Thesis for the Degree of Master of Arts

International Competitiveness of Uzbekistan's Mining Industries and Determinants of Uzbekistan's Trade: Applications of RCAs and Gravity Models.

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August, 2014

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우즈베키스탄 광업의 국제적 경쟁력과 무역의 결정 요인: RCA 와 Gravity 모델의 응용

Advisor: Prof. Ko Jong-Hwan

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Abstract

Uzbekistan's economic development path has been prescribed by IMF for developing nations as an Uzbek Model since country was the first to recover from Soviet collapse. Therefore, this research has explored and analyzed growth of Uzbekistan's economy, trade and mining industries of the last two decades. At first, Revealed Comparative Advantage Indices were applied to measure the competitiveness of fourteen mining industries from 1996 to 2011. According to the outcomes, six industries (HS27, HS28, HS 71, HS74, HS79, and HS81) were found fully advantageous and the rest (HS25, HS26, HS68, HS72, HS73, HS75, HS76, and HS78) fluctuated or were disadvantageous. In addition, Gravity Model of Trade was applied to determine the factors that encourage or mitigate Uzbekistan's trade and exports from 1992 to 2012 using Eviews 7.0 software. The analyses found that Uzbekistan's exports and trade have positive correlation with the economic sizes of trading parties but its population size has no significance in Uzbekistan's exports. In addition, Uzbekistan's trade and exports have a positive correlation with a language, a border and colonial ties. In conclusion, chapters were summarized and policy implications were provided.

우즈베키스탄 광업의 국제적 경쟁력과 무역의 결정 요인: RCA 와 중력모델의 응용

초록

우즈베키스탄이 소련 붕괴로부터 회복된 최초의 국가이기 때문에 IMF 는 우즈베키스탄의 경제 개발 경로를 개발도상국들을 위해 Uzbek Model 로 규정해오고 있다. 그러므로, 본 연구는 지난 20 년 간 일어난 우즈베키스탄의 경제, 무역 그리고 광업의 성장을탐구하고 분석하였다. 먼저, RCA 지표들은 1996 년부터 2011 년까지,14 개의 광업 경쟁력을 측정하기 위해 응용되었다. 결과에 따르면, 여섯 산업 은 완전한 우위를가지고 있었으며, 나머지산업들은 변동하거나 또는 불리한 것으로 나타났다. 또한, 무역의 중력 모델은 1992 년부터 2012 년 사이 우즈베키스탄의 무역과 수출을 촉진하거나 완화하는 요인 들을 밝히기 위해 적용되었으며, 이 과정에서 Eviews 7.0 sofware 를 활용하였다. 이 분석은 우즈베키스탄의 수출과 무역이 무역에 종사하는 주체들의 경제적 규모와의 긍정적인 상관관계가 존재하지 만, 이들의 인구 규모는 우즈베키스탄의 수출에 커다란 영향을 미치 지 못하는 것을밝혔다. 덧붙여, 우즈베키스탄의 무역과 수출은 언어, 국경 그리고 식민지적 관계와도 높은 상관관계가 있었다. 끝으로, 각각의 장들을 요약하였으며, 정책적 시사점을 도출하였다.

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Abbreviations

ADB   Asian Development Bank

ASEAN   Association of South East Asian Nations

CA   Comparative Advantage

CD   Comparative Disadvantage

CEM   Common Effects Model

CIS   Commonwealth of Independent States

CPI   Consumer Price Index

EU   European Union

EXIM Bank   Exports Import Bank

FDI   Foreign Direct Investment

FEZ   Free Economic Zone

FIEZ   Free Industrial and Economic Zone

GDP   Gross Domestic Product

GM   General Motors

HS   Harmonized System

IMF	International Monetary Fund
KB	Korea Bank
KEPCO	Korea Electric Power Corporation
KITA	Korea International Trade Association
KNOC	Korea National Oil Corporation
KOGAS	Korea Gas
KOICA	Korea International Cooperation Agency
MOU	Memorandum of Understanding
RCA	Revealed Comparative Advantage
RMA	Revealed Import Advantage
ROK	Republic of Korea
RTA	Revealed Trade Advantage
RXA	Revealed Export Advantage
UN comtrade	United Nations Commodity Trade
UNDP	United Nations Development Program
USD	United States Dollars

WB   World Bank

WEO   World Economic Outlook

WITS   World Integrated Trade Solution

WTO   World Trade Organization

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CHAPTER I INTRODUCTION

1.1 Background of Mining industry of Uzbekistan

The Republic of Uzbekistan has chosen a gradual model of economic development and since its independence it has managed to increase the share of industry (35.4 %) and service sectors (45.1 %) reducing the reliance on agriculture (19.5%)[1] in its economy. Mining industry is crucial in Uzbekistan's economy and the country is considered "the seventh largest gold producer in the world and the second largest in the CIS after Russian Federation with output of 86 tons. In terms of gold reserves it holds fifth ranking in the world and first in the CIS with an estimated 5300 ton reserves. Gold is the second largest foreign exchange in the country. Besides gold the country ranks fifth in terms of Uranium production all of which is exported"[2]. The quality of Uzbek gold is evaluated high as 9999 standard. The country is also rich in minerals and it is "among top ten countries in terms of copper, stone and potassium salt. Out of main reserves of copper in Olmalyq mining area only 20% has been extracted"[3]. The reason behind the ascending attention from government side towards mining industry is the high potential of natural resources that can boom the economy of the country providing employment to its people. As it has high potential "more than 2,800 fields and perspective ingresses of minerals, about 100 types of minerals among which 65 are used in industry and agriculture, 1,000 fields including fields of oil, gas, condensate, precious, non-ferrous, ferrous and radioactive

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[1] EUROSTAT(2010) "Uzbekistan - Main Economic Indicators"
[2] Mining World Events (2011) "8th International Exhibition for Mining and Processing of Metals and Minerals, Tashkent, Uzbekistan"
[3] Uzinfoinvest (2013) "Mining industry of Uzbekistan"

metals, coal, mining chemical feed stock, various construction materials are found in the country. The total mineral and raw material potential of the country is equal to approximately USD 3.5 trillion"[4]. In the path of independent years Uzbekistan has announced economic zones to facilitate the investment opportunities and create free environment to run business activities. Navoi FIEZ (Free Industrial Economic Zone) is the largest mining area and the largest province of Uzbekistan. The FIEZ is specialized in mining in particular and the central hub of transportation. Declaration of Angren FEZ (Free Economic Zone) located in the northern mountainous part of the country can also be implied as an important role of mining in Uzbek economy. According to Christine Cletou, the professor of the Netherlands Institute of International Relations, Uzbekistan made a significant progress in diverting its economy to industrialization[5].

However, despite vigorous efforts of Uzbek government to increase the local and foreign investment into the mining sector, some industries within the sector received less attention from the government as well as private investment groups. Major investments were direct to oil, gas, gold, uranium, copper, and various chemical mining industries. The author of this thesis believes that building stone – marble and granite - mining industry of the country is worth investing and has high potential of productivity with a short term pay back to investors. These industries, unlike other mining industries, need smaller volume of investment to boost production and good market conditions in and outside the region. This thesis will give you an insight of the building stones, in particular, marble and granite, mining and serves as a guide for the interested investors as well as policy guidance to external investment institutions of the Republic of Uzbekistan.

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[4] UNDP (2009) "Investment opportunities in Uzbeksitan/catalogue"
[5] Uzbekistan Today (2013, February) "Overlapping Views".

1.2 Objectives

The objective of this thesis is to conduct an explorative, analytic and contributive research on Uzbekistan's exports and mining sector. The first goal of researching is to explore the Uzbekistan's economy, its composition of sectors and dynamics over the 22 independence years and also to find out the key industries of the economy with exportable commodities. The second goal is to analyze the factors and determinants that encourage or hamper the exports and trade of Uzbekistan by using econometric models based on statistical data of post trade. The last objective is to contribute the existing literature of researches conducted on Uzbekistan's trade and economy since the available literature is not abundant in this area.
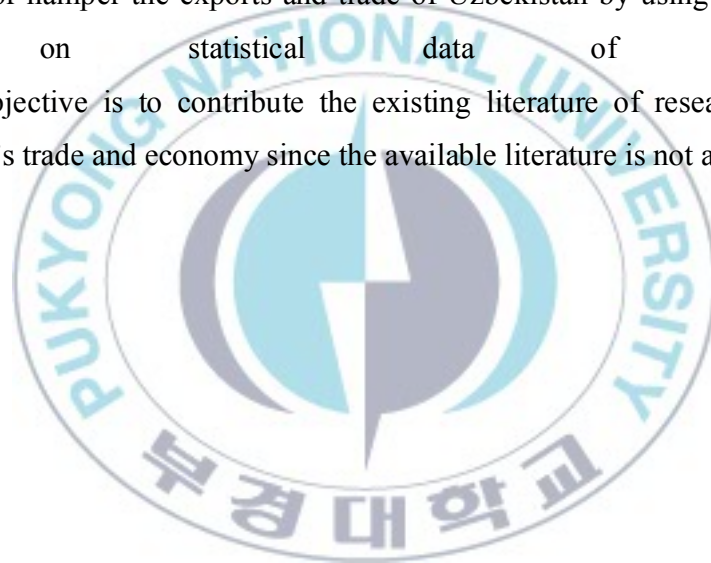
CHAPTER II OVERVIEW OF UZBEK ECONOMY

"After ten years of economic transformation in the fifteen former Soviet republics, the economic growth performance of one former republic has stood out from the rest – the Central Asian state of Uzbekistan"[6]. Uzbekistan was the first CIS republic in 2001 to improve its GDP fully with 3% surplus with that of in 1989. Unlike other former Soviet republics Uzbekistan constructed its own Uzbek Model of economic development and initially refused fully liberalize its economy. The economic cycles are synchronized with economic reforms which can be classified into three stages: period of contraction and intensive policy reforms from 1991 to 1996, the stage of recovery and reversal reforms from 1996 to 2001 and stable growth period with current policies[7].

Before the demise of Soviet Union, Uzbekistan was a big receiver of subsidies from Moscow and especially in the last three years of Soviet era the subsidies grew from 7-9% of GDP in 1988 to 21% in 1991[8]. When the subsidies were stopped by independence, Uzbekistan had an economic contraction with high dependence on imports of food and oil. Growth of GDP was negative until 1996 with cumulative decline of 18.3 percent. The rate of inflation spiked to 1457% till 1994 and from then on began to decrease. Main goal of economic reforms was focused on import substitution and energy self-sufficiency. Miraculously, the economy started to recover from 1996 in contrast with IMF prediction.

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[6] Kotz D.M. (2004). "The 'Uzbek Growth Puzzle' and the Washington Consensus". San Diego, USA.

[7] Dollery B. and Akimov A. (2009). "The Uzbek Approach to Financial Development: An Analysis of Achievements and Failures", Griffith University.

[8] IMF (1992). "Economic Review: Uzbekistan", Washington D.C.

This period is known as Uzbek Growth Puzzle[9] and the Uzbek Model was widely discussed in the IMF. By 1996, full energy and food self-sufficiency was met and import substitution was underway.

The second stage of the economic reforms and the period of recovery lasted from 1996 to 2001. And during the period Uzbekistan began to cooperate with IMF in a wider scope and follow liberalized trade. International currency conversion of Uzbek soum was officially available and privatization took place. There have been many amendments in the fiscal policy as well. For instance, in 1998, Tax Code was developed and adopted to reduce the tax burden and simplify administrative burden of accounting and payment procedures[10]. In general, economic recession was halted in 1996 and government has sought to create investment-friendly environment. Industry started to expand as foreign direct investment was brought on automobile manufacturing. Exports also began do be diversified. Current account balance, fiscal balance and employment saw significant improvement in this stage. Table 3.1 illustrates the main economic indicators of the past two decades of independence in details.

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[9] IMF, J. Z. (1999). "The Uzbek Growth Puzzle",IMF staff paper vol. S.80 (1)

[10] Tadjibayeva D. and Komilova I. (2009). "The influence of tax reforms on the prosperity of micro-firms and small business in Uzbekstan".

Table 2.1: Uzbekistan's main economic indicators, 1991-2011

Year	GDP growth %	industry as (% of GDP)	Agriculture as (% of GDP)	exports of goods and services (% of GDP)	total Investment % of GDP	Inflation, average CPI % change	Current account balance, % of GDP	Unemployment % of total labor force
1991	-0.5	36.6	37	35	-	-	-	-
1992	-11.1	36	35	27	43.93	718.8	-6.6	-
1993	-2.3	34	30	34	14.7	534.2	-7.9	0.3
1994	-5.2	26	37	17	18.2	1568.3	1.8	0.2
1995	-0.9	28	32	28	24.2	304.6	-0.1	0.3
1996	1.7	30	26	28	23	54.0	-7.0	0.3
1997	5.2	26	32	27	18.9	70.9	-3.9	0.3
1998	4.3	26	31	22	20.9	29.0	-0.6	0.4
1999	4.3	24	34	18	17.1	29.1	-0.9	0.4
2000	3.8	23	34	25	19.6	25.0	1.7	0.4
2001	4.2	23	34	28	21.1	27.3	-0.9	0.4
2002	4	22	34	31	21.2	27.3	1.2	0.4
2003	4.2	23	33	37	20.8	11.6	5.7	0.3
2004	7.4	26	31	40	24.5	6.6	7.1	0.4
2005	7	23	28	38	28	10.0	7.6	0.3
2006	7.5	27	26	37	29.6	14.2	9.1	0.2
2007	9.5	32	24	40	30	12.3	7.3	0.2
2008	9	31	21	44	31	12.8	8.6	0.1
2009	8.1	33	20	36	31	14.1	2.1	0.2
2010	8.5	35	20	31	30.67	9.4	6.1	0.2
2011	8.3	36	19	32	30.89	12.8	5.7	-

Source: WEO (World Economic Outlook) 2013[11]

Since 2001, Uzbekistan's GDP composition has changed significantly. High rate of growth performance was accelerated by foreign direct investments, growing exports of value added such as automobiles and transport vehicles, and high external demand as well. Even during Global and Eurozone financial crisis the economy was not affected

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[11]<http://www.econstats.com/weo/CUZB.htm>

much and the GDP kept growing average 9 percent in 2007 and 2008. It is explained that Uzbek government has taken certain measures before the crisis and was able to predict it[12]. Foreign direct investment made up average 17% of total investments during the period and the highest FDI inflow was 28% of total investments in 2008.

Manufacturing, value added and industry, in a part, replaced the dependence on agriculture. Tax exemptions and tariff privileges were granted to the import of certain technology, machinery and intermediary goods. The share of agriculture has shrunk sharply from 35%in 2002 to 19% in 2011 whereas industry has reached to 35% in 2011 against 23% in 2001. The means that, in a sense, Uzbekistan has diverged its economy from an agriculture-driven economy to a service and industry-driven economy. However, cotton still remains as one of the main foreign exchange earner. Industrialization and growing exports brought about the current account balance to surplus.

The current account balance surplus has gone up to 5.7 percent by 2011. The economic growth can be beneficial if it raises the income of citizens and reduces the poverty. According to millennium development data released by UNDP in Uzbekistan, level of poverty was cut from 27.5% to 19.5% in 2009. The rate of unemployment has been constantly declining to a minimum point. The external debt of the government was contracted to 9.5% in 2009 against 44% in 2001[13]. In overall, during the third phase, the economy has put itself on track.

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[12]Turkish Weekly (2009). "Measures taken in Uzbekistan to allow overcoming financial crisis".
[13]Fayzullayev Y. (2011). "Assessing Development Strategies to Achieve the MDGs in the Republic of Uzbekistan"

2.1 Consumption

According to the prominent economist John Maynard Keynes, consumption is influenced by our income. The higher our income is, the bigger our consumption is. However, in case of Uzbekistan, the theory does not fit much. Once economy was on constant growth, people's income increased simultaneously with it. During the last ten years, GDP per capita has skyrocketed three fold, from 456.7 bln USD in 2001 to 1545.93 in 2011. Government and private household consumption did not reflect to the GDP growth. For the whole two decades, Government consumption was, on average, stable 20% of GDP whereas household consumption has fluctuated sharply in different years and remain below 60% of GDP since the time GDP began to rise. (See the graphs2.1 and 2.2)

Graph 2.1 Distribution of Consumption as percent of GDP
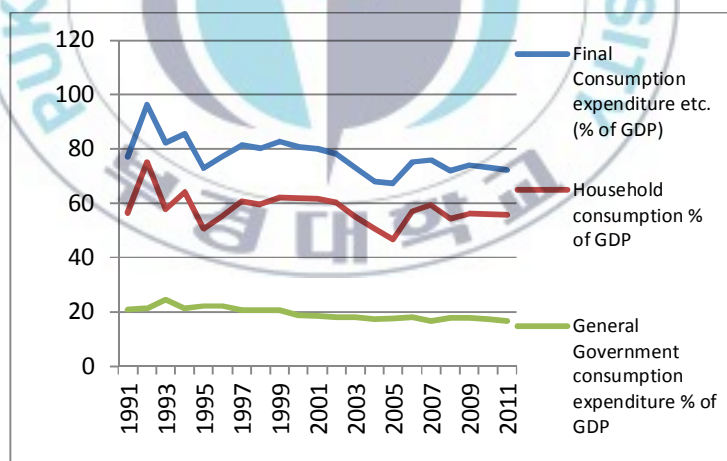
Source: World Bank/2013

Graph 2.2 GDP per capita of Uzbekistan

GDP perc capita (US dollars)
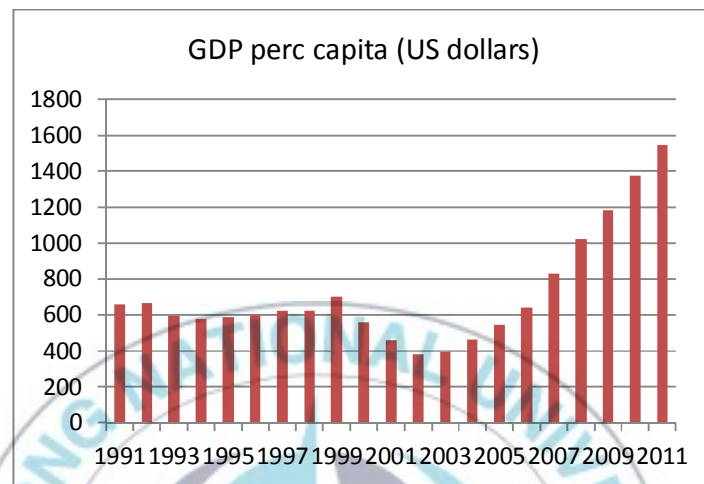
This can be explained as people's rational expectation derived from the sharp fluctuation led them to save extra income and keep consuming as usual. Despite the slight decline of household consumption, final consumption made up, on average, 81.2% of GDP over two decades. It can be implied that Uzbekistan is more or less a consumerist society.

Uzbekistan, being located in the heart of Central Asia, has served as continental hub, so-called 'Caravansaray' of merchants who traded along the Silk Road. Therefore, it can be said that Uzbek society is ethnically traders and merchants. Even at present, trade plays a significant role in a state economy and always more than a half of GDP consisted of trade. Share of imports and exports in the GDP composition has been reciprocal and reflective. The graph 3.3 shows that fluctuation of both trends was parallel.

Graph 2.3 Share of Uzbekistan's exports and imports of GDP

Share of import and export (% of GDP)
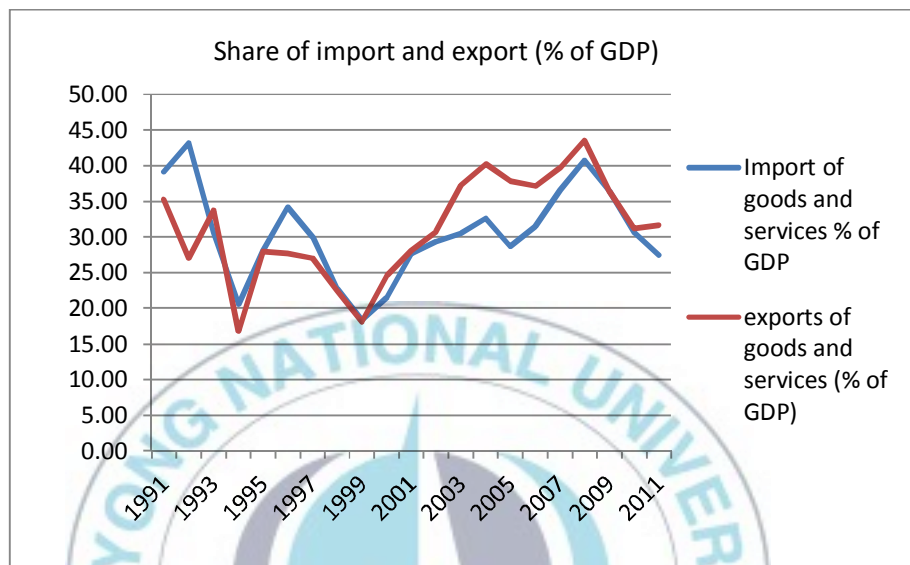
Source: World Bank/2013

According to the report of United Nations Social and Economic Affairs on Uzbekistan, percentage of gross national savings in GDP was higher than that of total investments. Both made up 23% in 1996 and savings went up to around 34% whereas investment increased by 4% up to 27% of GDP in 2011[14]. During the years of economic growth, savings outweighed investments in contrast with the second period when more capital was invested than it was saved. In summary, Uzbek Model of development has helped the economy to fully recover itself and grow with some factors remaining still unsatisfactory. See the Table 3.2 for the full numeric time series data of economic indicator.

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[14]Ibid. Olimov and Fayzullayev(2011) p.5

Table 2.2: Uzbekistan's economic indicators of consumption, 1991-2011

Years	Household consumption % of GDP	General Gov't consumption expenditure % of GDP	Trade % of GDP	Import of goods and services % of GDP	exports of goods and services (% of GDP)	GDP per capita (US dollars)	Final Consumption expenditure (% of GDP)
1991	56.27	20.77	74.42	39.14	35.28	658.66	77.05
1992	75.1	21.25	70.22	43.18	27.03	666.93	96.24
1993	57.65	24.54	64.25	30.53	33.72	597.03	82.2
1994	64.26	21.23	37.33	20.55	16.78	576.44	85.49
1995	50.6	22.26	56	28.05	27.95	585.93	72.87
1996	55.2	22.11	61.86	34.18	27.69	600.6	77.3
1997	60.8	20.5	57.04	30	27.04	623	81.3
1998	59.58	20.54	45.29	22.8	22.5	623.22	80.13
1999	62.11	20.64	36.55	18.41	18.15	699.94	82.75
2000	61.94	18.65	46.11	21.52	24.59	558.22	80.59
2001	61.57	18.41	55.72	27.65	28.08	456.7	79.98
2002	60.24	17.97	60.16	29.35	30.81	383.35	78.22
2003	54.96	18.09	67.8	30.55	37.25	396.38	73.05
2004	50.67	17.4	72.86	32.65	40.21	465.12	68.07
2005	46.68	17.6	66.52	28.66	37.85	546.12	67.28
2006	57.15	18.1	68.64	31.49	37.14	642.96	75.25
2007	59.26	16.7	76.2	36.53	39.67	830.41	75.96
2008	54.2	17.76	89.31	40.79	43.52	1022.52	71.96
2009	56.16	17.8	72.82	36.44	36.38	1181.85	73.96
2010	55.81	17.42	61.84	30.65	31.19	1377.08	73.23
2011	55.72	16.59	59.13	27.47	31.66	1545.93	72.31

Source: World Bank/2013[15]

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[15]<http://www.tradingeconomics.com/uzbekistan/gdp-us-dollar-wb-data.html>

2.2 Uzbekistan's Foreign Trade

Geographical location of Uzbekistan in the heart of Euroasian landmass facilitates trading throughout the continent. On the one hand, Uzbekistan can benefit being a transit state for railroad shipments, and on the other, it is able to sustain proportional trade with the trading partners not depending heavily on a certain country. The distribution of shares of exports and imports across its trading partners resonate the aforementioned statement. According to the table 3.3, Uzbekistan mainly imports from Russia 19.7%, South Korea 17.6%, EU27 17.4%, China 13.9% and Kazakhstan 12.3%. Interestingly, among top five import partners, only Kazakhstan borders with Uzbekistan and the rest are located far in the East (South Korea and China), West (EU27) and North (Russia) from Uzbekistan. It may mean that transportation cost of imports is not that significant when importing goods and services to Uzbekistan. In terms of top five export partners, Turkey (15.3%) and Ukraine (10.5%) were replaced by EU27 and South Korea. Imports and exports with China almost offset each other. Turkey is the second popular destination for Uzbek exports. Whether transportation cost, agreements, etc. matters in terms of exports is a question of research and could be explained in detail in bilateral trade analysis. Major five trading partners of Uzbekistan are same as import partners but with different ranking.

Table 2.3: Uzbekistan's top 5 trading partners, 2011

Major Import partners		Major Export Partners		Major Trade partners	
Russia	19.7%	Russia	18.6%	Russia	19.3%
South Korea	17.6%	Turkey	15.3%	China	13.7%
EU27	17.4%	China	13.3%	EU27	13.7%

China	13.9%	Kazakhstan	12.3%	Kazakhstan	12.3%
Kazakhstan	12.3%	Ukraine	10.5%	South Korea	11.8%

Source: EUROSTAT

Obviously, Russia remains the first trading partner sharing one fifth of country's total trade. It can be explained by considering Russia as a succeeding state of the Soviet Union where primary shipment of Uzbek goods was sent to and the exchange between local merchants has existed for quite long time. It is important to mention that trade with South Korea has been astoundingly growing for the last five years offsetting the trade with Russia. A detailed description of trade with the Republic of Korea is provided in the next chapter.

2.3 Major exporting merchandize goods and services

'Uzbekistan is a sunny state'[16] which is good for agriculture and it is rich in natural resources. Most exported merchandize goods for the last ten years were cotton fiber, energy products, fresh fruits and vegetables, precious metals, automobiles and others. It is a leading exporter of various metals and cotton fiber. For the last decade, as can be seen in the graph 3.4, the composition of Uzbekistan's exports has changed merely. The share of cotton exports has shrunk over two-fold as the aim was to redirect dependence on cotton and shift from agriculture to industry. Energy exports have increased due to the foreign direct investment and the new projects signed to develop the field. After the

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[16] It is depicted in the background of the national Emblem of the Republic of Uzbekistan.
<http://www.uzbekconsulny.org/uzbekistan/state_symbols/>

global financial crisis in 2007, exports of aforesaid merchandize goods have increased sharply except for the cotton. However, share of automobiles and fresh fruit and vegetables remained constant in respect to other goods. In terms of exports of services, tourism, railway and air transportation systems make up more than a half of total services exported. The remaining are communication services, pipeline transportation services, other types of transport services and others. The largest share of services belongs to the air transportation services.

Graph 2.4 Composition of Merchandise Exports (%,2001-2010)
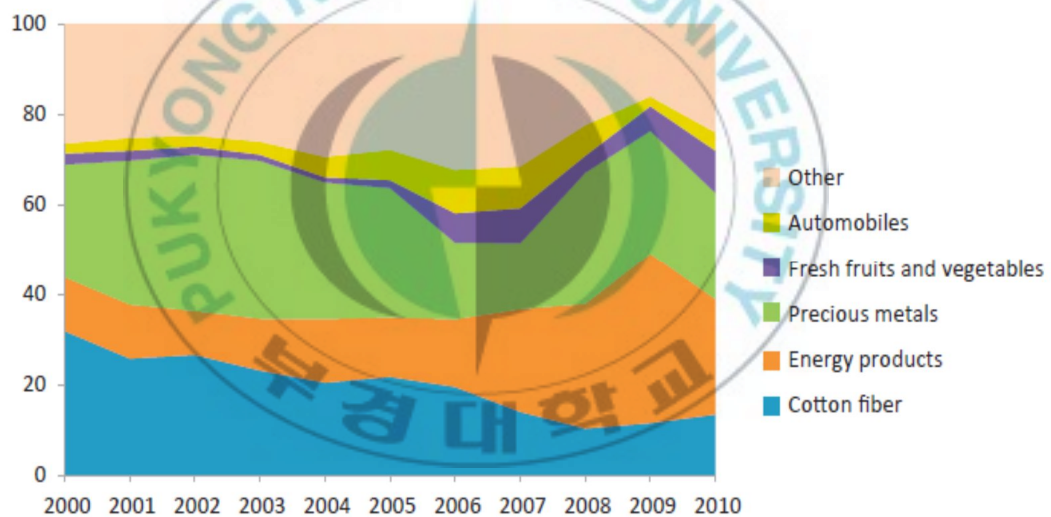
Source: The State Committee of the Republic of Uzbekistan on Statistics

*The graph is credited for Anderson and Klimov[17]

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[17] Anderson B. and Klimov Y. (2012). "Uzbekistan: Trade Regime and Recent Trade Developments"*, University of Central Asia.

2.4 Major importing merchandize goods and services

Beyond labor and capital, technology can also boost the size of economy and GDP. Uzbekistan imports goods under this phenomenon, in a sense. As can be seen in the graph 3.5 the country imports, in particular, machinery and equipment, means of transportation, metals, pharmaceutical and other chemical products, energy products and other goods. Around fifty percent of imported goods are metals, means of transportation and machinery and equipment. The vast import of these goods is encouraged by the tax exemptions on the imports of technological units used in manufacturing. Means of transportation imported can be categorized, according to the author, to trucks, public transports and other heavy load carrying transports rather than light automobiles. Imports of metals have grown in respect to other goods which remain same in the last years. Various types of services are imported as well. Among them are railway transportation, air transportation, tourism, communication services, and computer and information services, other types of transportation services and so on. A large portion (around 60%) of imported services in percent belongs to air transportation services. Railway and other transportation services, tourism, computer and information services, communication services make up around 20% in total. Other types of services have the same 20% share of total services imported.

Graph 2.5 Uzbekistan's Imports of Merchandize Goods (%, 2001-2010)
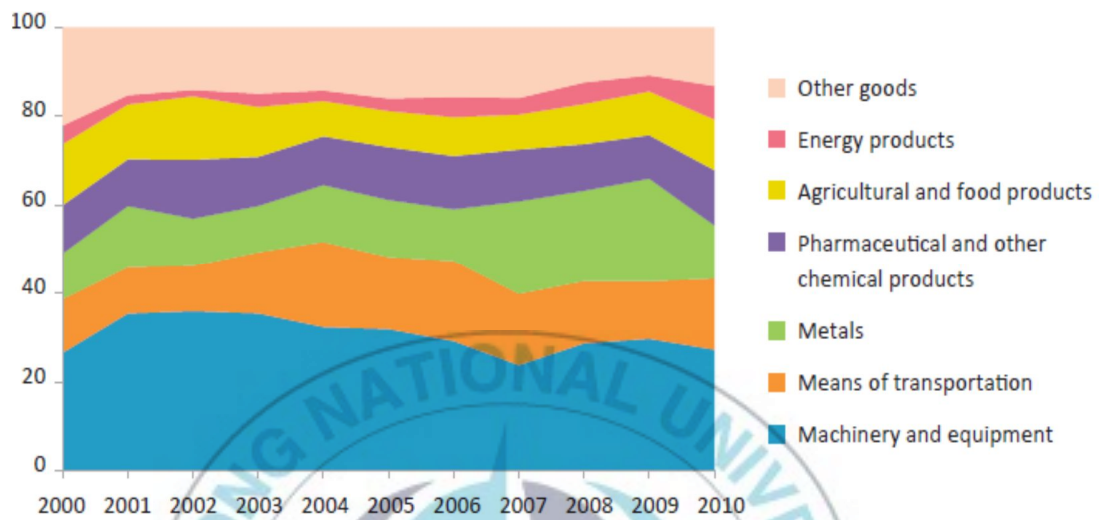
Source: The State Committee of the Republic of Uzbekistan on Statistics

*The graph is credited for Anderson and Klimov[18]

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[18] Ibid Anderson and Klimov (2012)

CHAPTER III UZBEKISTAN-KOREA BILATERAL ECONOMIC RELATIONS

Uzbekistan – home of the fourth largest Korean Diaspora after China, Japan and the United States – has been able to sustain strong economic ties with the Republic of Korea since it established diplomatic relations on 30th December, 1991[19]. Volume of trade and Korea's investment in Uzbekistan has grown considerably for the last five years of cooperation. In addition, a number of bilateral agreements in the areas of trade and economy have been signed. This chapter overviews the overall bilateral relations and focuses on describing the economic bilateral relations between two countries in details, in particular, in the sphere of micro and macro economy and FDI.

3.1 Overview of the relations

"Since the establishment of diplomatic relations the Republic of Korea has been and remains for Uzbekistan a time-tested and reliable, in all respect, strategic partner"[20]. South Korea was among first countries to admit the independence of Uzbekistan and establish diplomatic ties from the very beginning. Twenty years of trustful and close collaboration has given its fruits to both sides. A Parliamentary Association of Friendship Korea – Uzbekistan was established in 1995 by Korean side and reciprocally, Uzbekistan has established similar cooperative group in 2005. Joint declaration on Strategic Partnership was signed in 2006 in Seoul. Annual Korea-Central Asia Forum in areas of education, economy, culture and tourism has been held regularly since 2007[21]. Over two

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[19]Addressing speech of the ambassador Fen of Uzbekistan in Korea, 2012.
[20] Ibid. Fen
[21]Hwang, B. (2012). "A new Horizon in South Korea-Central Asia Relations: The ROK joins the 'Great Game'".

decades 200 legal documents of such kind have been concluded by both sides in various fields.

Deepening the cooperation with Central Asia, in particular with Uzbekistan, was accelerated after inaugurating the New Asia Initiative plan by the president Lee Myung-bak. 97% of South Korea's energy consumption depends on imports making it one of the most energy consumerist countries. Central Asian countries such as Azerbaijan, Kazakhstan and Uzbekistan are deemed to be promising sources of energy, in particular oil and gas and thus called as "Second Middle East" in terms of energy resources[22]. In 2009, Uzbekistan has signed five oil-and-gas deals with South Korea and currently Seoul is the largest investor in Uzbekistan[23]. While the benefit from the cooperation for the ROK was securing its energy supplies, Uzbekistan gained from myriad of large-and-small scale investments as well as the transfer of technology from Korea.

The presence of "*Koryoin*" – ethnic Koreans in Uzbekistan more or less played a role in deepening ties. Korean studies are taught in universities and high schools throughout the country and the introduction of "*hallyu*" –Korean Wave was well accepted in Uzbekistan. Korean cars, cell phones and dramas such as 'Jewel of Palace' and 'The Emperor of Seas' can easily be found in Uzbek homes[24]. Inter-state tourism is also becoming a popular trend in for both countries, in particular Uzbekistan. Various visa exemptions for travelers and business people alongside with above mentioned-factors are the proof of deep mutually beneficial and reliable relations between two states.

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[22] SAIS (2009). "US-Kkorea 2009 yearbook".

[23] Fumagali M. (2006). "Identity and intersts in Korea's policy towards Central Asia".
[24] Ibid SAIS

3.2 Bilateral Economic Relations in a Macroeconomic Scope

Trade between two countries has existed since the founding of the Silk Road. Since Gyeongju and Seokguram Grotto and Bulguksa Temple were located in the Silk Road during the Golden Age of Silla, alongside with Chinese silk, Korean goods were widely traded with and through ancient Central Asian cities such as Tashkent, Samarkand and Khiva. Some relics in the museum in Samarkand, Uzbekistan serve as clear facts of ancient trade between the two states[25].

Today, bilateral trade volume reaches 1,810 million US dollars making Korea one of the biggest trade partners treated under MFN tariff. However, a trade balance is quite disproportional. At present, Uzbekistan's exports to the ROK equal to around 40 million US dollars whilst imports make up 1,770 million US dollars. Korea mainly exports machineries, chemical products, electronics and imports agricultural products, textile, plastic, rubber, and leather goods. The negative trade balance can be offset by the inflow of technology to Uzbekistan and thus both sides gain from the trade.

As mentioned earlier, bilateral agreements signed after 2005 not only have secured the trade but also facilitated it. According to the graph 4.1, bilateral trade reached its peak point for the first time in 1997 declined gradually by 2003. The stimulus for the growth of trade could be as UzDaewoo automobile plant and the Daewoo Unitel Communication Company were launched in 1996 and demand for cellular phones and intermediary parts of car manufacturing may have grown[26].

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[25]Nematov Kh. (2013). "An explorative study on Bilateral Relations Between Uzbeksitan and Korea: History, Factors and Pospects".

[26] Telecompaper (2004, September 16). "Daewoo sells Uzbek operator to Germanos. Republic. of Korea".

Graph 3.1 Uzbek-Korean Bilateral Trade, US$100 (1992-2012)
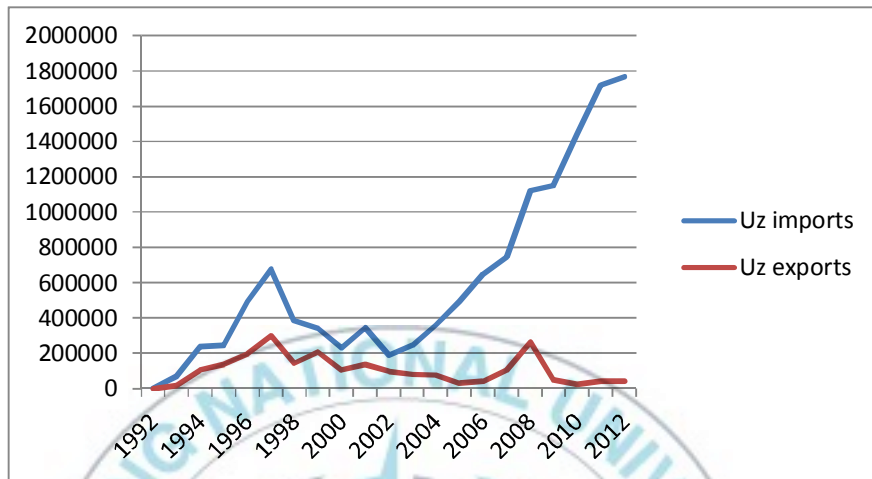
Source: KITA, 2013 (Korean International Trade Association)

Exports by the ROK has spiked since 2003 whereas Uzbek exports began to grow sharply after 2006 which can be attributed to signing bilateral agreements and strategic partnership in the same year. However, Uzbek exports saw a sharp decline to its former point in 2009 which can be considered as a consequence of global financial crisis. The table 4.1 provides a time-series numeric exposition of exports, imports and a trade balance including Foreign Direct Investment (FDI) from Korea.

Table 3.1: Exports, Imports, Trade Balance and the Korean FDI to Uzbekistan, US$1000

Year	UZB imports	UZB exports	Trade Balance	Korean FDI
1992	3361	326	-3035	…
1993	70096	17274	-52822	15000
1994	237281	105407	-131874	66300
1995	244246	134791	-109455	28549.433
1996	493833	196104	-297729	78136.596
1997	675113	297988	-377125	16033.103
1998	383974	142379	-241595	11266.656
1999	341422	208349	-133073	333.177
2000	230413	103989	-126424	17770
2001	345687	136726	-208961	60176.627
2002	188479	96812	-91667	461.995
2003	247138	78957	-168181	5252.168
2004	359048	76945	-282103	563.02
2005	493095	28828	-464267	8694.937
2006	649302	40087	-609215	22535.09
2007	748302	103890	-644412	70043.074
2008	1122592	262934	-859658	65152.166
2009	1149783	47410	-1102373	32322.971
2010	1438644	21979	-1416665	40643.162
2011	1718758	39822	-1678936	53190.838
2012	1766516	42362	-1724154	18781.537

Source: (a) export and import data are from Korean International Trade Association (KITA)[27],
(b) FDI data is from Export-Import Bank of Korea (EXIM Bank)[28].

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[27]www.kita.org

While total exports by Uzbekistan stagnated steadily, exports of some goods have increased in volume constantly for the past five years. Growing demand by Korea on manufactured goods, fertilizers, chemicals, textile yarn, and vegetables enabled Uzbek exports to grow from 2007 to 2011, chemical exports suffered from sharp decline in 2010 though.

Table 3.2 Uzbekistan's most exported goods to the Republic of Korea, US$1000 (2007-2012)

Year	Vegetables	Crude Materials	Textile Fibers	Textile Yarn	Chemicals	Fertilizers	Manufactured Goods
2007	231.5	26811.6	25462.6	10809.3	65224.4	2.6	10809.3
2008	132.4	11396.2	9099.5	13663.9	236815.3	-	14036.7
2009	28.6	2830.3	1547.5	13925.8	29660.0	155.9	14012.7
2010	123.7	4372.1	2822.5	15094.5	445.7	420.2	16527.2
2011	477.8	3385.6	593.0	16304.0	18981.5	1794.0	16335.7

*Source:*UNComtrade,2012

Crude materials export has shrunk over eight fold whereas the volume of textile fiber exports has plummeted around fifty times within five years. Herein, it is essential to mention that although in a smaller value, demand on fertilizers has gone up considerably. Import of manufactured goods to the industrial and export-driven Korea may seem unusual. However, since the GM motors engine plant in Tashkent is a successor of the former UZ-Daewoo plant, most of intermediary or final goods may have been exported to Korea. For the Korean side, exports have spiked due to the growing demand from Uzbek

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[28]www.koreaexim.go.kr

local consumers on automobile parts, smart phones and communication technologies, electronics, manufacturing equipment, light and heavy transport vehicles and intermediary inputs for local manufacturing. A retail trade of clothes made in Korea also sees a growing demand among Uzbek youth. Interestingly, growing bilateral trade volume is proportional to the increasing volume of Korea FDI to Uzbekistan.

3.3 Korean FDI to Uzbekistan

Korea's investment to Uzbekistan is immense and diverse. Energy Diplomacy, Korean Caravan and the New Asia Initiative of the ROK hoping that Azerbaijan, Kazakhstan and Uzbekistan will become major energy suppliers in the 21st century replacing the Middle East have not only poured the investment into natural resources sector but also a wide range of other sectors including transportation, finance, textile, telecommunications and social sector as well[29]. This large scale investment was spurred by the promotion of guarantee for the security of investment. A Bilateral Treaty for the Protection of Investment Rights was signed. Its main aim is to treat investors fair and equitable,to prohibit nationalization and expropriation of invested assets, to compensate for losses incurred by wars, riots and etc., to guarantee remittance of profit, capital gain and to proceed accruing from the sale or liquidation of investments[30]. In addition, Bilateral Agreement for the Avoidance of Double Taxation was also concluded by both sides. However, the flow of investment has fluctuated drastically over twenty years as can be seen in the graph 4.2.

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[29] Ibid SAIS (2009)
[30] Bilateral Treaties signed by Korea available on the homepage of the Korean Exim Bank.

Graph 3.2: Korean Foreign Direct Investment to Uzbekistan (1993-20012)

Korean FDI to Uzbekistan (US$ 1000)
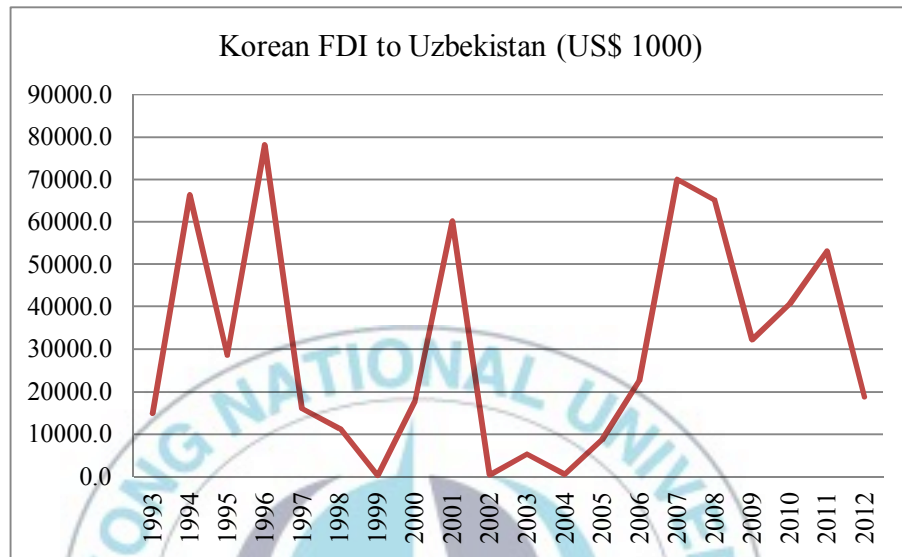
Source: Korean Export Import Bank (Korean EXIM bank), 2013

Korea commenced investing from the embryonic stage of independence in 1993. A sharp fall in investment to a quite small volume was in 1997 and continued till 1999. Obviously, the reason in the drop of investments was the Asian Financial Crisis in 1997 that hit the ROK severely including other South East Asian countries. The trend has spiked again in 2001 with a similar scenario of sharp decline in 2002. From 2004 to 2006, it went up sharply and steadily to 70 million US dollars and fell almost in half after the Global Financial Crisis. According to the Korean ExIm Bank, the investment was mainly directed to the areas of electricity, gas, steam and water supply, public administration and defense, compulsory social security, education, human health and social work activities, activities of household as employer; undifferentiated goods- and services- producing activities of households for own use, activities of extraterritorial organizations and bodies.

Notable investments were made especially in oil and gas industries, transportation sector, in particular in Free Economic Zones, education, financial as well as social sectors.

The both countries have signed 16 Memoranda of Understanding (MOU) to grant a right for Korean companies to develop oil and mineral resources and industrial infrastructure in Uzbekistan[31]. Korean National Oil Corporation (KNOC) and Korean Gas (KOGAS) Corporation are actively engaged in exploring and development oil-gas sites in cooperation with the Uzbek counterpart – a state owned Holding UzbekNeftGaz (UzbekOilGas). The prominent sites currently under exploration and development are Chust-Pap and Namangan-Terachi sites expected to be rich in oil and gas deposits. Another crucial investment made in partnership is the $4 billion project in Ustyurt Plateau to develop Surgil Gas Chemicals Complex. The project includes the construction of 2,300 kilotons per annum gas production wells, pipeline and delivery infrastructure, a gas separation plant and a chemical complex [32] . The shareholders of JV UzKorGasChemical are Honam Petrochemical Corporation, Korea Gas Corporation STX Energy Company Limited, and Uzbekneftegaz (UzbekOilGas).Moreover, Daewoo International also received permission to explore and develop Kushkuduk and Ashilbulok sites in the Plateau[33]. In the energy and mineral resources area, the Korea Resources Corporation is cooperating with Uzbek State Committee for Mineral Resources to develop the Zhantuar deposit site[34]. Korea Electric Power Corporation (KEPCO) made a

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[31]People's Daily Newspaper (2006, March 29). "S.Korea, Uzbekistan sign MoU on jointly developing oil, gas fields."
[32] ADB (2011) "Uzb: Surgil Natural Gas Chemicals"
[33]Peyrouse S. (2010),"South Korea's Advances Into Central Asia"
[34]Wise Uranium (2012), "New Uranium Mining Projects – Uzbekistan"

deal with Uzbek state to purchase uranium worth $400 million. It can be implied that Korea's priority investment is focused on natural resources.

In transportation sector, Korea's investment commitment is even more ambitious. In the central province of Uzbekistan, where there is a Navoi Free Industrial Economic Zone – a heart of gold and other mining deposits, Korea's Hanjin International Logistics Company is turning NavoiAirpot into International Logistic Hub. A parent company of Korean Air has invested in building residential Navoi Complex and a modern airport. Korean Air is the major cargo carrier delivering annually 100,000 tons of cargo worldwide which makes the Navoi Airport the largest logistic and cargo terminal in the region[35]. A large number of investments by itself create a necessity for the engagement of financial firms of Korea in Uzbekistan's financial system.

Therefore, the branch of the Korean Export-Import Bank began its activity from 2007. Initially, the bank invested US$ 120 million of long-term credits of which 14 million was directed to telecommunications system[36]. Korean Development Bank was launched in 2007 and since then has been expanding its presence in the region. Recently, it has purchased 82.35% stake in the Uzbek Unit of Royal Bank of Scotland for $16.5 million[37]. It is also aiming to open a new branch in the Navoi FIEZ. Korean Financial Corporation signed a MOU with the Uzbek state-owned bank UzPromStroyBank (Industrial and

[35]Odyssey Media Group (2012, March 21), "Hanjin Group's 'Navoi Project' To Develop Uzbekistan Navoi Airport Achieves Landmark"
[36] Central Bank of Uzbekistan, <www.cbu.uz>, <http://uzbek-banks.narod.ru/>
[37]Kanga Dong, *The Wall Street Journal,* (2011, December14) <http://online.wsj.com/article/BT-CO-20111214-717240.html>)

Construction Bank of Uzbekistan) in 2012[38]. The content of MOU is to provide financial support to resource development and other power projects through financing the projects and syndicated loans. A branch of Korea Bank (KB) is expected to be launched soon.

In education and social spheres, investments are mostly made by Korea's International Cooperation Agency (KOICA). Annually scholastic grants are given to the exchange of students and government officials to train and exchange knowledge. KEXIM bank provides US$106 million loan to renovate schools and colleges with modern equipments and facilities[39]. In 2007, Tashkent, the capital city of Uzbekistan, became the sister city of Seoul, the capital city of Korea[40]. For the sake of sister relationship, Mayors of the two cities agreed to construct a modern Seoul Park in the center of Tashkent which will illustrate the culture of Seoul.

In summary, the bilateral relations between the two partners have prospered and brought its broad engagement almost in all spheres starting from economic to socio-political areas. Time-tested and reliable partnership has attributed to the growth of bilateral trade volume and large-scale investments in natural resources, transportation, financial and social sectors. Energy and telecommunications sector remain in the core of mutually beneficial relations.

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[38]KoFC Press Release (2012 September 17). "KoFC signs MOU with Uzbekistan state-owned development bank"

[39] Ibid <http://uzbek-banks.narod.ru/>

[40] Seoul Metropolitan Govrnment,"Sisterhood relationship between Seoul and Tashkent: the first global initiative of Mayor Oh's new term"
<http://english.seoul.go.kr/gtk/cg/news_view.php?idx=10688&mcd=MN01040103&mode=prevData>)

CHAPTER IV INTERNATIONAL COMPETITIVENESS OF UZBEKISTAN'S MINING SECTORS USING INDICES OF REVEALED COMPARATIVE ADVANTAGE

4.1. Methods

A powerful tool of classical trade theory that drives the international trade and enables countries to export more goods increasing cash inflows to the economy is comparative advantage. That means a country with CA exports to the other which has comparative disadvantage[41]. CA has been developed from classical theoretical terms to current RCA indices that are widely used to determine the export capability of a country based on its trade, production and consumption.

In perspective of classical theorists such as Adam Smith, David Ricardo and Stuart Mill, there are certain factors that create advantage for a country over the other. Initially, Stuart Mill developed the absolute advantage idea that a nation with low cost production of a good and labor specialization will export. Later on, an absolute advantage theory was redefined by Ricardo positing that allocations of resources to the highest level of productivity and specialization will determine the CA. Ricardo mentions that a country can be an importer even if it is lowest cost producer[42].

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[41]Sanditas E. and Shin Y. (2010). "Comparision of Revealed Comparative Advantage Indices with Application to Trade Tendencies of East Asian Countries",

[42]Leishman D. and Menhaus D. J.(2013). "Revealed Comparative Advantage and the measurement of International Competiteveness for Agricultural Commodites: An Empirical Analysis of Wool Exporters",

Neoclassical theory and the New Trade Theory revolutionized the concept of CA. Factor-abundance theory was introduced by Heckscher-Ohlin (H-O) model assuming that country purse specialization based on the endowments – labor and capital - they are rich in. Labor abundant nations will export labor-intensive goods whereas capital-abundant nations will export capital-intensive commodities[43]. The New Trade Theory revealed that countries will still hold intra-industry trade so that they will have complete specialization.

Since the trade was determined under Autarky – the situation where economy is not influenced by external factors and closed in a sense – measurement of CA with numeric variables was impossible until Bella Balassa revealed a comparative advantage. Balassa claims that international trade indicators such as production, consumption, import and export help reveal CA of a country. In 1965 Balassa proposed a concept of RCA in relevance to CA in Autarky and an index to measure it[44]. Value of RCA indices show the level of CA or CD that a country has. The RCA indices are numerous and diverse, in fact Volrath states that there can be as many RCA indices as there are combinations and transformations of post-trade variables[45]. Regardless of criticism for the accuracy and preciseness of RCA indices by many researchers, Balassa's RCA indices still provide us with proper numeric values with respect to comparative advantage[46]. It is not determined which index is the best to analyze and all of them have own results. Therefore this research chooses the following indices:

[43]Memedovic O.(1994)."On the Theory and Measurement of Comparative Advantage: An Empirical Analysis of Yugoslav Trade in Manufactures with the OECD Countries
[44]Balassa, B(1965)."Trade Liberalisation and 'Revealed' Comparative Advantage",
[45]Volrath T. (1991). "A Theoretical Evaluation of Alternative Trade Intensity Measures of Revealed Comparative Advantage".
[46]ibid SANIDAS and SHIN.

1) Before Balassa introduced his RCA index first time in 1965, Leisner had initiated the simple formula to measure comparative advantage of the UK[47]. For the sake of sequence, RCA indices are indicated with number to show their order. The first one is as follows:

$$RCA_1 = X_{ij} / X_{nj}$$

In this formula, X denotes exports, *j* is a commodity (or industry) *i is* a country and *n* is a set of countries (in this paper it denotes the world).

The Leisner's index is designed to reveal the comparative advantage of exports by the country *i* in respect with a set of countries *n* (or the world). In other words, it shows the ratio of exports by a single country and a set of countries. Results take a value between 0 and 1. The interpretation of results is that the bigger the value, the bigger the share of exports (the bigger comparative advantage) is.

2) The second formula is the (somewhat modified) classical formula proposed by Balassa in 1965.

$$RCA_2 = \left(X_{ij} / X_{it} \right) \big/ (X_{nj} / X_{nt}) = \left(X_{ij} / X_{nj} \right) \big/ \left(X_{it} / X_{nt} \right)$$

In addition to the components of Leisner's index, the formula includes the data of total exports both by a single country and a set of countries. *X* means exports, *t* is

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[47]Ibid Seyman (2004)

total exports, *j* stands for commodity, *i* is a single country and *n* is a set of countries (in this research is means the world). The distinguishing feature of this index is that it aims to measure the ratio of the shares of exports of the commodity *j* by a single country and a set of countries in respect to their total exports. The results take positive values and if the value is less than unity, the comparative disadvantage is revealed. If the values are bigger than a unity, then a country is measured to have a comparative advantage. The value one means that the share of exports of a commodity j by a single country is equal to that of by a set of countries. Since the formula omits the import data, it is argued to have some bias[48].

3) As the omission of import values may cause argument over bias, it is essential to include the following Balassa's formula to avoid bias:

$$RCA_3 = \left(X_{ij} - M_{ij} \right) \big/ \left(X_{ij} + M_{ij} \right)$$

Here X stands for exports and M for imports, *i* is a single country and *j* is a commodity (or industry). The logic of the formula is to measure the ratio of trade balance and actual trade. The results take a value between 1 and -1. Positive values mean advantage and the closer the value to 1, the greater the advantage is. In contrary, negative values yield comparative disadvantage with the higher

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[48] Greenaway D. and Milner C. (1993). "Trade and Industrial Policy in Developing Countries: A Manual of Policy Analysis"

disadvantage in values closer to -1. However, it is mentioned by economists that the formula might have ambiguity around zero values[49].

4) The fourth RCA index, similar to the previous one, contains import values. However, it tends to measure the ratio of the shares of exports and imports of the commodity j in respect to total exports and imports. The formula is shown below:

$$RCA_4 = \left(X_{ij} / X_{it} \right) \Big/ \left(M_{ij} / M_{it} \right) = \left(X_{ij} / M_{ij} \right) \Big/ \left(X_{it} / M_{it} \right)$$

According to the formula, X and M denote exports and imports whereas j and t means certain commodity and total commodities. i is a single country. If the result is a positive value bigger than one, it means share of exports of a commodity j is greater than that of imports which is revealed advantage. If the result is a positive value but less than a unity, than the share of imports of the commodity j is greater than that of exports, which, in turn, reveals the comparative disadvantage.

5) The last RCA index yields Relative Trade Advantage by subtracting Relative Import Advantage from Relative Export Advantage[50]. Positive values mean trade advantage whereas negative values show trade disadvantage.

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[49]Utku and Seyman (2004) by referring Greenaway and Milner (1993) mention it in their work.
[50]Utku and Seyman (2004) used acronyms such as RTA for Revealed Trade Advantage, RXA for Revealed Export Advantage, and RMA for Revealed Import Advantage.

$$RCA_5 = RTA = RXA - RMA = \left(X_{ij}/X_{it}\right)\Big/\left(X_{nj}/X_{nt}\right) - \left(M_{ij}/M_{it}\right)\Big/\left(M_{nj}/M_{nt}\right)$$

*the components of this formula follow the same logic of previous indices.

4.2. Data

The data on exports and imports of mining commodities are used in time series. Data for this research is obtained from World Integrated Trade System (WITS) powered by World Bank and it comes under Harmonized System (HS) 1996 classifications of 2-digits[51]. Time series of data are from 1996 to 2011. The reason for the selection of 1996 as a base year is that Uzbekistan's economy started major turnover from this year on[52]. Precious metals, base metals, steel raw metals and other metals have been selected as commodities of mining[53] and their HS classifications are as follows:

HS1996 (Selected Classification)

HS25 – Salt, sulphur, earth & stone, plastering mat, and lime & cement

HS26 -- Ores, slag and ash.

HS27 -- Mineral fuels, oils and product of their distillation, etc.

HS28 -- Inorganic chemicals, compounds of precious metals, and radioactive elements.

HS68 -- Art of stone, plaster, cement, asbestos, mica and similar materials

HS71 – Natural &cultured pearls, precious stones & metals, and coin etc

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[51]www.wits.worldbank.com

[52]IMF, (1998) "Republic of Uzbekistan: Recent Economic Developments".

[53]www.infomine.com

HS72 -- Iron and steel.

HS73 -- Articles of iron or steel.

HS74 -- Copper and articles thereof.

HS75 -- Nickel and articles thereof.

HS76 -- Aluminum and articles thereof.

HS78 -- Lead and articles thereof.

HS79 -- Zinc and articles thereof.

HS80 -- Tin and articles thereof.

HS81 -- Other base metals; cermets; articles thereof.

As the intent of this study is to measure the comparative advantage of mining industry as a whole, 2-digit classification of aggregate commodities in relevant field is preferable to 4-digit and 6-digit classifications of specific commodities.

Uzbekistan is not a member of World Trade Organization (WTO) and has been under the status of an observer state since 1994[54]. In addition, Uzbekistan is not in the list of reporters in most of statistics sites including WITS World Bank and so on. Concerning this issue, data is collected basing on mirror data[55]. The Result of the study is not free from limitations. Most of mining commodities, in particular building stones such marble and granite etc, are heavy and thus traded locally or on intraregional-basis[56]. Only two countries – Kyrgyzstan and Tajikistan – are the members of WTO and the rest –

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[54]<http://www.wto.org/english/thewto_e/acc_e/a1_ouzbekistan_e.htm>
[55] Mirror data is when export and import data is obtained from the reporting data of Uzbekistan's partners.
In this regard partner's exports are regarded as Uzbekistan's imports and the vice versa
[56] Rassin A. (2012) "A comprehensive study of Marble industry in Afghanistan".

Afghanistan, Kazakhstan and Turkmenistan – are still observer states. This means the derived mirror data may not include all exports and imports of mining commodities of Uzbekistan.

4.3. Research findings

The analysis of different RCA indices has yielded nearly similar results despite slight difference on some industries. All five RCAs found that industries six (HS27, HS28, HS71, HS74, HS79, and HS81) industries have had comparative advantage over 16-year period whereas the restof the industries (HS25, HS26, HS68, HS72, HS73, HS75, HS76, and HS78) have had a disadvantage.

Table 4.0 List of industries with an advantage and a disadvantage.

Industries with comparative advantage	Industries with comparative disadvantage
HS27 – Inorganic chemicals; compounds of precious metals, radioactive elements, etc.	HS25 – Salt; sulphur; earth & stone; plastering mat; lime & cement
HS28 – Mineral fuels, oils & product of their distillation;etc.	HS26 – Ores, slag and ash.
HS71 – Natural/cultured pearls, precious stones & metals, coin etc	HS68 – Art of stone, plaster, cement, asbestos, mica/similar materials
HS74 – Copper and articles thereof	HS72 – Iron and steel.
	HS73 –Articles of iron or steel.
	HS75 –Nickel and articles thereof.
HS79 – Zinc and articles thereof.	HS76 –Aluminum and articles thereof.
HS81 – Other base metals; cermets; others	HS78 – Lead and articles thereof.

For the sake of sequence and simplicity, the outcomes are given in order with the RCA formulas in complete tabular forms and bar graphs containing overall mean of the sector.

I. Empirical results of RCA 1

The purpose of RCA 1 is to find the share of Uzbekistan's exports of mining commodities in respect with their world exports. The higher the value of RCA 1 is, the bigger the share is. During the period between 1996 and 2011, the industry with the highest share of world exports was Zinc and articles thereof (HS79), Mineral fuels, oils & product of their distillation (HS28), and Copper and articles thereof (HS74) have had almost similar high shares of exports in the world market. Other industries have had minimal shares except for natural & cultured pearls, precious stones & metals, and coin etc. (HS71) and other base metals, cermets, articles thereof (HS81). Graph 4.1 illustrates a complete picture of shares of all the industries.

Graph 4.1: Sectoral mean of RCA 1, 1996-2011
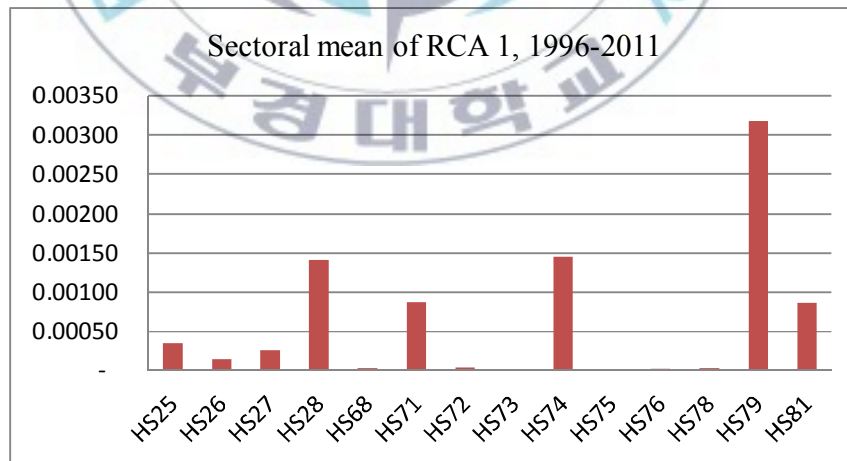
Source: Author's own calculatio

Table 4.1: The results of the calculation of RCA 1, 1996-2011.

Years	HS25	HS26	HS27	HS28	HS68	HS71	HS72	HS73	HS74	HS75	HS76	HS78	HS79	HS81
1996	0.0000018	0.0000636	0.0000003	0.0003221	0.0000003	0.0007271	0.0000002	0.0000004	0.0010970	-	0.0000077	-	0.0007004	0.0003856
1997	0.0000149	0.0000138	0.0000143	0.0005467	0.0000269	0.0011470	0.0000377	0.0000020	0.0012880	0.0000196	0.0000700	-	0.0015090	0.0018050
1998	0.0000324	0.0000387	0.0001471	0.0005824	0.0000376	0.0004534	0.0000230	0.0000020	0.0007879	0.0000041	0.0000122	0.0000892	0.0034070	0.0015800
1999	0.0000837	0.0000637	0.0000200	0.0002607	0.0000141	0.0006890	0.0000526	0.0000031	0.0005491	0.0000032	0.0000078	-	0.0016180	0.0005032
2000	0.0002769	0.0005892	0.0002417	0.0003646	0.0000558	0.0010220	0.0000864	0.0000036	0.0006128	0.0000183	0.0000040	0.0001779	0.0057370	0.0003422
2001	0.0000650	0.0000543	0.0003257	0.0008471	0.0000151	0.0014350	0.0000761	0.0000028	0.0015440	0.0000252	0.0000030	-	0.0051700	0.0005184
2002	0.0000682	0.0003784	0.0001289	0.0002705	0.0000247	0.0023990	0.0000543	0.0000018	0.0012380	0.0000113	0.0000079	0.0000166	0.0031650	0.0003584
2003	0.0000823	0.0004420	0.0001567	0.0006078	0.0000212	0.0014240	0.0000607	0.0000037	0.0018230	0.0000027	0.0000034	0.0001062	0.0025460	0.0001356
2004	0.0001463	0.0004785	0.0001906	0.0008760	0.0000196	0.0014050	0.0000830	0.0000028	0.0017000	0.0000148	0.0000054	0.0000540	0.0021930	0.0018270
2005	0.0003010	0.0000448	0.0003075	0.0014580	0.0000179	0.0009642	0.0000753	0.0000046	0.0021770	0.0000031	0.0000160	0.0000271	0.0018400	0.0009875
2006	0.0004859	0.0000151	0.0003462	0.0018520	0.0000228	0.0003721	0.0000024	0.0000037	0.0018070	0.0000026	0.0000103	0.0000000	0.0028210	0.0007427
2007	0.0015160	0.0000422	0.0004052	0.0034390	0.0000430	0.0004144	0.0000975	0.0000026	0.0019030	0.0000000	0.0000199	0.0000000	0.0050860	0.0011350
2008	0.0011250	0.0000349	0.0005265	0.0022060	0.0000406	0.0005919	0.0000794	0.0000049	0.0015890	0.0000010	0.0000429	0.0000019	0.0044860	0.0011790
2009	0.0006078	0.0000801	0.0008108	0.0033740	0.0000368	0.0002592	0.0000332	0.0000103	0.0014270	0.0000001	0.0000264	0.0000008	0.0031810	0.0009590
2010	0.0003979	0.0000017	0.0003096	0.0033680	0.0000319	0.0003737	0.0000235	0.0000137	0.0016310	0.0000001	0.0000480	0.0000001	0.0039990	0.0008502
2011	0.0004845	0.0000025	0.0003002	0.0022180	0.0000535	0.0002208	0.0000061	0.0000043	0.0019560	-	0.0000591	0.0000306	0.0033160	0.0004541

Source: Author's own calculations

II. Empirical results of RCA 2

The intent of Balassa's classical RCA was to compare the shares of the exports of mining commodities by Uzbekistan and the world relative to their total exports. The values, smaller than a unity, revealed the comparative disadvantage whereas the higher values yielded an advantage. According to the results from this formula, all the mining industries have had comparative advantages during the observed years. Zinc industry has had a strong advantage (3173.387), followed by minerals, fuels, oil industries (1445,63) and a copper industry (1412.115). The industries with the smallest advantages were natural andcultured pearls, precious stones & metals, and coins (1.0363), articles of iron or steel (4.140343) and nickel and articles thereof (6.635312). See the graph 4.2 for other industries.

Graph 4.2: Sectoral mean of RCA 2, 1996-2011
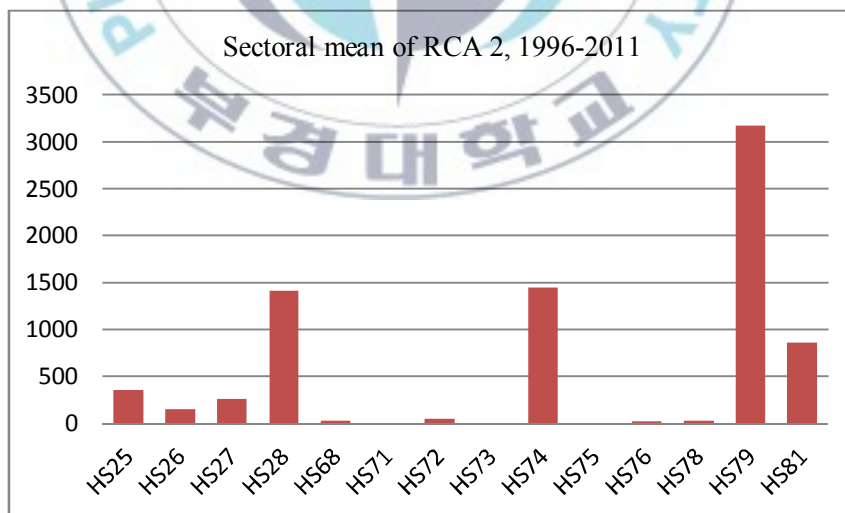
Source: Author's own calculations

Although the advantage of the Zinc industry (HS79) has fluctuated and had a sharp decline in 2005, it increased as a whole. The industry has revealed the highest advantages in 2000 and 2007. The second increasing advantage was observed in the industry of mineral fuels, oils, & products of their distillation. In 2007 its share of exports was 200 times bigger than that of the world. The exports of mineral fuels and oil grew constantly since 2002 with a slight decline in 2008. Copper mining and exporting were advantageous for Uzbekistan and its exports rose from 1000 times of world shares to 2000. Other base metals, cermets and article thereof have been advantageous and fluctuating. However, the advantage has remained almost similar with its initial point in 1992.

Graph 4.3: Sectors with the most comparative advantage, 1996-2011
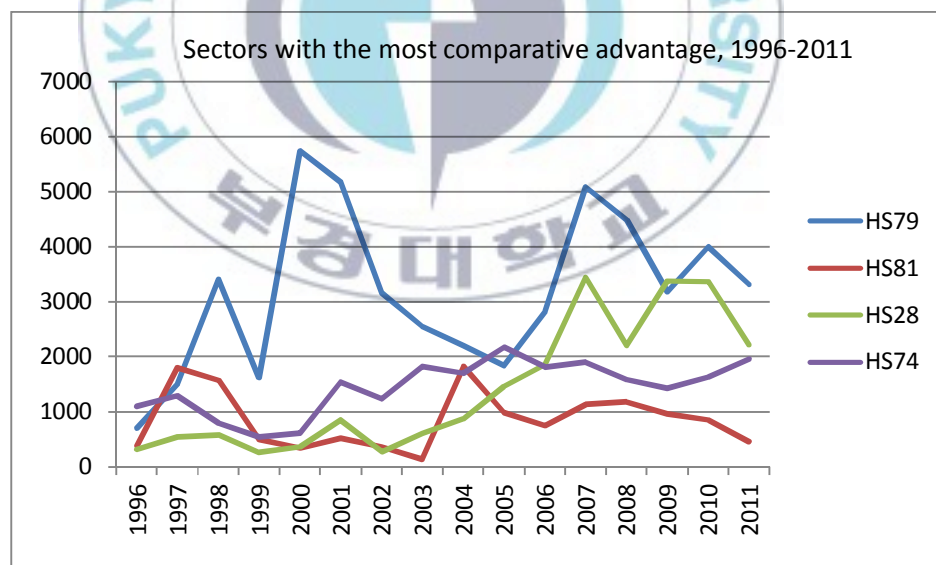
Source: Author's own calculation

Table 4.2: The results of the calculation of RCA 2, 1996-2011.

Years	HS25	HS26	HS27	HS28	HS68	HS71	HS72	HS73	HS74	HS75	HS76	HS78	HS79	HS81
1996	1.827115	63.6083	0.301522	322.0514	0.300167	1.4472E-13	0.21797	0.357659	1096.99	0	7.672551	0	700.3674	385.625
1997	14.86163	13.77351	14.30979	546.6969	26.89499	6.5057E-13	37.6647	1.995815	1287.798	19.56208	69.98659	0	1509.249	1804.656
1998	32.37646	38.64543	147.0592	582.4399	37.58149	6.4417E-15	23.03365	2.022018	787.9137	4.120496	12.17115	89.16355	3407.26	1579.895
1999	83.72423	63.71312	19.94629	260.7284	14.11854	6.8755E-13	52.54975	3.08222	549.0814	3.233064	7.814536	0	1618.051	503.1904
2000	276.8609	589.2447	241.7263	364.6099	55.7873	5.8106E-15	86.41954	3.638511	612.8088	18.31616	4.005296	177.871	5736.61	342.2347
2001	64.96169	54.30999	325.7385	847.1187	15.06499	1.5297E-14	76.04734	2.786583	1544.277	25.15376	2.974039	0	5170.371	518.3659
2002	68.23825	378.4485	128.9434	270.4542	24.6637	1.144E-13	54.32683	1.787222	1238.104	11.28553	7.92808	16.56581	3165.002	358.4344
2003	82.29428	442.0115	156.657	607.8085	21.23812	1.9236E-14	60.66931	3.65893	1823.448	2.693724	3.351312	106.1718	2545.779	135.6493
2004	146.3163	478.5441	190.6268	876.0115	19.63265	9.5994E-15	83.03865	2.789391	1699.616	14.8445	5.353354	54.01354	2192.602	1827.191
2005	300.9505	44.74561	307.495	1457.622	17.89849	2.8524E-15	75.33643	4.570694	2176.949	3.084051	15.94645	27.10173	1840.415	987.4994
2006	485.8936	15.05917	346.2099	1852.177	22.81032	1.4894E-16	2.410023	3.687695	1806.783	2.639589	10.29031	0.025814	2820.871	742.6772
2007	1515.618	42.14625	405.2252	3439.379	43.00015	1.3758E-16	97.54297	2.627809	1902.829	0.032453	19.87917	0.003129	5086.418	1134.679
2008	1125.429	34.87122	526.5005	2206.269	40.60456	5.0628E-16	79.43302	4.935473	1588.814	1.031749	42.89015	1.9076	4485.505	1178.555
2009	607.7882	80.12289	810.8286	3373.598	36.75322	1.8031E-16	33.21447	10.27316	1427.31	0.051912	26.37738	0.764669	3180.697	958.9837
2010	397.8836	1.748967	309.6225	3368.499	31.86375	4.1745E-16	23.49837	13.72159	1630.914	0.115938	47.94709	0.109535	3999.198	850.1916
2011	484.512	2.452468	300.2086	2218.374	53.46432	1.9192E-16	6.069209	4.31072	1956.448	0	59.13555	30.55189	3315.792	454.0674

Source: Author's own calculations

III. Empirical results of RCA 3

Unlike other indices, RCA 3 index found clear-cut results. As it included import values, results are yielded in negative and positive values between -1 and 1. Negative values indicate comparative disadvantage and the positive values mean the opposite. We can interpret the results in percent. For 16-year period, the industry of Zinc (HS79) has had 98% advantage, the industry of copper (HS74) has been advantageous with 93%, other base metals, and cermett (HS81) (84%) and the industry of pearl, natural fuel, oil(78%) had strong advantages. Other two industries inorganic chemicals, compounds of precious metals, and radioactive elements, etc. (HS27) and mineral fuels, oils and product of their distillation (HS28) have had 59% and 46% advantage. The most disadvantageous industries were articles of iron or steel (HS73) (-98%), and lead and articles thereof (HS78) (-87%). The following graph 4.3 has a complete comparison of advantages and disadvantages.

Graph 4.3 Sectoral mean of RCA3, 1996-2011
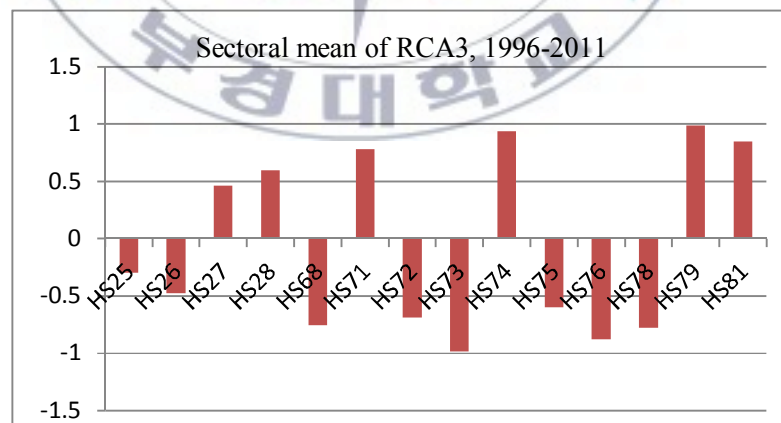
Source: Author's own calculations

According to the results yielded from RCA3, the competitiveness of Uzbekistan in the industries of copper and zinc has been observed throughout all years. And their comparative advantage was over 90% for all years implying that the exports of these commodities have almost completely outweighed the imports. The competitiveness in the exports of natural and cultured pearls, precious stones, metals, and coins (HS71) has plummeted from 95% initially to 36% in 2010. Despite the sharp decline in export advantage of other base metals and the articles thereof in 2003, at the end of the last decade it went up again to 95%.

Graph 4.4: Sectors with the most comparative advantage, 1996-2011
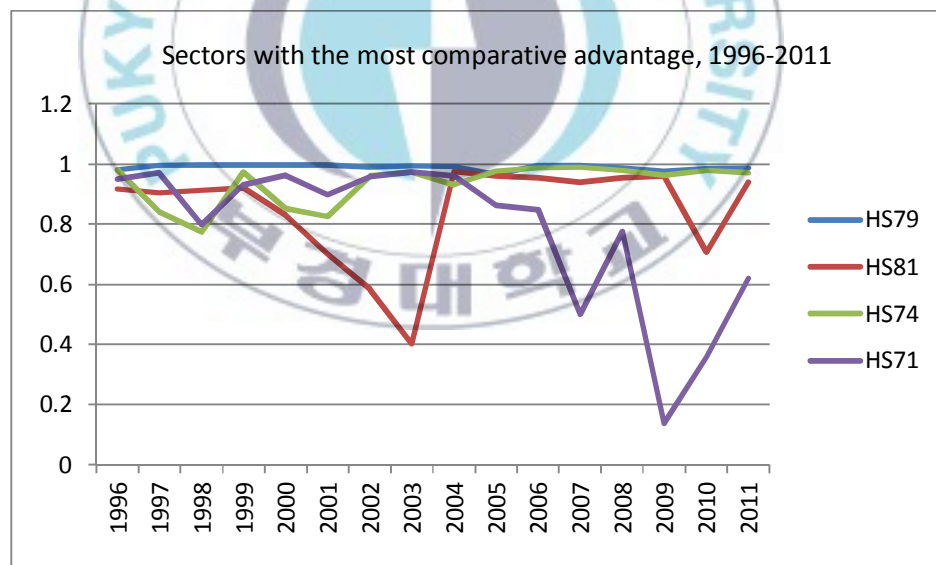
Source: author's own calculations

Table 4.3: The results of the calculation of RCA 3, 1996-2011.

Years	HS25	HS26	HS27	HS28	HS68	HS71	HS72	HS73	HS74	HS75	HS76	HS78	HS79	HS81
1996	-0.93979	0.780433	-0.87358	0.619116	-0.99566	0.950092	-0.99588	-0.9978	0.981954	-1	-0.88452	-1	0.981224	0.917128
1997	-0.84546	-0.96464	0.015689	0.139165	-0.88593	0.97016	-0.70071	-0.99395	0.84122	-0.20296	-0.60703	-1	0.996146	0.90439
1998	-0.92787	-0.84775	0.785706	0.342237	-0.77764	0.798055	-0.79005	-0.99064	0.774298	-0.61016	-0.90394	-0.35052	0.998212	0.912493
1999	-0.3132	0.133373	0.200451	0.154788	-0.85697	0.93133	-0.46859	-0.99138	0.971992	-0.73537	-0.88034	-1	0.996755	0.921087
2000	-0.28774	-0.01636	0.294374	0.225823	-0.46526	0.961929	-0.30557	-0.98229	0.852661	0.412957	-0.95183	0.275399	0.997661	0.830045
2001	-0.76076	-0.82693	0.758632	0.563126	0	0.898735	-0.45233	-0.99173	0.825064	0.058381	-0.97253	-1	0.997582	0.701188
2002	-0.69532	-0.18025	0.627732	0.105316	-0.8414	0.957835	-0.59296	-0.99181	0.959637	-0.39157	-0.90964	-0.83202	0.990176	0.584127
2003	-0.52718	-0.14216	0.592248	0.598846	-0.82245	0.971978	-0.59103	-0.97975	0.972684	-0.78296	-0.9644	-0.35236	0.994104	0.402847
2004	-0.43787	-0.05412	0.679285	0.706008	-0.87111	0.961421	-0.48409	-0.99011	0.931258	-0.21187	-0.94312	-0.62471	0.991442	0.974854
2005	0.012328	-0.69853	0.778139	0.81412	-0.84537	0.862997	-0.57938	-0.97815	0.976859	-0.77871	-0.86877	-0.71348	0.964452	0.960294
2006	0.20637	-0.93634	0.773334	0.793795	-0.82483	0.848744	-0.98199	-0.98805	0.986745	-0.48303	-0.92457	-0.99974	0.996221	0.955009
2007	0.574916	-0.89413	0.555487	0.934742	-0.70842	0.500995	-0.58095	-0.99575	0.989261	-0.9949	-0.88498	-0.99998	0.995166	0.939852
2008	0.447225	-0.78298	0.661335	0.882216	-0.79005	0.775707	-0.65936	-0.99293	0.978337	-0.91062	-0.82587	-0.99296	0.987739	0.95338
2009	-0.09962	-0.201	0.697386	0.885984	-0.95029	0.136571	-0.89184	-0.98959	0.962669	-0.99821	-0.91607	-0.99336	0.977019	0.960561
2010	-0.22095	-0.97996	0.349619	0.910998	-0.72378	0.360323	-0.92108	-0.94962	0.9784	-0.99276	-0.79258	-0.99958	0.985581	0.70696
2011	0.004375	-0.98104	0.468579	0.842889	-0.75339	0.6193	-0.9788	-0.98563	0.971346	-1	-0.75782	-0.90506	0.987857	0.940405

Source: Author's own calculations

IV. Empirical results of RCA 4

The logic of applying the fourth index was to find the ratio of the shares of exports and imports in respect with total exports by Uzbekistan. The results yielded indicate that the commodities of eight industries (HS25, HS26, HS68, HS72, HS73, HS75, HS76, and HS78) have been imported more than exported. That is why they have had a disadvantage during the observed 16-year period. The commodities of the other six industries have been imported with an advantage and the share of those exports overweighs the share of imports several times: Inorganic chemicals; compounds of precious metals, radioactive elements, etc.(4.742254) have four times bigger export shares; mineral fuels, oils & product of their distillation; etc. (10.53418) ten times; natural/cultured pearls, precious stones & metals, coin, etc. (27.02808) twenty seven times; copper and articles thereof (74.85154) seventy four times; other base metals, cermets, and articles thereof. (28.81036) twenty eight time, and zinc and articles thereof have had strong (371.3735) advantage.

Graph 4.5: Sectoral mean, RCA 4, 1996-2011
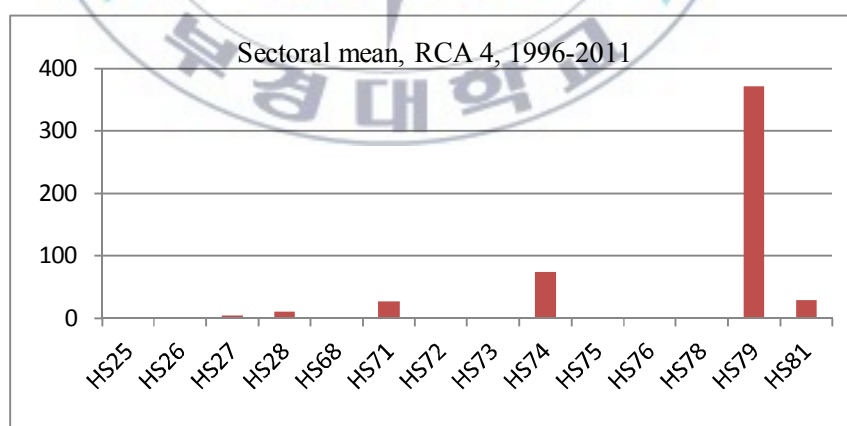
Source: Author's own calculations

The share of exports of zinc, as revealed from the previous indices, has had a strong advantage and the competitiveness of the industry was at its peak in 1998 with shares of exports 823 times bigger than imports. The advantage in exporting copper and the articles thereof over imports was the second largest followed by other base metals. The competitiveness of salt, sulphur, earth and stones, plastering materials, lime and cement gained advantage from 2005 and was competitive nearly all the following years. The exports of inorganic chemicals; compounds of precious metals, radioactive elements and mineral fuels and oil were advantageous as well. However, their advantage was not as strong as the top three industries though it was stationary through all years. Zero values emerged due to the missing data in those years and can be neglected from analysis.
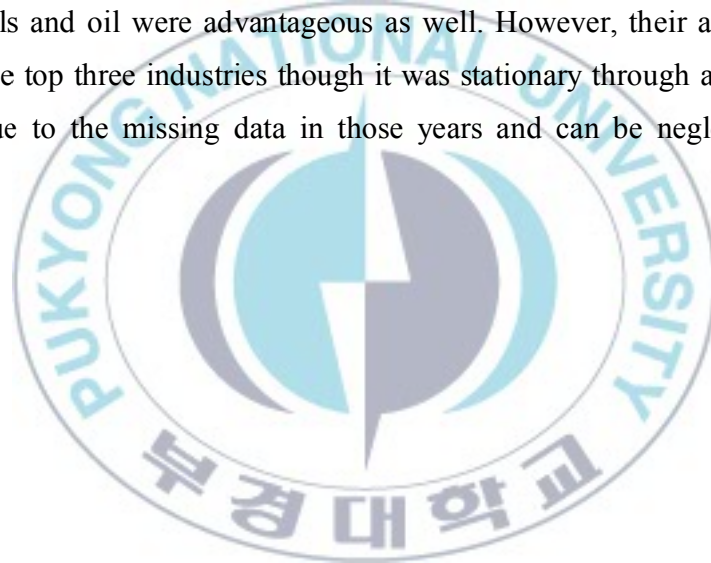
Table 4.4: The results of the calculation of RCA 4, 1996-2011.

Years	HS25	HS26	HS27	HS28	HS68	HS71	HS72	HS73	HS74	HS75	HS76	HS78	HS79	HS81
1996	0.028737	7.506733	0.062464	3.935312	0.002011	36.17239	0.001912	0.001018	101.6721	0	0.024188	0	41.65337	9.131868
1997	0.061659	0.013253	0.759808	0.974409	0.044536	48.6165	0.129577	0.002233	8.538586	0.487866	0.226374	0	479.4377	18.43937
1998	0.033079	0.072846	7.367159	1.8041	0.11059	7.871741	0.103693	0.004156	6.950116	0.214048	0.03715	0.354113	823.0272	16.09289
1999	0.413912	1.035029	1.188258	1.081305	0.06096	22.25886	0.286375	0.003424	55.72367	0.120688	0.056261	0	543.9723	21.52287
2000	0.530163	0.927656	1.758264	1.517702	0.349808	49.3951	0.509829	0.008566	12.0525	2.307058	0.019533	1.393025	675.9162	8.521972
2001	0.155585	0.108475	8.343019	4.096993	1.145058	21.47004	0.431798	0.004752	11.9461	1.287046	0.01335	0	791.7991	5.45699
2002	0.24651	0.952675	5.997485	1.694566	0.118142	63.68945	0.350485	0.005641	66.59455	0.599722	0.054184	0.10499	231.9683	4.361708
2003	0.357857	0.868123	4.513536	4.606784	0.112607	81.34143	0.297109	0.011822	83.47367	0.140699	0.024857	0.656882	463.8975	3.222304
2004	0.411017	0.943382	5.504881	6.10082	0.072421	53.45168	0.365472	0.005223	29.53638	0.683728	0.033835	0.266994	268.9813	90.77398
2005	1.010336	0.174954	7.90027	9.620367	0.082597	13.40418	0.262521	0.010886	84.20778	0.122635	0.073825	0.175802	58.09866	51.90487
2006	1.127117	0.024378	5.801108	6.450298	0.071179	9.062961	0.006736	0.004458	111.1402	0.258476	0.038636	0.000126	520.7407	42.83277
2007	3.383977	0.051049	3.196145	27.07926	0.155887	2.747382	0.242101	0.001943	169.1911	0.002335	0.045243	9.14E-06	306.0496	23.91392
2008	3.629905	0.168756	6.801355	22.15604	0.162611	10.97651	0.284615	0.004916	126.6155	0.064861	0.087105	0.003225	148.0737	38.27
2009	1.355588	1.101419	9.286191	27.38521	0.042197	2.179293	0.094651	0.008664	87.04017	0.001485	0.060734	0.004616	119.2755	68.92288
2010	0.939731	0.014909	3.056197	31.62261	0.236004	3.131983	0.060505	0.038058	134.8976	0.005354	0.191561	0.000352	227.9817	9.643673
2011	1.584247	0.015029	4.339916	18.42112	0.220884	6.679852	0.016821	0.011369	108.0446	0	0.202909	0.073396	241.1038	47.95365

Source: Author's own calculations

RCA5

The last index has revealed the trade advantage and disadvantage of the observed industries. Similarly to the previous indices, the seven industries have been found disadvantageous and have had negative trade balance. The mean of these industries during the observed years are as follows: HS25 (-0.1635), HS68 (-0.46529), HS72 (-0.27115), HS 73 (-1.12549), HS 75 (-0.01917), HS76 (-0.44749) and HS 78 (-0.15361). Advantageously traded commodities are of the industries: HS 26 (0.242314), HS 27 (4.742254), HS28 (0.885813), HS71 (1.469165), HS74 (1.797519), HS79 (6.459451) and HS81 (1.568789).

Graph 4.5: Sectoral mean, RCA5, 1996-2011
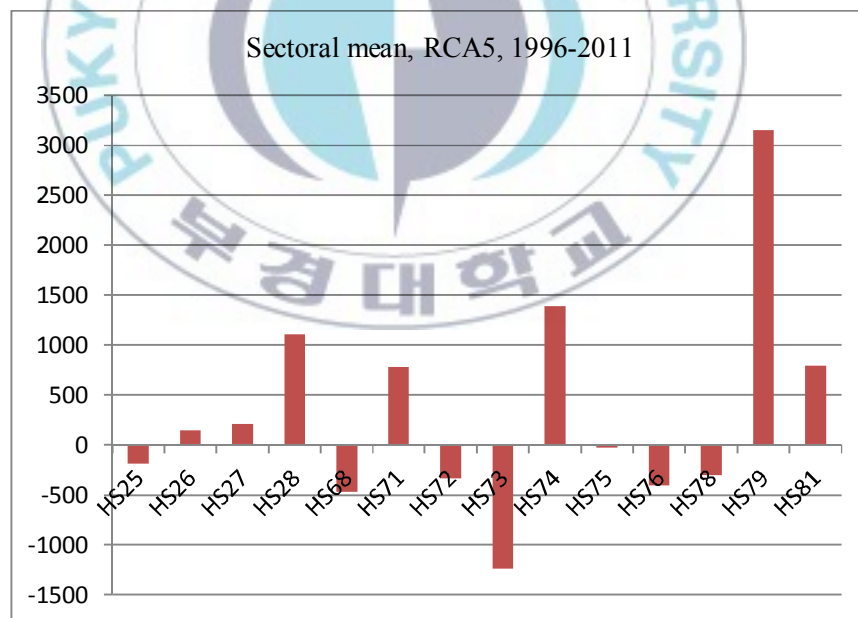
Source: Author's own calculations

If we look into the fluctuation of competitiveness in advantageous industries, it is crucial to mention that the industry of mineral fuels, oil and the products thereof has consolidated competitiveness for the last five years. Contrary to it, the advantage of copper industry has weakened during these years. The trend of advantage in zinc exports was almost flat and stationary competitive.

Table 4.5: The results of the calculation of RCA 5, 1996-2011.

Years	HS25	HS26	HS27	HS28	HS68	HS71	HS72	HS73	HS74	HS75	HS76	HS78	HS79	HS81
1996	-0.08803	0.248945	0.062464	0.847538	-0.5385	2.395557	-0.36314	-1.19262	3.672872	-0.00535	-0.81864	-0.00896	1.788227	0.926306
1997	-0.52478	-0.02678	0.759808	0.272214	-2.6798	5.051338	-1.05349	-4.12419	5.108019	-0.06411	-0.95677	-0.31497	5.651638	6.442621
1998	-0.96223	0.076138	7.367159	0.555577	-0.56154	0.728276	-0.32759	-0.87219	1.230387	-0.02259	-1.47655	-0.74019	15.98493	7.018117
1999	-0.82765	0.461272	1.188258	0.352973	-1.52138	4.615054	-0.83318	-6.09082	3.759503	-0.15315	-0.26661	-0.01042	3.110799	0.927295
2000	-0.18828	0.60398	1.758264	0.149545	-0.11139	0.994168	-0.07236	-0.42397	0.56096	0.012256	-1.4628	0.512768	45.31194	2.441204
2001	-0.16535	0.083136	8.343019	0.742563	0.001523	1.532607	-0.09831	-0.66834	1.588295	0.0108	-0.20707	-0.38327	5.162377	0.436896
2002	-0.17394	0.604059	5.997485	0.20106	-0.29742	3.654501	-0.14589	-0.50629	1.886441	-0.00642	-0.16214	-0.13807	3.665186	0.334707
2003	-0.08279	0.541223	4.513536	0.57851	-0.20529	1.650184	-0.15874	-0.3732	2.114113	-0.01302	-0.21627	-0.05314	4.171266	0.161352
2004	-0.05152	0.474671	5.504881	0.684596	-0.24138	1.258545	-0.1201	-0.51461	1.500377	-0.00214	-0.2005	-0.14524	2.843758	2.355906
2005	0.004706	0.092718	7.90027	1.046544	-0.16317	0.707266	-0.15635	-0.35055	1.697729	-0.01283	-0.21347	-0.1048	1.787475	0.960199
2006	0.028385	0.071004	5.801108	0.864295	-0.16623	0.178607	-0.18185	-0.47346	0.966229	-0.00252	-0.2285	-0.15249	2.442357	0.631212
2007	0.058375	0.093756	3.196145	1.561498	-0.11096	0.122401	-0.1286	-0.6626	0.886621	-0.00519	-0.23853	-0.16865	2.945622	0.635955
2008	0.08863	0.132659	6.801355	1.112577	-0.11842	0.28153	-0.094	-0.54825	0.826919	-0.00621	-0.22635	-0.24925	2.149384	0.55749
2009	0.032893	0.138659	9.286191	2.031893	-0.54715	0.079082	-0.19325	-0.76418	0.875774	-0.0187	-0.19694	-0.07664	1.49087	0.44679
2010	0.093687	0.126498	3.056197	1.936881	-0.06339	0.149903	-0.21038	-0.20928	0.956565	-0.01058	-0.14498	-0.20624	2.780356	0.54511
2011	0.14187	0.155081	4.339916	1.234743	-0.1202	0.107617	-0.20117	-0.23321	1.129497	-0.00691	-0.14372	-0.21825	2.065035	0.279464

Source: Author's own calculations

Table 4.6: The RCA means by sectors

	HS25	HS26	HS27	HS28	HS68	HS71	HS72	HS73	HS74	HS75
RCA1	0.000356	0.000146	0.000264	0.001412	2.89E-05	0.0008686	4.95E-05	4.14E-06	0.001446	6.64E-06
RCA2	355.596	146.4654	264.4624	1412.115	28.8548	1.0363E-13	49.46701	4.140343	1445.63	6.635312
RCA3	-0.30066	-0.47452	0.460276	0.594948	-0.75703	0.7816359	-0.68591	-0.98682	0.934649	-0.60136
RCA4	0.954339	0.873667	4.742254	10.53418	0.186718	27.028084	0.215263	0.007946	74.85154	0.3935
RCA5	-0.1635	0.242314	4.742254	0.885813	-0.46529	1.4691648	-0.27115	-1.12549	1.797519	-0.01917

Source: Author's own calculation

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4.4 Conclusion of RCA analysis on mining industry of Uzbekistan

To conclude the analysis of RCA measurements, it is important to mention that beyond the results obtained from the various indices, the research has tested the reliability and biasedness of these five indices. The outcomes were almost synchronized across all indices. So, regardless of their analytical purposes, five indices are found unbiased and yielded similar results. RCA 1 has revealed that the industries Zinc and articles thereof (HS79), Mineral fuels, oils & product of their distillation (HS28), and Copper and articles thereof (HS74) have high advantage and competitiveness in the world markets. RCA 2 has found Zinc industry with a strong advantage (3173.387), followed by minerals, fuels, oil industries (1445,63) and a copper industry (1412.115).RCA 3has given us results in percent of the industry of Zinc (HS79) with 98% advantage, and the industry of copper (HS74) with 93% advantage. RCA 4 shows that the competitiveness of salt, sulphur, earth and stones, plastering materials, lime and cement gained advantage from 2005 and was competitive nearly all the following years. RCA 5 cut clear results and advantageously traded commodities are of the industries: HS 26 (0.242314), HS 27 (4.742254), HS28 (0.885813), HS71 (1.469165), HS74 (1.797519), HS79 (6.459451) and HS81 (1.568789). According to the all formulas, industries of zinc was the strongly advantageous, and the industries of inorganic chemicals, compounds of precious metals, radioactive elements, mineral fuels and oil, natural pearls, precious stones and metals, copper, and other base metals are found to have an advantage and competitiveness in trade. The rest of the observed industries have had a disadvantage as the imports exceeded the exports of the products in these industries. Some industries (HS25, HS68, HS72, HS73, HS76, HS78 and HS75) have had high fluctuations and weakened or lost their competitiveness over the years. This can be attributed to various reasons such the

technological deficiency and lack of investment. More capital and technical investment policies by the government to the above mentioned industries are recommended.

CHAPTER V GRAVITY THEORY OF TRADE: DETERMINANTS OF UZBEKISTAN'S EXPORTS AND TRADE

5.1 Introduction

Uzbekistan has a common border with six countries and has chosen a gradual growth path after its independence. Exports play a key role in the economy and mainly they consist of agricultural products such as cotton, fruit and vegetables, mining and chemical products such as oil, gas, uranium, copper, gold, ferrous and nonferrous metals, etc, and industrial goods such as machinery, automobiles, textile, etc. Its top exporting partners are China, Kazakhstan, Russia, Turkey and Ukraine out of which only one has a common border. Thus it is intriguing and important to find what the determinants of Uzbekistan's trade are.

Uzbekistan's economy has not been hit hard by the world financial crisis and export volumes kept rising. It is generally assumed that Uzbekistan exports to its neighbors and major transportation routes such as railways cross through Uzbekistan to reach Tajikistan and Afghanistan which make it essential for the trade with these states. However, the states in the region do not systematically report trade data to the international economic institutions which makes it impossible to derive data from primary sources – the importing countries data sources. I have collected data on a mirror-basis ranging from 1992 to 2012 which are the years of independence of Uzbekistan. Throughout the observed period, in total, Uzbekistan has exported to 136 countries of the world in total.

Graph 5.1 Uzbekistan's exports partners by continents, 1992-2012
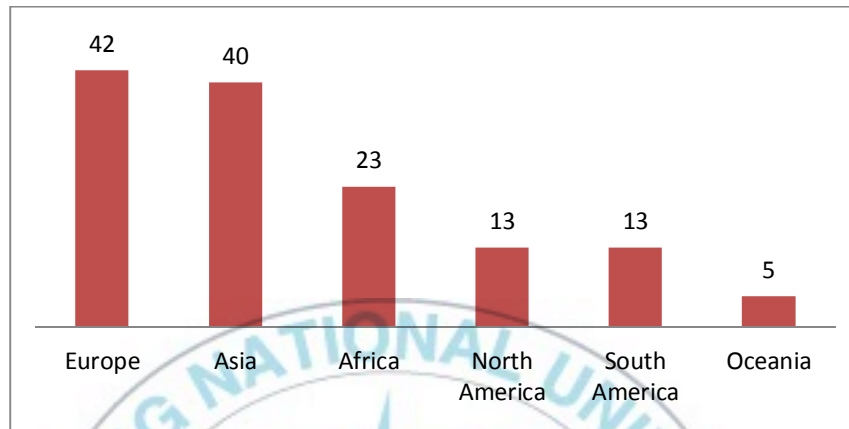
Source: world Bank/2013

As Uzbekistan is located in the Euroasian landmass its most trading partners are located in Europe and Asia. The country traded with European countries more systematically and in a bigger volume compared to Asian countries. One reason for that can be the export-oriented economy of most Asian countries. Trade with 56 countries was not included in the analysis because of zero (missing) values. Therefore, exports to these countries were considered insignificant to measure and thus skipped. Nevertheless, the list of countries is fully illustrated below and the insignificant exporting partners are highlighted.

Table: 5.1.1 Uzbekistan's export partners in Europe

Europe			
Andorra	Denmark	Latvia	Russian Fed
Albania	Estonia	Lithuania	Slovakia
Austria	Faeroe Is	Luxemburg	Slovenia

Belarus	Finland	Malta	Spain
Belgium	France Monaco	Montenegro	Sweden
Bosnia Herzegovina	Germany	Netherlands	Swiss Liechtenstein
Belize	Greece	Norway	Macedonia
Bulgaria	Greenland	Poland	Ukraine
Croatia	Hungary	Portugal	United Kingdom
Cyprus	Ireland	Rep. of Moldova	
Czech Rep	Italy	Romania	

Table: 5.1.2 Uzbekistan's export partners in Asia

Asia			
Afghanistan	India	Lebanon	Singapore
Armenia	Indonesia	Macau	Sri Lanka
Azerbaijan	Iran, Islamic Rep.	Malaysia	Syrian A.R.
Bahrain	Israel	Maldives	Tajikistan
Bangladesh	Japan	Mongolia	Thailand
Bhutan	Jordan	Palestine (Occ.Terr.)	Turkey
Cambodia	Kazakhstan	Oman	Turkmenistan
China	Korea Rep.	Pakistan	United Arab Emirates
Georgia	Kuwait	Philippines	Viet Nam
Hong Kong	Kyrgyzstan	Saudi Arabia	Yemen

Table: 5.1.3 Uzbekistan's export partners in Africa

Africa			
Algeria	Gabon	Mauritius	South Africa
Cameroon	Ghana	Morocco	Tanzania
Cote Devoir	Kenya	Mozambique	Trinidad Tobago
Egypt	Libya	Namibia	Tunisia
Ethiopia	Madagascar	Nigeria	Zambia
Fm Sudan	Malawi	Rwanda	

Table: 5.1.4 Uzbekistan's export partners in North America and in the Atlantic.

North America/Atlantic			
Antigua, Barbuda	Cuba	Jamaica	USA,PR,USVI
Barbados	Dominican Rep.	Mexico	
Canada	Guatemala	St.Kitts-Nev	
Costa Rica	Honduras	St.Vincent,G	

Table: 5.1.5 Uzbekistan's export partners in Central and South America

South America			
Argentina	Colombia	Nicaragua	Venezuela
Bolivia	Ecuador	Paraguay	
Brazil	El Salvador	Peru	
Chile	Guyana	Uruguay	

Table: 5.1.6 Uzbekistan's export partners in Oceania

Oceania				
Australia	French Polynesia	New Caledonia	New Zealand	Samoa

Despite its landlocked location Uzbekistan's trade stretches beyond the oceans. Even distant countries with advanced economies have imported from Uzbekistan regularly. Such countries are Brazil, Australia, New Zealand, Canada, etc.

At the embryonic stage of independence Uzbekistan was able to export to seventeen countries according to the data observed from UN Com trade. Interestingly, none of its

top 10 export destinations had a common language, colonial ties or border with Uzbekistan. Germany was the top importing country from Uzbekistan in 1992 with its share of imports 31.1%. As stated earlier, the economy of the country began to recover and improve from 1996 and exports to Russian Federation, which has a common colonial history and language, had a significant 23.7 % share. In the literature, it is often assumed that Turkey, India, Iran and Russia competed to increase bilateral trade with Uzbekistan after the independence. However, share of imports of Iran and India from Uzbekistan were far from the reach with those of Russia and Turkey. As can be seen in the table below, in 2002 United Kingdom imports counted 35.1 % of Uzbekistan's total exports.

Table: 5.1.7 Uzbekistan's top 10 export destinations

1992		1996		2002		2007		2012	
Germany	31.1	Russia	23.7	UK	35.1	Russia	22.5	Russia	28.0
Turkey	19.9	Italy	9.2	Russia	14.8	Poland	10.4	China	22.0
China	12.9	S. Korea	7.1	Italy	6.4	Turkey	9.5	Kazakhstan	16.4
Spain	11.7	USA	6.0	S. Korea	4.2	Ukraine	8.4	Turkey	16.4
Japan	8.5	Brazil	5.9	Kazakhstan	3.7	Kazakhstan	8.3	France	3.1
Romania	6.2	China	5.5	USA	3.5	Bangladesh	7.9	Ukraine	2.2
Switzerland	5.6	Germany	5.0	Turkey	3.2	China	5.6	Japan	2.2
Portugal	2.2	Kyrgyzstan	4.8	Japan	3.2	France	3.3	Kyrgyzstan	1.3
USA	0.7	France	4.1	Bangladesh	2.8	Hungary	3.1	S. Korea	0.9
S. Korea	0.3	Poland	3.9	Kyrgyzstan	2.6	USA	2.6	UK	0.8

Source: UN Comtrade

Since 2007 Russia has been a primary importing country from Uzbekistan. Out of six bordering countries only two – Kazakhstan and Kyrgyzstan – imported in large amounts,

and out of fifteen former Soviet countries imports from only 4 – Russia, Ukraine, Kazakhstan and Kyrgyzstan – were included in top ten exporting destinations.

It is intriguing that Uzbekistan, a double landlocked country, exports more to distant partners that have no significant linguistic or historic ties. To look into what determines Uzbekistan's exports and trade I applied gravity model of trade using the econometric software Eviews 7.0.

5.2 Gravity theory

Gravity model has been popular among social scientists and trade analysts with its high explanatory feature for decades. It has been widely applied in analyzing flows across borders and landmasses. Gravity theory of trade is an analogy of Newtonian gravitational theory. It implies that a mass of labor or goods supplied from a source is attracted to a mass of labor and goods in destination[57]. The flow of the trade is reduced as the distance between two masses increases which is considered to be a negative force whereas size of the trading countries are positive. The economic size of the countries is commonly measured by their GDP and GDP per capita. The logic is that the bigger and closer the masses are, the higher the attraction is. It explains the movement of labor and goods from source to destination. It is similar with Newton's law:

$$F_{ij} = G \frac{M_i M_j}{D_{ij}}$$

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[57]Anderson J. E. (2011). "The Gravity Model"

F denotes trade flow from source *i* to destination *j, Mi, Mj* are the masses of labor or products of the countries *i* and *j, Dij* is a distance, and *G* is a constant. In most empirical researches the traditional model is rewritten in log using all the variables in order to better interpret the results. The log form of the original formula takes the following patterns:

$$\ln F_{ij} = \alpha + \beta_1 \ln M_i + \beta_2 \ln M_j - \beta_3 \ln D_{ij} + \varepsilon$$

Fij denotes bilateral trade flow between countries *i* and *j*. *a* constitutes constant value, while *Mi* and *Mj* denotes the size of the economy in countries *i* and *j*. Moreover, *Dij* denotes the distance between these two countries.

In 1889, first application of gravity was used by Ravenstein to explain the flow of migration[58]. However, in 1962 the gravity model of trade was first used by Poyhonen[59] and Tinbergan[60]. Separately from the original analogical formula, he applied post trade data and put into log-linear relationship. Another distinct feature of the gravity model is to explain the effects of Free Trade Agreement on trade flows[61]. In general, Gravity model is applied to predict and explain the effects and the flows of migration, trade,

[58] Revenstein E G. (1889). "The Laws of Migration"
[59] Poyhonen P. (1973). "A tentative Model for the Volume of Trade Between Countries"
[60] Tinbergan (1962). "Shaping the World Economy: Suggestions for an International Economic Policy"
[61] Kepaptsoglou K.. and Karlafis M. (2010). "The Gravity Model Specification for Modeling International Trade Flows and Free Trade Agreement Effects: A 10-year Review of Empirical Studies"

Custom Unions, Monetary Unions, Free Trade Agreements, Foreign Direct Investment, commuting, tourism, and commodity shipping, etc[62].

The Gravity model is popular among social scientists due to its high explanatory power and data availability. However, it has been criticized for lacking a theoretical foundation for its analysis. To answer the criticism, Oguledo and Macphee[63] embodied price variables and Bergstrand[64] included population size. It was certain that the gravity equation is a good representation irrespective of the structure of product markets[65].

In the literature the Gravity model has been for two targets: target and a tool[66]. Commonly, it is used to investigate the flows such as bilateral trade, specific products, and an FDI, as well as the policy implications such as border effects, domino effects, rules of origin, transportation costs, etc. In addition, there have been numerous researches on the improvement of the model and introduction methodological novelty. These attempts led to the inclusion of new effects to the model such as stochastic aspects and spatial effects. As the improvement of the model or other related questions are out of the scope of this research, it will focus on analyzing the determinants of the Uzbekistan's exports and trade as well as the existing barriers to them.

Previous researches conducted on trade in and with Central Asia are mainly concentrated on indentifying various trade barriers. Thus, the focus has been given on trade with all

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[62]Bergstrand J. H. (1989). "The Generalized Gravity Equation, Monopolistic Competition and the Factor-Proportions Theory in International Trade"
[63]Oguledo V. I. and Macphee C. R. (1994). "Gravity Models: A Reformulation and an Application to Discriminatory Trade Arrangements"
[64]Ibid Bergstrand J. H
[65]Eita J. H. (2011)."Determinants of Namibian Exports: A gravity model approach"
[66]Ibid Kepaptsoglou K

Central Asian countries, including Azerbaijan, Georgia, Armenia and Afghanistan as well. The contribution of this research to the existing literature can be its concentration on trade between an individual state – Uzbekistan and its partners.

Generally analyzed informal trade barriers are corruption, absent infrastructure, wealth gap barriers, political competition and social cultural barriers. In a collective study on formal and informal barriers of trade of service in Uzbekistan and Kazakhstan which are the largest countries in the region, Irnazarov[67] found that trade in both states are dominated by foreign companies and firms. Local firms and companies have a very little role in international trade. It is crucial to mention that the research found that Kazakhstan was more active and advanced in cross-border activities of the firms. However, they found higher interest in Uzbekistani companies to trade with the partners outside the region. Their well-organized and analytic study was based on the interviews they had conducted among multinational and national companies in financial services, telecommunications and business consulting industries. The interview questions were prudently made in scale and order which are then measured using gravity model.

In addition, Suvankulov and Guc[68] have conducted a study on major foreign trading players in Central Asia assuming that after the collapse of the Soviet Union China, Turkey, Russia, Iran and India have attempted to increase trade with the region. The findings showed that China and Turkey were the most trading partners the region. Russia has been losing a momentum in benchmarking and trade with Iran and India had no

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[67]Irnazarov F. and Vakulchuk R. (2012). "Liberalization of Trade in Services in Kazakhstan and Uzbeksitan: Analysis of Formal and Informal Barriers"

[68]Suvankulov F. and Yunusov G. (2012, 5). "Who is Trading Well in Central Asia? A Gravity Analysis of Exports from the Regional Powers to the Region"

sufficient volume to compete with China and Turkey though they have a great potential. In the research they also applied common language, border, colonial ties, legal system, currency, and WTO membership to indentify trade facilitators and found that common border and colonial history were top trade facilitators among the observed variables.

In line with the findings of Suvankulov and Guc, Felipe and Kumar[69] paid a focus on the role trade facilitation in the region using a gravity model. They estimated the gains from the improvement of trade for the members of regions, Azerbaijan being a least benefiting member with 28 percent and Tajikistan as the most benefiting member with 63 percent. They have also found that intra-regional trade has increased for 100 percent. Major improvements in trade infrastructure were logistics, and efficiency of customs and border agencies. It was conclusive that Central Asian states seek more differentiated and high-technology products to trade rather than depending on resource exports which are negative to country's manufacture.

Clemens et al.[70] has done an interesting study using a Gravity model to find barriers of the trade in Central Asia. They paid a specific focus on borders and border barriers in the region. They concluded that Uzbekistan is the largest market in the region and crossing its borders is more difficult than the neighboring countries Kazakhstan and Kyrgyz republic. Their paper also provided CPI estimation of basket goods across the cities in the region and found that in Tashkent – capital of Uzbekistan prices of goods are cheaper than other places which contrasts World Bank estimates.

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[69] Felipe J. and Kumar U. (2010). "The Role of Trade Facilitation in Central Asia: A Gravity Model"
[70] Grafe C. and Raiser M. (2005). "Beyond borders: Reconsidering regional trade in Central Asia"

5.3 Datasets and Variables

Since there are three types of data – cross-sectional, time series and panel – used in the researches, most of them have found to use panel data useful and least biased. Panel data consists of multiple sections across many years which make it more complete than other types of data. However, the best application of each type of data differs case by case. Depending on the scope, panel data can be low and wide – fewer years and many sections, high and narrow – many years and fewer section, and high and wide which indicates there are many sections across many years observed. In this research low and wide panel data is used since there are 80 countries bilateral trade data with Uzbekistan across twenty one years has been observed.

In Gravity model there are dependent and explanatory variables. Dependent variables are commonly referred as bilateral trade flows and exports. Explanatory variables can be classified into two groups which can be factors indicating demand and supply of trade and factors that impede trade flows between two source and destination. Typical proxies for the factors denoting demand and supply are country's GDP, GDP per capita, population and the proxies for impediments of trade are transportation cost, tariffs, quotas, distance, etc. Apart from the tangible impediments, dummy variables such as language, adjacency, landlocked location, etc. are used[71]. In this research data on Uzbekistan's exports and trade are used as dependent variables. GDP of Uzbekistan and its exporting partners are applied as a proxy of their economic size. Population variable is observed to

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[71] Ibid

* Russian has been implied as a common language with the post-soviet countries, and although Turkic languages can be common with some of the trading partners, it was not observed in this research as a stimulus of exports and trade of Uzbekistan.

measure its correlation with trade and exports. Population is deemed as a natural resource of a country and thus as population grows, a country will depend less on international trade[72]. Therefore, an anticipation of the effect of population is negative. A distance between them is used as an explanatory variable of its impediment for trade and exports. In addition, common language, border, and colonial ties are used as dummy variables*. Dummy variables take 1 if there is common feature and 0 if there is not.

<div align="center">5.4 Gravity model</div>

The purpose of applying gravity model in this research was to find the determinants of the Uzbekistan's exports to its partners. Panel data across twenty one years was used. Uzbekistan's exports and trade were used as dependant variables, GDPs, population, distance, language, colonial ties and a common border were used as explanatory and dummy variables. Due to the features of the panel data, OLS approach was used to analyze the trade flows[73]. The analysis of OLS gravity model was based on three sections from 30 countries to 50 and to 80 countries. Trade with top 30 partners makes up 98% of Uzbekistan's trade and exports with this group of countries. And the reason of running the analyses in three different sections is to check whether trade determinants change across sections that include distant countries from the Americas, Australia and Northern Africa, Southeast Asia. The following logarithmic formula was used to facilitate the interpretation of the results.

$$\ln(T_{ijt}) = \beta_0 + \beta_1 \ln(GDP_{it}GDP_{jt}) + \beta_2 (\ln POP_{it}POP_{jt}) + \beta_3 \ln(DISTANCE_{ij})$$
$$+ \beta_4 LANGUAGE + \beta_5 BORDER + \beta_6 COLONIAL\_TIES + \varepsilon_t$$

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[72] (Kristjánsdóttir, 2005)
[73] Korniawan R. (2013). "Evaluating Bilateral Trade Performance Using Gravity Model: The cases of Indonesia and Korea"

The variables in the formula denote the followings:

lnTijt = the exports of Uzbekistan as a country to its partner country

ln(GDPiGDPe)I(+)

- *GDPit* = Uzbekistan's GDP
- *GDPjt* = GDP of Uzbekistan's importing destination

Ln(POPitPOPjt)(-)

- *POPit* = Uzbekistan's population
- *POPjt* = Population of Uzbekistan's import destination

lnDISTANCEij = Distance between the capital of Uzbekistan to the capital of its import destination (-)

LANGUAGE = Common language used in Uzbekistan and in its importing partner (?)

BORDER = Common border between Uzbekistan and its import destination (?)

COLONIAL_TIES = Common colonial history of Uzbekistan with its importing partner (?)

Ɛt = residual

5.5 Research outcomes for Uzbekistan's exports

The outcomes of Uzbekistan's exports are found to be synchronic across three cross section analyses and the correlation alongside with significance of variables increase from 30-partner exports to 80-partner exports. Gdp of Uzbekistan and its import destination, serving as an economic size of the countries, is found to be a positive factor to the exports. No matter which continent the nation is once the economy gets bigger the country increases its imports from Uzbekistan at a significant rate. However, number of people residing in Uzbekistan and its trading partners does not significantly influence the exports of Uzbekistan to the nation although population should have declined international trade as a growing natural resource. It can be explained by the fact that primary exporting good of Uzbekistan is cotton which is processed into fabric or apparel in an importing country and then plausibly re-exported to the third partner. Geographic distance between exporting and importing countries has been found to be negative to Uzbekistan's exports with its high impeding significance. As the number of partners increase to 80 including distant countries in the Americas, distance plays more significant hampering role in exports. The analyzed independent variables all reveal theoretically reciprocal results although population found to be not reducing the exports. Under general assumptions dummy variables such as a common language, border and colonial ties with a partner should encourage exports as they facilitate communication, time of shipping and understanding between traders. And so are they found to be. Language dummy motivates exports to 30 and 50 importing destinations but insignificant to 80-group of partners. It is because there is no common language spoken between Uzbekistan and its distance importing destinations. Border dummy shows insignificance with the exports to the top 30 partners and it's due to the fact most of the countries, only except

Kazakhstan, do not share common border with Uzbekistan. Exports to the rest 50 and 80 partners are encouraged if there is a common border between them. Having a common history with a country in any group of cross sections that are observed is found to be important and positive. This factor motivates exports to the partners. Its impact on exports especially bigger with 30 partners and 80 partners as more post soviet states are included in this group of countries. The following paragraphs will explain the correlation of variables in detailed numeric values in the order of cross sections.

Exports to the top 30 partners are significant in Uzbekistan's total exports as they make up 94% of total exports. The partners are usually big economies in Europe and Asia. Therefore border dummy is insignificant in determining exports to them albeit it has a positive correlation. If a country borders with Uzbekistan, they tend to import almost by 1% more. However this variable is rejected due its statistic insignificance. The table below shows a full picture of results.

Table: 5.5.1 Research outcome for the analysis of Uzbekistan's exports to the top 30 import destinations

Dependent Variable: LNEXPORTS
Method: Panel Least Squares
Date: 27/06/14   Time: 10:41
Sample: 1992 2012
Periods included: 21
Cross-sections included: 30
Total panel (balanced) observations: 630

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	3.696383	2.803749	1.318371	0.1879
LNGDPI_GDPE	0.813176	0.086429	9.408642	0.0000
LNPOPULATIONIE	0.039380	0.130087	0.302725	0.7622
LNDISTANCE	-1.179346	0.236017	-4.996871	0.0000

LANGUAGE	1.093020	0.425150	2.570902	0.0104
BORDER	0.973338	0.488815	1.991221	0.0469
COLONIAL_TIES	1.150660	0.390578	2.946046	0.0033
R-squared	0.306695	Mean dependent var		16.85449
Adjusted R-squared	0.300018	S.D. dependent var		2.538975
S.E. of regression	2.124232	Akaike info criterion		4.355747
Sum squared resid	2811.201	Schwarz criterion		4.405143
Log likelihood	-1365.060	Hannan-Quinn criter.		4.374934
F-statistic	45.93237	Durbin-Watson stat		0.271404
Prob(F-statistic)	0.000000			

Source: Author's own calculations

Economic size is positive and if gdp of any of the partners increases by 1% exports rise by 0.8% and it is statistically significant. As people get richer they tend to buy more imported goods and as the market gets bigger exporters prefer to export more. Population grows in either of countries does not impact on exports of Uzbekistan. Primary exporting good – cotton is re-exported after being processed in a partner country. This variable has low t-statistic value and thus rejected. When a distance between an import destination and Uzbekistan increases by 1 km the exports to that partner are reduced by 1.1%. If the exporters and importers speak common Russian language, they prefer to increase the trade by 0.9% and it is significant enough to accept. Moreover, if they have a common history, exports are motivated to increase exports by 1.1%. Language and colonial ties are significant determinants of exports to the top 30 partners.

In this cross section analysis 20 more partners, most of neighboring states, are included. All the dummies in this observation are yielded to be statistically significant in determining the exports. The outcomes are illustrated in the table 5.5.2.

Table: 5.5.2 Research outcome for the analysis of Uzbekistan's exports to the top 50 import destinations

Dependent Variable: LNEXPORTS
Method: Panel Least Squares
Date: 27/06/14   Time: 10:50
Sample: 1992 2012
Periods included: 21
Cross-sections included: 50
Total panel (balanced) observations: 1050

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.522961	1.759130	0.297284	0.7663
LNGDPI_GDPE	0.901637	0.054305	16.60312	0.0000
LNPOPULATIONIE	0.016036	0.086966	0.184398	0.8537
LNDISTANCE	-1.037702	0.139208	-7.454355	0.0000
LANGUAGE	1.668024	0.277481	6.011308	0.0000
BORDER	1.402204	0.364801	3.843755	0.0001
COLONIAL_TIES	0.734171	0.201833	3.637511	0.0003

R-squared	0.412390	Mean dependent var	16.05855
Adjusted R-squared	0.409010	S.D. dependent var	2.454630
S.E. of regression	1.887018	Akaike info criterion	4.114517
Sum squared resid	3713.954	Schwarz criterion	4.147561
Log likelihood	-2153.122	Hannan-Quinn criter.	4.127046
F-statistic	121.9980	Durbin-Watson stat	0.333271
Prob(F-statistic)	0.000000		

Source: Author's own calculations

Exports grow by 1.6% if the importing partners speak common language with Uzbekistani exporters. It is mostly true because the five out of six neighboring countries of Uzbekistan speak common Russian languages. Although the local languages of these countries belong to the Turkic group of languages and the communication in own language of trading partners is still plausible, the language dummy observed only Russian as a common language. They also are post soviet states and therefore having this colonial

history increases exports to them by 0.7%. Sharing border with these states stimulates exports by 1.4%. In contrary to border, distance hampers exports. For every 1 km distance gap between Uzbekistan and its export destination, exports shrink by 1% and it is statistically very significant. Number of people in an importing and exporting country seems not to have an impact on exports. Despite its positive correlations it is rejected because of low statistical value. The explanation of this is similar as mentioned earlier. Primary exporting good of Uzbekistan is not directly consumed by the population in an importing country and thus not affected by it. Economic masses in both countries, in accordance with theory, have a positive correlation. If the wealth of either country rises by 1% it drives Uzbekistan's exports by 0.9%. This factor is statistically the most significant among the observed variables. All in all, determinants of exports in this part of analysis are almost similar with the previous outcomes besides the border variable which gained significance in this section. The impact of each variable also increased except for the colonial ties dummy which declined its impact but remained significant.

The last cross section dataset embodied more distant partners in the Americas, Asia and also East European states. Therefore there was a shift in the impact of a language and border dummies. For every 1% growth in the economic size of the countries, exports go up by 1.3%. Economic size is the most significant factor. The second most significant factor is distance. However it reduces exports by 2.1 % for every 1km geographic gap between Uzbekistan and its partners. The negative impact of distance in this section has doubled because, as mentioned above, more importing destinations are in distant continents and export volume with them is not as high as with the 30 and 50 partners. Population growth does not have any correlation of importing from Uzbekistan due to the nature of the importing product. It also statistically insignificant and it is rejected. And

also common language speaking factor is insignificant with this group of countries. This group of partners do not speak common Russian language although many of East European states are post soviet states. Inclusion of some neighboring countries such as Afghanistan may explain the importance of border dummy. If a partner has a common border with Uzbekistan, local exporters seem to increase volume by 0.8%. The table below shows complete representation of the outcome.

Table: 5.5.3 Research outcome for the analysis of Uzbekistan's exports to the top 80 import destinations

Dependent Variable: LNEXPORTS
Method: Panel Least Squares
Date: 27/06/14   Time: 11:00
Sample: 1992 2012
Periods included: 21
Cross-sections included: 80
Total panel (balanced) observations: 1680

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-4.447973	1.890785	-2.352447	0.0188
LNGDPI_GDPE	1.334531	0.055940	23.85654	0.0000
LNPOPULATIONIE	0.096872	0.102503	0.945064	0.3448
LNDISTANCE	-2.117478	0.128364	-16.49583	0.0000
LANGUAGE	0.755891	0.379907	1.989673	0.0468
BORDER	0.921428	0.452571	2.035984	0.0419
COLONIAL_TIES	2.450039	0.251606	9.737586	0.0000
R-squared	0.473211	Mean dependent var		14.14030
Adjusted R-squared	0.471322	S.D. dependent var		3.621260
S.E. of regression	2.633027	Akaike info criterion		4.778304
Sum squared resid	11598.63	Schwarz criterion		4.800914
Log likelihood	-4006.775	Hannan-Quinn criter.		4.786679
F-statistic	250.4742	Durbin-Watson stat		0.286702
Prob(F-statistic)	0.000000			

Source: Author's own calculations

The impact of having a common colonial history is higher and more significant in this section than in the previous two. Uzbekistani exporters raise the volume of exports by 2.4% if the partner is a former soviet country. Unlike previous sections, results in this section showed more impact and significance of gdp of the countries, border and colonial ties whereas population and language were found to be unimportant. Distance gained twice much negative impact on exports.

Broader comparison of sections and the shifts in the impact of variables show that variables have higher correlations as the number of partners increase. Impact of gdp on exports increases from 0.8% to 0.9% and 1.3% for every 1% growth of gdp of 30, 50 and 80 partners. Population is consistently irrelevant to exports in all sections and thus rejected in all sections. Impact of distance is the lowest on exports to 50 partners and the highest to 80 partners. The table below gives a full picture of the comparison of three section analyses.

Table: 5.5.4 Significance and insignificance of variables across samples

Variable names	30 partners	50 partners	80 partners
LN(GDPI_ GDPE)	0.813176	0.901637	1.334531
	(9.408642)	(16.60312)	(23.85654)
LN(POPI_POPE)	0.039380	0.016036	0.096872
	(0.302725)	(0.184398)	(0.945064)
LNDISTANCE	-1.179346	-1.037702	-2.117478
	(-4.996871)	(-7.454355)	(-16.49583)
LANGUAGE	1.093020	1.668024	0.755891
	(2.570902)	(6.011308)	(1.989673)
BORDER	0.973338	1.402204	0.921428
	(1.991221)	(3.843755)	(2.035984)
COLONIAL_TIES	1.150660	0.734171	2.450039
	(2.946046)	(3.637511)	(9.737586)

Source: Author's own calculations

Common language plays a significant role in exports only to 30 and 50 partners and insignificant in the 80-partner analysis. Almost similarly border dummy is rejected in the 30-partner cross sections and highly important in 50-pair analysis. Common colonial history is significant in determining exports with all the partners and has the highest impact on exports to 80 countries and the lowest to 30 partners.

5.6 Research outcomes for Uzbekistan's trade (Exports & Imports)

Observing the post trade data of Uzbekistan's trade with its partners at three sections has shown the results that are fully compatible with the theories posited at the beginning of the chapter. Only border dummy has been found to be insignificant factor for determining Uzbekistan's trade with 50 and 80 partners. The other variables are statistically significant in all section analyses. The most signifying factor is the economic size of countries which is gdp. Its significance triples in the trade with 80 partners. Growth in the number of residents in either country is found to be negative to trade with Uzbekistan across all sections and is very significant. So is distance between them. The impeding influence of distance is negative to trade almost similarly with exports. Speaking a common language with a partners is found to have a positive correlation with trade and significant in trade with all partners. Unlike its role in exports a border dummy is insignificant to trade with 50 and 80 partners. It can be implied that most imports do not come from bordering countries. Uzbekistan's trade is also significantly determined by the partner's history. Having a common history serves as a stimulus of a trade. The following paragraphs will look into outcomes in detail at every section.

As economic sizes serving as masses get bigger trade increases according to theory. And the results prove it once again. Every time when gdp of either Uzbekistan or its trading partner goes up by 1% the trade between them increases by 0.9%. Growth of trade with gdp is almost reciprocal. As the people get wealthier more consumption needs arise and thus drive international trade. However, whenever the population increases the dependence on international trade decreases. For every 1% increase in the number of people in each country bilateral trade reduces by 0.2%. Trade is also hampered by

distance and when the gap in distance widens by 1 km the trade declines by 09% and it's statistically important. Whereas population and distance hamper the trade by almost 2% jointly, the facilitation of trade by communication in a common Russian language motivates it by 1.3% and it is statistically accepted. Another facilitator of trade against distance is sharing a border with a partner. This will make delivery and paper jobs on imports and exports easier and faster. If the trade partner has a common border with Uzbekistan the trade is driven up by 0.7%. Most of the bordering states with Uzbekistan are post soviet states and belong to the Commonwealth of Independent States which in turn has movement of goods. Therefore in this section the border dummy is significant and positive to the trade. Furthermore, their former colonial past encourages trade by 0.9%. Full details are shown in the table 5.6.1 below.

Table 5.6.1 Research outcome for the analysis of Uzbekistan's trade with the top 30 partners

Dependent Variable: LNTRADE
Method: Panel Least Squares
Date: 27/06/14   Time: 10:45
Sample: 1992 2012
Periods included: 21
Cross-sections included: 30
Total panel (balanced) observations: 630

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	5.424998	2.008104	2.701553	0.0071
LNGDPI_GDPE	0.964788	0.061902	15.58574	0.0000
LNPOPULATIONIE	-0.292088	0.093171	-3.134978	0.0018
LNDISTANCE	-0.999400	0.169040	-5.912204	0.0000
LANGUAGE	1.301023	0.304502	4.272632	0.0000
BORDER	0.731825	0.350099	2.090336	0.0370
COLONIAL_TIES	0.917458	0.279740	3.279681	0.0011

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R-squared	0.435715	Mean dependent var	17.95016
Adjusted R-squared	0.430281	S.D. dependent var	2.015665
S.E. of regression	1.521419	Akaike info criterion	3.688213
Sum squared resid	1442.069	Schwarz criterion	3.737610
Log likelihood	-1154.787	Hannan-Quinn criter.	3.707400
F-statistic	80.17540	Durbin-Watson stat	0.202546
Prob(F-statistic)	0.000000		

Source: Author's own calculations

In this section of analysis it has been found that trade is determined by a common language more than other determinants. Impact of countries' economic sizes and their shared history has almost similar 1% influence on trade. For the 20 years since the collapse of the Soviet Union, the countries still managed to keep common roots to facilitate trade between them through communication.

Outcomes yielded from 50-pair analyses reciprocate the previous results. However, when Uzbekistan trades with this group of countries border lines do not play a significant role. It still has a positive connection with trade but it does not have a statistical significance. The wealth of nations is significant and when every time nations get richer by 1%, the trade between them grows by 1.1%. This factor is the most significant stimulus for the trade. The following is a language dummy. Saving a translator's service charges on pocket Uzbekistani traders increase the volume of trade to 1.7% to the Russian speaking partner. It is depicted in detail in the following table 5.6.2.

Table 5.6.2 Research outcome for the analysis of Uzbekistan's trade with the top 50 partners

Dependent Variable: LNTRADE
Method: Panel Least Squares
Date: 27/06/14   Time: 10:53
Sample: 1992 2012
Periods included: 21
Cross-sections included: 50
Total panel (balanced) observations: 1050

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	5.236641	1.426598	3.670719	0.0003
LNGDPI_GDPE	1.128818	0.044040	25.63175	0.0000
LNPOPULATIONIE	-0.359396	0.070527	-5.095872	0.0000
LNDISTANCE	-1.372586	0.112893	-12.15831	0.0000
LANGUAGE	1.720620	0.225028	7.646241	0.0000
BORDER	0.450813	0.295842	1.523833	0.1279
COLONIAL_TIES	0.629549	0.163680	3.846206	0.0001

R-squared	0.537943	Mean dependent var	17.08747
Adjusted R-squared	0.535285	S.D. dependent var	2.244846
S.E. of regression	1.530311	Akaike info criterion	3.695464
Sum squared resid	2442.552	Schwarz criterion	3.728507
Log likelihood	-1933.118	Hannan-Quinn criter.	3.707993
F-statistic	202.3832	Durbin-Watson stat	0.273418
Prob(F-statistic)	0.000000		

Source: Author's own calculations

Common colonial roots motivate traders deal more by 0.6%. Distance and population impede trade. For every 1km increase in the distance between exporters and importers the trade reduces by 1.3% and for every 1% rise in the number of people in each country the trade volume goes down by 0.3%. The trade in this section is not determined by border and hampered by population and distance whereas gdp, language and colonial ties drive it up.

Uzbekistan's trade with 50 countries and 80 countries is determined by nearly similar factors. This group of countries tend to augment the volume of trade with Uzbekistan if their national wealth increases. If the gdp increases by 1%, the trade rises by 1.6%. Complete outcomes are shown in the table below.

Table 5.6.3 Research outcome for the analysis of Uzbekistan's trade with the top 80 partners

Dependent Variable: LNTRADE
Method: Panel Least Squares
Date: 27/06/14   Time: 11:02
Sample: 1992 2012
Periods included: 21
Cross-sections included: 80
Total panel (balanced) observations: 1680

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-4.036893	1.651917	-2.443762	0.0146
LNGDPI_GDPE	1.671989	0.048873	34.21104	0.0000
LNPOPULATIONIE	-0.380208	0.089554	-4.245584	0.0000
LNDISTANCE	-2.054393	0.112148	-18.31862	0.0000
LANGUAGE	0.667061	0.331912	2.009751	0.0446
BORDER	0.752483	0.395397	1.903109	0.0572
COLONIAL_TIES	2.598381	0.219820	11.82048	0.0000

R-squared	0.567670	Mean dependent var		15.21700
Adjusted R-squared	0.566120	S.D. dependent var		3.492340
S.E. of regression	2.300389	Akaike info criterion		4.508192
Sum squared resid	8853.168	Schwarz criterion		4.530803
Log likelihood	-3779.881	Hannan-Quinn criter.		4.516567
F-statistic	366.1221	Durbin-Watson stat		0.263865
Prob(F-statistic)	0.000000			

Source: Author own calculations

When the population, a natural resource of a country increases by 1%, the country lowers the international trade by 0.3% and if the distance between traders gets far by 1km the trade shrinks by 2%. Having a common language and colonial ties encourages trade by 0.6% and 2.5% and both are significant. Regardless of the positive impact on trade, the border dummy is rejected due to low significance value.

In overall, impact of gdp on trade increases from 0.9% to 1.1% and 1.6% as the number of trading partners increase. The significance also rises similarly. The Population of countries hampers trade by 0.3% with all partners similarly whereas the negative impact of distance jumps from 0.9% to 1.3% and 2% as the number of traders increases. The table below shows it in details.

Table 5.6.4 Significance and insignificance of variables across samples

Variable names	30 partners	50 partners	80 partners
LN(GDPI_ GDPE)	**0.964788** (15.58574)	**1.128818** (25.63175)	**1.671989** (34.21104)
LN(POPI_POPE)	**-0.292088** (-3.134978)	**-0.359396** (-5.095872)	**-0.380208** (-4.245584)
LNDISTANCE	**-0.999400** -(5.912204)	**-1.372586** (-12.15831)	**-2.054393** (-18.31862)
LANGUAGE	**1.301023** (4.272632)	**1.720620** (7.646241)	**0.667061** (2.009751)
BORDER	**0.731825** (2.090336)	**0.450813** (1.523833)	**0.752483** (1.903109)
COLONIAL_TIES	**0.917458** (3.279681)	**0.629549** (3.846206)	**2.598381** (11.82048)

Source: Author's own calculations

Common language determines trade highly with 30 and 50 partners by 1.3% and 1.7% but its impact reduces to 0.6% on trade with 80 partners. It is because more Russian

speaking countries were included in the previous two sections. The border is significant in trade with only 30 partners increasing it by 0.7% and it is rejected in the next sections. Impact of colonial ties fluctuates across different sections increasing trade by 0.9%, 0.6% and 2.5%. Trade determinants with 50 and 80 partners are similarly reciprocated.

5.7 Conclusion

The determinants of Uzbekistan's recent growing exports and trade have been found using the gravity model of trade that is an analogy of Newton's gravity theory. The assumptions were proven: a) the bigger the economic sizes of a country is, the bigger the flow of trade will be. Gdp of the countries were tested as an economic size and its growth encourages both exports and trade of Uzbekistan with its 30, 50 and 80 countries. As it grows by 1%,, the exports rise by 08%, 0.9%, and 1.3% as well as trade volume increases by 0.9%, 1.1%, and 1.6%. Latest growth of Uzbekistan's gdp shows up 6 or 7% which can partly explain why the exports and trade of Uzbekistan's has been rising. b) Population growth of a country reduces country's dependence on international trade and thus should be negatively correlated. This is true for the trade with Uzbekistan impeding it by 0.2%, 0.3%, and 0.3% whereas the nation's exports are not affected by it. The primary exporting good of Uzbekistan is cotton and the purpose of importing the cotton is not to consume, at least not in all cases, but to reprocess it and re-export it to the third country. Therefore, rise or fall of natural resources of an importing country does not influence on Uzbekistan's exports. c) As the geographic gap widens countries trade less

due to the high shipping costs. It is true for both exports and trade. On average distance flow of exports and trade by 1% and 2% depending on the range of the partner. The high significance of distance shows that double landlocked Uzbekistan's trade sees it as a main impediment. General assumptions are made for the dummy variables. Direct communication with a trade partner should not only reduce the cost of trade by excluding the translation costs but also increase the personal connection between traders. The observed language dummy variable proves this assumption by encouraging exports and trade by 1.3% on average. It is only insignificant in exports to distant countries in the American and African continents. Uzbekistan's exporters and traders seem to favor dealing more with Russian speaking partner and keep the trade volume constant with a partner where they can not directly communicate. Sharing a common history should also have traders feel connected with a partner and share more understanding. It should be positive to trade and it is found to be positive to exports and trade in all sections. It encourages exports and trade by 2.5% at highest being the largest motivating factor observed in this research. The trade partnership with the former Soviet countries is high. The common border significantly cuts the time and cost of shipment of goods and thus should be a positive factor. It determines Uzbekistan's exports only. However, Uzbekistan's trade does not depend on border and it is not significant whether it trades with neighbors or distant partners. So it can be implied that Uzbekistan trades more through inter-blocs and inter-continents. In overall, the patterns of exports and trade of Uzbekistan do not differ significantly from each other and regardless of the partner being located in Europe or Asia or in the far Americas, they are primarily determined by gdp of the countries, common language and common colonial ties. The other factors are insignificant or discourage exports and trade.

CHAPTER VI CONCLUSION AND POLICY RECOMMENDATIONS

The Republic of Uzbekistan announced its independence in 1991 and since then has run liberal market economy. This research explored and analyzed the structure of Uzbekistan's economy, its exports and its mining sector using descriptive, econometrical and statistical tools.

The economy of the country recovered and has been steadfast growing since 1995. Its economic policy and development model was found prudential by IMF and studied thoroughly by academic scholars. The structure of national GDP of Uzbekistan has diverged from agriculture-based to manufacture-based to the end of the decade. Service sector boomed after 2000 and foreign direct investment flow was stimulated by policies on tax exemption and free zones. Major attracting industries of foreign direct investment are oil, gas, natural resources and mining industries.

Bilateral trade turnover with South Korea spiked during the last six years. The trade balance is highly negative and imports from Korea jumped whereas exports reduced constantly. The imported goods are mainly machinery and Hi-tech equipment whereas exports to South Korea make up fruit and vegetables, textiles and fiber. South Korea overtook Russia in terms of investment and is considered the largest investor in Uzbekistan. Investments are mainly directed to natural resources and telecommunications industries.

The international competitiveness of the mining sector was tested using Revealed Comparative Advantage indices. Five formulas were applied in the analysis of measuring fourteen mining industries. The robustness of each formula was checked as well. The

data was obtained on a mirror basis from World Bank database. The results strictly proved the robustness of all five RCA indices and yielded similar outcomes. Accordingly, six industries (HS27 – Inorganic chemicals; compounds of precious metals, radioactive elements, HS28 – Mineral fuels, oils & product of their distillation; HS71 – Natural/cultured pearls, precious stones & metals, coin; HS74 – Copper and articles thereof; HS79 – Zinc and articles thereof; HS81 – Other base metals; cermets; articles thereof) were found to have an advantage. The rest of the industries (HS25 – Salt, sulphur, earth & stone, plastering mat, lime & cement; HS26 – Ores, slag and ash; HS68 – Art of stone, plaster, cement, asbestos, mica/similar materials; HS72 – Iron and steel; HS73 – Articles of iron or steel. HS75 –Nickel and articles thereof. HS76 –Aluminum and articles thereof; HS78 – Lead and articles thereof) fluctuated or were disadvantageous.

Uzbekistan's exports have fluctuated and risen considerably since its independence. To analyze the determinants of export and trade flows of Uzbekistan, an econometric model – Gravity theory of trade was applied by using econometric software Eviews 7.0. The results were yielded after analyzing at three sections and Uzbekistan's gdp have significant correlation with its exports and trade. Gdp of a partner is also positive to exports and trade. The population of trading partners and Uzbekistan do not influence on exports but reduce the trade. Dummies such as common language – Russian and Soviet colonial history facilitate trade and exports. Borderlines with six Central Asian states do not significantly influence trade but encourage exports. The trade determinants are similar despite the location of a partner.

The observations and outcomes lead to the conclusion that although Uzbekistan's economy has been shifted from agriculture based economy but it is not highly driven by

exports of industrial goods. Key sectors such as mining and natural resources remain the major attraction of investment and exporting commodities in addition to cotton. More trade is based within the (Euroasian) continent. Besides the contribution of this thesis to the existing literature on Uzbekistan's trade and exports, it offers some policy recommendation based on the outcomes of the research:

- The Republic of Uzbekistan should encourage exports of mining commodities that are found to be advantageous, and develop the industries whose advantage has fluctuated or diminished. More foreign and domestic investments should be directed.

- Considering the significance of speaking common languages with a partner, the Republic of Uzbekistan should encourage exports to the countries with common language and if it is a barrier to exports to the countries with non-common language, linguistic or translational services should be offered by government to facilitate trade and exports.

- The Republic of Uzbekistan should form agreements with the closest coastal states for accessing ports to reduce freight fee since the border and distance are important factors in trade and exports with all partners. It can be done in favor of win-win process for Uzbekistan and its partners.

- The Republic of Uzbekistan should consider signing FTAs with former Soviet states as their role is significant in trade and exports.

As often cited history of XXI century will be made in Asia supposing mainly East Asia. But development just as crisis has a spillover effect and Uzbekistan being located in the

heart of Euroasian continent cannot be left without a touch by the dynamic development. Therefore, this research humbly observed, analyzed and suggested vital points for further development of Uzbekistan's economy.

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