2,957.8	3,571.7	3,959.4	3,782.3	4,008.8	4,097.7	4,385.0	4,510.5	4,541.8
Section L	Public administration and military security; social insurance	1,715.6	1,738.3	1,817.4	1,719.4	1,761.9	1,830.1	1,884.4	1,883.4	1,878.5	1,817.8	1,832.6	1,826.1	1,820.4
Section M	Education	938.8	950.0	953.4	956.4	961.0	971.5	970.7	957.1	940.2	932.8	922.6	923.2	917.2
Section N	Health care and social services	1,163.5	1,126.0	1,137.7	1,156.6	1,173.3	1,186.7	1,197.8	1,195.6	1,199.4	1,212.8	1,237.1	1,246.2	1,258.2
Section O	Other community, social and personal services	476.1	480.1	510.3	524.9	564.5	612.8	621.5	497.2	507.9	505.7	518.4	515.0	501.3
Section P	Provision of services for housekeeping													
	Taxes on products	4,100.3	4,313.9	4,740.8	5,071.6	5,515.4	6,016.2	6,323.8	5,454.9	5,789.7	6,174.8	6,362.4	6,416.0	6,424.7
	Subsidies on products	280.7	279.8	272.7	226.3	215.0	234.4	229.7	215.9	171.9	163.3	163.3	160.0	160.0
	Net taxes on products	3,766.3	3,988.3	4,441.4	4,841.5	5,298.8	5,780.1	6,094.2	5,239.0	5,623.7	6,018.1	6,205.7	6,262.1	6,270.9

NOTE: * Data for 2014 are presented taking into account the data on the Crimean Federal District.

Source: Author's calculations on the basis of data taken from Russian Federation's Federal State Statistics Service.

Table A-2: Structure of Russian Exports and Imports by commodity sector, as % of totals

HS Code	Commodity sector	Exports			Imports		
		2000	2007	2014	2000	2007	2014
01-24	Foodstuffs and agricultural raw materials	1.60	2.50	3.80	21.80	13.69	13.75
25-27	Mineral products	53.80	64.70	70.40	6.30	2.37	2.37
27	*Including: Fuel and energy products*	*52.90*	*64.00*	*69.50*	*3.60*	*1.28*	*1.27*
28-40	Chemical products, rubber	7.20	5.90	5.80	18.00	14.00	16.31
41-43	Hides and skins, furs and products from them	0.30	0.10	0.10	0.40	0.35	0.45
44-49	Timber and pulp and paper products	4.30	3.60	2.30	3.80	2.63	2.07
50-67	Textiles, textile products and footwear	0.80	0.20	0.20	5.90	4.13	5.71
71-83	Metals and products from them (includind Precious stones, precious metals and products from them)	21.70	16.40	10.70	8.30	8.04	6.98
84-90	Machinery, equipment and vehicles	8.80	5.30	5.20	31.40	51.42	47.97
68-70, 91-97	Other products	1.50	1.30	1.50	4.10	3.37	4.39

Source: Author's calculations on the basis of data taken from http://www.customs.ru/index.php?option=com_newsfts&view=category&id=52&Itemid=1978&limitstart=80

Table A-3: Critical values from the small-sample (48, 100, 136, 200) distributions of test statistics for seasonal unit roots on 24000 Monte Carlo replications: data generating process $\Delta_4 x_t = \epsilon_t \sim$ nid (0,1)

Critical values from the small-sample distributions of test statistics for seasonal unit roots on 24000 Monte Carlo replications: data generating process $\Delta_4 x_t = \epsilon_t \sim \text{nid}(0,1)$.

Auxiliary regressions	T	Fractiles $t:\pi_1$ 0.01	0.025	0.05	0.10	$t:\pi_2$ 0.01	0.025	0.05	0.10	$t:\pi_3$ 0.01	0.025	0.05	0.10
No intercept	48	−2.72	−2.29	−1.95	−1.59	−2.67	−2.27	−1.95	−1.60	−2.66	−2.23	−1.93	−1.52
No seas. dum.	100	−2.60	−2.26	−1.97	−1.61	−2.61	−2.22	−1.92	−1.57	−2.55	−2.18	−1.90	−1.53
No trend	136	−2.62	−2.25	−1.93	−1.59	−2.60	−2.23	−1.94	−1.61	−2.58	−2.21	−1.92	−1.56
	200	−2.62	−2.23	−1.94	−1.62	−2.60	−2.24	−1.95	−1.61	−2.58	−2.24	−1.92	−1.55
Intercept	48	−3.66	−3.25	−2.96	−2.62	−2.68	−2.27	−1.95	−1.60	−2.64	−2.23	−1.90	−1.52
No seas. dum.	100	−3.47	−3.14	−2.88	−2.58	−2.61	−2.24	−1.95	−1.60	−2.61	−2.23	−1.90	−1.54
No trend	136	−3.51	−3.17	−2.89	−2.58	−2.60	−2.21	−1.91	−1.58	−2.53	−2.18	−1.88	−1.53
	200	−3.48	−3.13	−2.87	−2.57	−2.58	−2.22	−1.92	−1.59	−2.57	−2.21	−1.90	−1.53
Intercept	48	−3.77	−3.39	−3.08	−2.72	−3.75	−3.37	−3.04	−2.69	−4.31	−3.92	−3.61	−3.24
Seas. dum.	100	−3.55	−3.22	−2.95	−2.63	−3.60	−3.22	−2.94	−2.63	−4.06	−3.72	−3.44	−3.14
No trend	136	−3.56	−3.23	−2.94	−2.62	−3.49	−3.15	−2.90	−2.59	−4.06	−3.72	−3.44	−3.11
	200	−3.51	−3.18	−2.91	−2.59	−3.50	−3.16	−2.89	−2.60	−4.00	−3.67	−3.38	−3.07
Intercept	48	−4.23	−3.85	−3.56	−3.21	−2.65	−2.24	−1.91	−1.57	−2.68	−2.27	−1.92	−1.52
No seas. dum.	100	−4.07	−3.73	−3.47	−3.16	−2.58	−2.24	−1.94	−1.60	−2.56	−2.19	−1.89	−1.54
Trend	136	−4.09	−3.75	−3.46	−3.16	−2.65	−2.25	−1.96	−1.63	−2.56	−2.20	−1.90	−1.52
	200	−4.05	−3.70	−3.44	−3.15	−2.59	−2.25	−1.95	−1.62	−2.58	−2.21	−1.92	−1.56
Intercept	48	−4.46	−4.04	−3.71	−3.37	−3.80	−3.41	−3.08	−2.73	−4.46	−4.02	−3.66	−3.28
Seas. dum.	100	−4.09	−3.80	−3.53	−3.22	−3.60	−3.22	−2.94	−2.63	−4.12	−3.76	−3.48	−3.14
Trend	136	−4.15	−3.80	−3.52	−3.21	−3.57	−3.18	−2.93	−2.61	−4.05	−3.72	−3.44	−3.12
	200	−4.05	−3.74	−3.49	−3.18	−3.52	−3.18	−2.91	−2.60	−4.04	−3.69	−3.41	−3.10

Critical values from the small-sample distributions of test statistics for seasonal unit roots on 24000 Monte Carlo replications: data-generating process $\Delta_4 x_t = \epsilon_t \sim \text{nid}(0,1)$.

Auxiliary regressions	T	Fractiles $t:\pi_4$ 0.01	0.025	0.05	0.10	0.90	0.95	0.975	0.99	$F:\pi_3 \cap \pi_4$ 0.90	0.95	0.975	0.99
No Intercept	48	−2.51	−2.11	−1.76	−1.35	1.33	1.72	2.05	2.49	2.45	3.26	4.04	5.02
No seas. dum.	100	−2.43	−2.01	−1.68	−1.32	1.31	1.67	2.00	2.40	2.39	3.12	3.89	4.89
No trend	136	−2.44	−1.99	−1.68	−1.31	1.30	1.66	1.99	2.38	2.41	3.14	3.86	4.81
	200	−2.43	−1.98	−1.65	−1.30	1.29	1.67	1.97	2.36	2.42	3.16	3.92	4.81
Intercept	48	−2.44	−2.06	−1.72	−1.33	1.30	1.68	2.04	2.41	2.32	3.04	3.78	4.78
No seas. dum.	100	−2.38	−1.99	−1.68	−1.30	1.28	1.65	1.97	2.32	2.35	3.08	3.81	4.77
No trend	136	−2.36	−1.98	−1.68	−1.31	1.27	1.65	1.97	2.31	2.36	3.00	3.70	4.73
	200	−2.36	−1.98	−1.66	−1.29	1.28	1.65	1.96	2.30	2.37	3.12	3.86	4.76
Intercept	48	−2.86	−2.37	−1.98	−1.53	1.54	1.96	2.35	2.81	5.50	6.60	7.68	9.22
Seas. dum.	100	−2.78	−2.32	−1.96	−1.53	1.52	1.93	2.29	2.73	5.56	6.57	7.72	8.74
No trend	136	−2.72	−2.31	−1.96	−1.52	1.51	1.92	2.28	2.71	5.56	6.63	7.66	8.92
	200	−2.74	−2.33	−1.96	−1.54	1.53	1.95	2.32	2.78	5.56	6.61	7.53	8.93
Intercept	48	−2.41	−2.05	−1.70	−1.33	1.26	1.64	1.96	2.37	2.23	2.95	3.70	4.64
No seas. dum.	100	−2.38	−1.97	−1.65	−1.28	1.28	1.65	1.98	2.32	2.31	2.98	3.71	4.70
Trend	136	−2.36	−1.97	−1.64	−1.29	1.26	1.62	1.92	2.31	2.33	3.04	3.69	4.57
	200	−2.35	−1.97	−1.66	−1.29	1.26	1.64	1.96	2.30	2.34	3.07	3.76	4.66
Intercept	48	−2.75	−2.26	−1.91	−1.48	1.51	1.97	2.34	2.78	5.37	6.55	7.70	9.27
Seas. dum.	100	−2.76	−2.32	−1.94	−1.51	1.51	1.92	2.28	2.69	5.52	6.60	7.52	8.79
Trend	136	−2.71	−2.78	−1.94	−1.51	1.53	1.96	2.31	2.78	5.55	6.62	7.59	8.77
	200	−2.65	−2.27	−1.92	−1.48	1.55	1.97	2.31	2.71	5.56	6.57	7.56	8.96

Source: Hylleberg, Engle, Granger & Yoo (1990).