

## Kazakhstan's Competitiveness in the Eurasian Economic Union Market

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### Avrasya Ekonomik Birliği Pazarında Kazakistan'ın Rekabet Gücü

#### Abstract

The paper basically explores the competitiveness of the industries of Kazakhstan in the Eurasian Economic Union Market by employing different trade measures such as the Balassa's Revealed Comparative Advantage Index (RCA), Vollrath's Revealed Competitiveness Index, and Brülhart B Marginal Intra-Industry Trade Index. The main drawback of the existing empirical literature is that various RCA indices are widely used to explain the competitiveness of a country. This paper however not only focuses on various RCA indices but some additional and complementary measures of competitiveness are also applied since they underline different aspects/dimensions of competitiveness.

**Keywords** : Revealed Comparative Advantage, Kazakhstan, Eurasian Economic Union.

**JEL Classification Codes** : F14.

#### Öz

Bu çalışmada Kazakistan'ın endüstrilerinin Avrasya Ekonomik Birliği pazarındaki rekabet gücü farklı ticaret endeksleri (Balassa'nın açıklanmış karşılaştırmalı üstünlükler endeksi (RCA), Vollrath'ın açıklanmış rekabet gücü endeksi ve Brülhart B marjinal endüstri içi ticaret endeksi) kullanılarak ölçülmüştür. Bu alandaki ampirik literatürdeki temel sorun, çeşitli RCA endekslerinin aynı anda kullanılmasıdır. Bu çalışma da iki farklı RCA endesini kullanmış ve ayrıca rekabet gücünü çeşitli açılardan incelemek için ek analizler yapmıştır.

**Anahtar Sözcükler** : Açıklanmış Karşılaştırmalı Üstünlük, Kazakistan, Avrasya Ekonomik Birliği.

## 1. Introduction

After more than two decades on December 26, 1991, the Soviet Union collapsed and the former Soviet Republics formed the Commonwealth of Independent States (CIS). The dissolution became the reason of the huge economic downturn and the reapture of all economic relations, especially trade relations among the new Republics. Metcalf (1997: 4), in his research, noted that the exports among the former Soviet Republics (FSR) dropped from \$320 billion in 1990 to \$20 billion in 1992.

In order to renew disrupted economic ties it was proposed to create a Eurasian economic union among the FSR. The creation process started in 1995 by the treaty guaranteeing creation of the Customs Union. Eventually, on January 1, 2010 the Eurasian Customs Union (CU) came into force with three founding states (Belarus, Kazakhstan and Russia). Later, on May 29, 2014 the treaty on the Eurasian Economic Union (EEU) was signed by Belarus, Kazakhstan and Russia, and came into existence on January 1, 2015. Today the Eurasian Economic Union comprises five member states including Armenia, Kyrgyzstan and three founding countries.

The creation of the CU has a positive impact on the trade among member countries, but does Kazakhstan have some advantages from the Union? In this paper, we evaluate the competitiveness of Kazakhstan's trade with the CU countries since its creation in 2010. In our paper, we apply to different trade measures such as Balassa's Revealed Comparative Advantage (RCA) Index, Vollrath's Revealed Competitiveness Index (VRC), Trade Entropy Index (TE), and Brühlhart B Marginal Intra-Industry Trade Index (Brühlhart-B). The paper contributes to the existing literature in two significant aspects. Firstly, this paper is the first paper that examines Kazakhstan's competitiveness in the EEU. The second aspect is that in most of the empirical literature RCA is used as the main measurement of competitiveness by losing sight of the fact that the definition and empirical adaptation of the RCA indices are subject to some controversies. However, this paper employs different indices that help to determine various aspects of the competitiveness.

The paper consists of four sections. The first section explains the methodology, reviewing the trade measures of competitiveness. The second section provides background for the analysis, an overview of Kazakhstan's export and import structure with the EEU. The third section reports data and empirical findings. The fifth and the last section gives policy implications and concludes.

## 2. Methodology: Trade Measures of Competitiveness

In his renowned work "Inquiry into the Nature and Causes of the Wealth of Nations" published in 1776, Adam Smith proposed the theory of "Absolute advantage" that marked the beginning of the international trade theories. The main idea of the theory was that the international trade is good and it is not a zero sum activity. Later, the theory was developed by other prominent economists, such as David Ricardo and Karl Marx, and these two

economists explained comparative advantage as the result of differences in labor productivity.

In the beginning of the 20th century, one of the leading modern trade theories, Heckscher-Ohlin Theory was developed by a Swedish economist Eli Heckcher and his student Bertil Ohlin. Heckscher-Ohlin model of "inter-industry trade", which was based on comparative advantage relies on factor endowment differences to explain trade. Later, in 1980s Paul Krugman proposed that one of the drawbacks of the "inter-industry trade" theory is that it has constant "return to scale" assumption, which was the reason to develop second trade model ("intra-industry trade" represented by the New Trade Theory). Intra-industry trade has eased the assumptions of inter-industry trade, like imperfect competition with production differentiation, economies of scale, consumer preferences, trademark, and consequent specialization. These two theories are mostly used complements rather than rivals to each other.

In our paper, trade measures are explained in three different categories: measures of concentration/dispersion of trade flows; trade measures of interindustry trade and trade measures of intra-industry trade.

### **2.1. Measure of Concentration/Dispersion of Trade Flows: Trade Entropy Index/TE**

Recently, it was commonly suggested (Hesse, 2006: 12; Agosin, 2007: 5) that diversification of trade is a good motive to foster economic growth. Thus for a country, it is important to understand the level of concentration/dispersion of the trade. In this paper, we have used Trade Entropy index for measuring the concentration or dispersion of trade. With this index we can measure the level of trade integration of Kazakhstan, and this index will be the starting point of our empirical analysis.

The trade entropy index equations are as follows:

$$TE_{mi} = \sum_j a_{ij} \ln (1/a_{ij}) \text{ with } 0 < a_{ij} < 1 \text{ and } \sum_j a_{ij} = 1 \quad (1)$$

$$TE_{xi} = \sum_j b_{ij} \ln (1/b_{ij}) \text{ with } 0 < b_{ij} < 1 \text{ and } \sum_j b_{ij} = 1 \quad (2)$$

Where  $TE_{mi}$  and  $TE_{xi}$  entropy index of export and import. From the equation, we can observe that the index has independent variables  $a_{ij}$  and  $b_{ij}$ , and they are import and export shares from country  $i$  to country  $j$  respectively. The higher  $a_{ij}$  and  $b_{ij}$  are (country  $j$  has a higher share in import and export than country  $i$ ), the higher import and export concentration is. Low index shows high diversification.

### **2.2. Trade Measures of Inter-Industry Trade: RCA, RC**

As it was noted above, inter industry trade is based on a comparative advantage. Thus, we have used Balassa's original and revised Revealed Comparative Advantage/ RCA indices

(Balassa, 1965) and Vollrath's Revealed Competitiveness Index (RC) (Vollrath, 1991) to measure inter-industry trade.

### 2.2.1. Balassa's Revealed Comparative Advantage Index/ RCA

This index is the most common method in analyzing trade data. The index is based on Hecksher-Ohlin theory, and measuring comparative advantage in this theory has some difficulties, since relative prices under autarky are not observable, which hinders the identification of true comparative advantage (Balassa, 1989). That's why, Balassa (1965, 1977) suggested that it might not be necessary to include all constituents that affect a country's comparative advantage. Instead, he proposed that comparative advantage is revealed by observed trade patterns that represent differences in factor endowments across nations.

Original Balassa Index is widely used, despite the fact that it was revised/refined a number of times over the years. In this paper, for the original Balassa Index we use acronym  $RCA_1$ , in some literature RCA is also called as the Comparative Export Performance Index (CEP) (Yılmaz & Ergun, 2003: 6; Yılmaz, 2003: 15; Erlat & Erlat, 2005: 2; Akgüngör et.al. 2002: 10).

The original RCA index of Balassa is as follows:

$$RCA_1 = CEP = (X_{ij} / X_{it}) / (X_{nj} / X_{nt}) = (X_{ij} / X_{nj}) / (X_{it} / X_{nt}) \quad (3)$$

$X_{ij}$  - export of a good or industry j of country i

$X_{it}$  - total export of country i

$X_{nj}$  - export of a good or industry j of a set of countries n

$X_{nt}$  - total export from a set of countries n

From the equation, we can observe that  $RCA_1$  index measures comparative advantage from comparison "revealed" share of export of a good or industry from country i with share of exports of a good or industry from a set of countries n. A value higher than 1 indicates "revealed" comparative advantage, while when index is less than 1, the country has a comparative disadvantage. Greenaway and Milner (1993: 181) argued that the Balassa Index is biased because it omits import, due to the fact that other "revealed" comparative indexes were offered.

The second RCA index uses both exports and imports of the country but omits other countries' impact.

$$RCA_2 = (X_{ij} - M_{ij}) / (X_{ij} + M_{ij}) \quad (4)$$

$X_{ij}$  - export of a good or industry j of country i

$M_{ij}$  - import of a good or industry  $j$  of country  $i$

A value of the index ranges from ranges from -1 (comparative disadvantage) to +1 (comparative advantage). The drawback of the index is that it has ambiguity in results around zero values (Greenaway & Milner, 1993).

The next RCA index takes into account shares of import and export of good or industry in a total country import and export respectively.

$$RCA_3 = (X_{ij} / X_{it}) / (M_{ij} / M_{it}) = (X_{ij} / M_{ij}) / (X_{it} / M_{it}) \quad (5)$$

$X_{ij}$  - export of a good or industry  $j$  of country  $i$

$X_{it}$  - total export  $j$  of country  $i$

$M_{ij}$  - import of a good or industry  $j$  of country  $i$

$M_{it}$  - total import  $j$  of country  $i$

A value of the index ranges from ranges from -1 (comparative disadvantage) to +1 (comparative advantage).

### 2.2.2. Vollrath's Revealed Competitiveness Index (RC)

Vollrath (1991) offered an alternative specification of "revealed" comparative advantage. This alternative specification of RCA is called the revealed competitiveness (RC). In Vollrath's Revealed Competitiveness, index positive result indicates comparative/competitive advantage, whereas negative result indicates comparative /competitive disadvantage.

The main problem in measuring such kind of indices is that revealed export and import can be perverted by government trade policies. Government protectionism policy and subsidies change country's import and export, which means, in that case, trade patterns do not "reveal" actual comparative advantage.

The first index, RC (the relative competitiveness) is calculated as a difference between logarithm of relative export advantage (RXA) and relative import advantage (RMA).

$$RC = \ln RXA - \ln RMA$$

where  $RXA = RCA_1 = CEP = (X_{ij} / X_{it}) / (X_{nj} / X_{nt})$  and  $RMA = (M_{ij} / M_{it}) / (M_{nj} / M_{nt})$

where  $M$  accounts for imports. In consequence;

$$RC = \ln RXA - \ln RMA = \ln ((X_{ij} / X_{it}) / (X_{nj} / X_{nt})) - \ln ((M_{ij} / M_{it}) / (M_{nj} / M_{nt})) \quad (7)$$

As we can see from the equation, RXA equals to RCA1 (Original Balassa index). It is important to note that the main difference of Vollrath's RXA from Balassa's original RCA1 index is that it prevents us from double-counting. RMA index is measured by the same principle as RXA index, but by changing share of export to share of import.

There are a range of RCA alternative indices suggested and employed in the literature, and some researchers noted that some inconsistent results may be obtained by the use of different RCA indices. (Balance et al., 1987; Yeats, 1985; Hinloopen and Van Marrewijk, 2001). It is therefore encouraged that the policy makers need cautious interpretation of RCA indices by especially underlining probabilities of revealing a comparative advantage or disadvantage.

### **2.3. Trade Measures of Intra-Industry Trade**

As an intra-industry trade measure, we employ Brülhart B Intra-Industry Trade Index. (Brülhart, 1994).

#### **2.3.1. Brülhart B Marginal Intra-Industry Trade Index/ Brülhart-B**

$$\text{Brülhart-B} = (\Delta X - \Delta M) / |\Delta X| + |\Delta M| \quad (12)$$

This index takes values between -1 and +1. The index gives information on two dimensions. First one is information about the proportion of marginal intra-industry trade (MIIT), and second one is country-specific sectoral performance. Industry shows higher marginal intra-industry trade when Brülhart-B value is close to zero. When the index value equals to zero, it means that particular industry is purely intra-industry, while value ranged from -1 to +1 industry is purely inter-industry type. Regarding the second dimension, the definition of the sectoral performance is the change in exports and imports in relation to each other. When Brülhart-B = -1,  $\Delta M$  was  $\geq 0$  while  $\Delta X$  was  $\Delta \leq 0$  over the examined period. For Brülhart-B = 1, it is vice versa. In other words, when Brülhart-B  $> 0$  then this implies that  $\Delta X > \Delta M$ , and when Brülhart-B  $< 0$  then this reflects that  $\Delta X < \Delta M$  (Brülhart, 1994; 606-607).

### **3. Trade Relations of Kazakhstan with the Eurasian Custom Union**

The historical basis of the Customs Union stems from 1995, when the treaty on the formation of a customs union was signed by Belarus, Kazakhstan and Russia. Then in 2000s Treaty on the Eurasian Economic Community was signed on October 10, 2000 by five former Soviet Union countries: Belarus, Kazakhstan, Kyrgyzstan, the Russian Federation, and Tajikistan. Later in 2006 Uzbekistan became a member, but its membership was suspended in December 2008. In August 2006 three Eurasian Economic Community countries (Belarus, Kazakhstan and Russia) decided to create the CU. On January 1, 2010 the Eurasian Customs Union (CU) came into force with three founding states (Belarus, Kazakhstan and Russia) with harmonized trade tariffs.

The main goal of the custom union is to foster economic integration between the member countries. The creation of the CU led to a trade liberalization and increased

competitive pressure on the industries of the member country. In order to get harmonized trade tariff, member countries changed their tariffs and 85% of tariffs were harmonized (Dreyer & Popescu, 2014: 1). According to Isakova and Plekhanov (2011: 9) more than 50% of Kazakhstan tariffs were changed, while 18% of Russian tariffs and changes in Belarus tariffs were 25%. As a result, average import rate in Kazakhstan rose from 6.5% to 12.1% (Dreyer and Popescu, 2014). This increase in the import rate shows that initially Kazakhstan was the most trade liberal country among three member countries.

Arithmetic mean rate of the Common Customs Tariff (CCT) in 2012, 2013 and 2014 was 10%, 9.5% and 8.7% respectively. The tariffs with 20% duty rate account for less than 1% of the CCT, while tariffs with 15%, 10%, 5% and 0% duty rate account for 6%, 11%, 27% and 15% of CCT (40% - other tax rates). Goods such as meat and meat products, end-meat and fish products, weapons and ammunition, alcoholic and non-alcoholic beverages, natural pear with an average tax rate 36.9%, 16.3%, 17.8%, 16.3% and 15.84% respectively are the most protected goods of the CCT. In June 2015, becoming a WTO member Kazakhstan committed to bind tariff rates for all products on average at 6.1% (Russia commits to decrease its tariffs to 7.9% until 2020), which means that the EEU needs to decrease the CCT to 6.1% in order not to violate the Kazakhstan's WTO commitment.

The CU has an unbalanced structure. According to the World Bank, Russia accounts for 86.4% of the unions' GDP and 84.3% of the total population. Kazakhstan and Belarus account for 10.1% and 3.5% of the GDP and 10.1% and 5.6% of the total population respectively. In addition, according to the statistics, Kazakhstan has a negative trade balance with these countries. Between 2009-2014 the member countries' average share in import with Kazakhstan is 38.1% while their share in export with Kazakhstan is 8.2%. According to foreign trade statistics, Russia accounted for 16.72% of Kazakhstan's trade while Belarus accounted for only 0.69% in 2014.

**Table: 1**  
**Kazakhstan's Trade Balance and the Trade Balance between Kazakhstan and the Customs Union (Billions of \$) (2005-2014)**

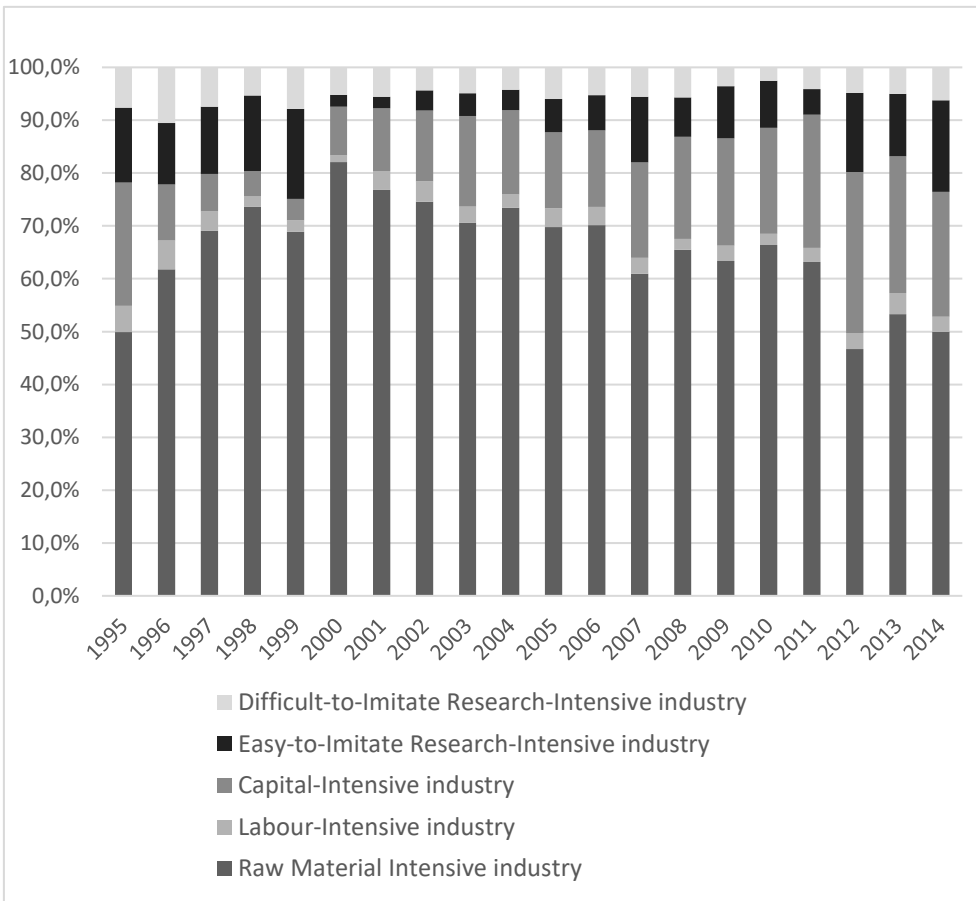
	Kazakhstan's Trade Balance	X/M Trade Balance, %	Kazakhstan - the CU Trade Balance	X/M Kazakhstan - the CU, %
2005	10.4	157.8%	-3.84	43.5%
2006	14.7	161.0%	-5.55	40.7%
2007	15.2	146.0%	-7.18	40.0%
2008	33.6	187.6%	-7.75	45.2%
2009	15.0	151.9%	-5.66	38.9%
2010	28.5	186.6%	-2.68	53.2%
2011	44.8	211.1%	-9.27	45.1%
2012	38.1	178.2%	-10.95	38.4%
2013	34.8	168.5%	-12.74	31.8%
2014	36.7	184.2%	-8.13	44.2%

Source: Committee on Statistics of the Ministry of National Economy of the Republic of Kazakhstan and authors' calculations.

Table 1 shows that Kazakhstan's trade surplus has increased since the creation of the Customs Union in 2010. However, surplus growth is not the result of the accession to the CU, because during the same period, Kazakhstan had a trade deficit with the CU countries which increased from \$2.68 billion to \$8.13 billion between 2010-2014. Kazakhstan has

huge X/M ratio (184.2% in 2014), while the X/M ratio with the CU countries is 44.2%. The main sources of trade surplus of Kazakhstan are raw materials such as metal, oil and gas (energy). In average (between 2010-2014) exports of mineral products account for 78.4% of total exports, and they are mostly imported into the European Union countries. In 2014 Kazakhstan had \$35.8 billion trade surplus with the European Union countries, and the X/M ratio was 515.8%. It becomes evident that the CU is mostly the reason of decreasing of the trade surplus of Kazakhstan. The reason of this situation is that the main trade partner of Kazakhstan in the CU (Russia, account for 96% of Kazakhstan-the CU trade) is not interested in the oil import (the oil export from Kazakhstan to Russia is less than 0.5% in 2014), which is the main export product of Kazakhstan.

**Figure: 1**  
**Sectoral Share of Kazakhstan’s Exports to the CU, (% , 1995-2014)**



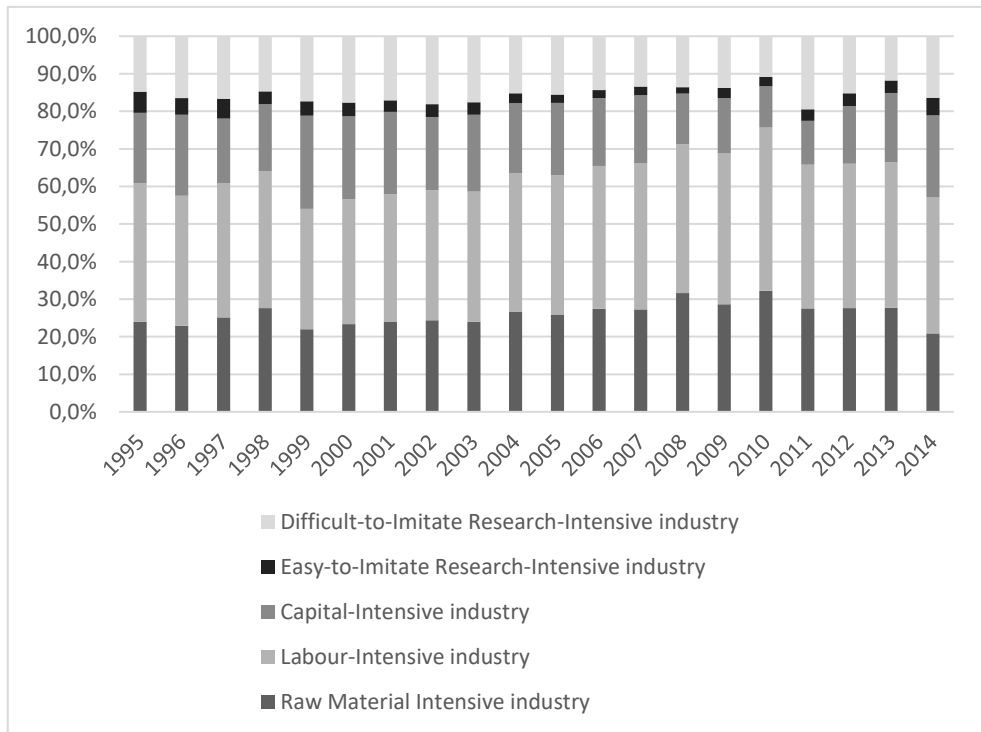
Source: UN COMTRADE and authors’ calculations.



Figure 1 and Figure 2 show the relation between exports and imports between Kazakhstan and the CU. Exports and imports are divided into five categories, namely, labor intensive industry, capital intensive industry, raw material intensive industry, easy to imitate research intensive industry, and difficult to imitate research intensive industry.

Figure 1 shows that since 2000 in Kazakhstan the share of raw material intensive industry in total exports has gradually decreased (49.9%, 82.1%, 66.4% and 50.0% in 1995, 2000, 2010 and 2014 respectively), while the share of easy to imitate research-intensive industry (14.2%, 2.3%, 8.9% and 14.3% in 1995, 2000, 2010 and 2014 respectively) and capital-intensive industry (23.3%, 9.2%, 20.0% and 23.7% in 1995, 2000, 2010 and 2014 respectively) have sustainably increased. In 2012, the exports of raw material intensive industry hit its minimum rate, while capital-intensive industry was at the highest level. Other categories have not radically changed.

**Figure: 2**  
**Sectoral Share of Kazakhstan's Import from the CU, (% , 1995-2014)**



Source: UN COMTRADE and authors' calculations.

Figure 2 shows that the shares of all categories of imports have not changed dramatically since 1995. According to Figure 2, we can say that raw material intensive

industry and labor-intensive industry are major import categories. In 2010, when the CU was created, the share of raw material intensive industry (23.9%, 23.3%, 32.2% and 20.9% in 1995, 2000, 2010 and 2014 respectively) and labor-intensive industry (37.0%, 33.3%, 43.5% and 36.3% in 1995, 2000, 2010 and 2014 respectively) in total imports were at their highest rate. Since 2011, their shares in total imports have gradually decreased, while the shares of easy to imitate research-intensive industry (5.7%, 3.7%, 2.4% and 4.7% in 1995, 2000, 2010 and 2014 respectively) and capital intensive industry (18.7%, 22.1%, 11.0% and 21.7% in 1995, 2000, 2010 and 2014 respectively) in total imports have been doubled.

#### 4. Data and Empirical Findings

To calculate our indices we used annual three-digit SITC Rev.3 data, which covers the export and import data of the CU member countries between 1998-2014. The entire data is sourced from UN COMTRADE. We classified the sectors into five categories: labour intensive industry, capital intensive industry, raw material intensive industry, easy to imitate research intensive industry, and difficult to imitate research intensive industry<sup>1</sup>. The data consist of 258 different industries at the three-digit level (62 labour intensive, 37 capital intensive, 79 raw material intensive, 28 easy to imitate research intensive, 52 difficult to imitate research intensive industries).

##### 4.1. Findings of Trade Entropy Index

We start our empirical analysis with the Trade Entropy Index, which shows the level of trade concentration and dispersion of a country.

**Table: 2**  
**Trade Entropy Index/TE Calculation Results of Kazakhstan to the CU (1998-2014)**

	Export		Import	
	Tex	RTE <sub>x</sub>	TE <sub>m</sub>	RTE <sub>m</sub>
1998	0.07	10.3%	0.15	21.4%
1999	0.06	8.3%	0.13	18.2%
2000	0.05	7.7%	0.08	12.2%
2001	0.02	2.9%	0.08	12.2%
2002	0.05	6.6%	0.10	14.7%
2003	0.04	5.5%	0.13	18.5%
2004	0.04	5.6%	0.13	19.0%
2005	0.05	7.4%	0.14	19.8%
2006	0.09	13.4%	0.14	19.6%
2007	0.12	17.9%	0.15	21.0%
2008	0.12	17.8%	0.13	18.4%
2009	0.08	11.3%	0.17	24.1%
2010	0.07	10.4%	0.18	26.0%
2011	0.07	10.4%	0.16	22.8%
2012	0.07	10.1%	0.16	23.3%
2013	0.06	8.0%	0.16	23.0%
2014	0.05	7.7%	0.21	29.9%

Source: UN COMTRADE authors' calculations.

<sup>1</sup> This classification which is also used by Yılmaz (2002) and Erlat and Erlat (2005) is based on Hufbauer and Chilas (1974). For details of this classification see Appendix A.

Table 2 shows that Kazakhstan has high export and import concentration in the CU. The TE index points out that, in general Kazakhstan has higher export concentration rather than import concentration. The highest level of export concentration was in 2001, while the highest level of export diversification was in 2007-2008. Since the creation of the CU, Kazakhstan has gradually decreased its export diversification. The reason for the decline of diversification was not only the creation the CU. Also the global economic crisis affected Kazakhstan's trade. Kazakhstan with a high export concentration implies that its trade is restricted to the CU. On the other hand, Kazakhstan has increased its import diversification since the creation of the CU. In 2014, Kazakhstan had the highest level of import diversification.

If trade entropy level to the CU market is high, it means that Kazakhstan is almost trading with all the CU members and TE will be maximum if Kazakhstan trades with all the CU members equally. Relative entropy ratios which are calculated based on the maximum entropy ratios seem to be reasonably reliable indicators in examining the level of the country's trade integration with the CU. Relative entropy ratios (RTE) are the maximum possible entropy ratios for import and export (for given countries). RTE<sub>ex</sub> and RTE<sub>im</sub> show the share of TEx and TE<sub>im</sub> in RTE. The increasing entropy indicators obviously imply the increasing degree of integration of Kazakhstan into the CU. The RTE<sub>ex</sub> and RTE<sub>im</sub> indicate that export and import diversification of Kazakhstan is substantially low (far away from its maximum level). At least it looks fair to come to a point that Kazakhstan's trade appears to be concentrated with the CU members to a certain degree. In general, from the TE index results we can conclude that the CU affects Kazakhstan's exports negatively, while affects imports positively, which eventually will decrease the trade balance.

**Table: 3**  
**Raw Materials Intensive industry: Aggregated Findings for Kazakhstan to the CU (1998-2014)**

	RCA1 (CEP)	RCA2	RCA3	RC	Brulhart B	
1998	1	0.3	2.2	0.4	0.8	0.8
1999	1	0.4	2.7	0.3		
2000	1.1	0.4	2.8	0.4		
2001	1.1	0.2	2.5	0.4		
2002	1.1	0.2	2.6	0.5		
2003	1.1	0.2	2.5	0.5		
2004	1.1	0.1	2.2	0.6		
2005	1.1	0	2.1	0.6		
2006	1	-0.1	1.9	0.6		
2007	1	-0.2	1.7	0.7		
2008	1	-0.2	1.5	0.7		
2009	1	-0.2	1.7	0.8		
2010	1	-0.1	1.5	0.9	0.8	
2011	1	-0.1	1.7	0.5		
2012	1	-0.3	1.3	0.6		
2013	1.1	-0.4	1.5	0.6		
2014	1.1	-0.1	2	0.5		

Source: UN COMTRADE authors' calculations.

## 4.2. Findings of Trade Measures and Competitiveness in the Raw Materials Intensive Industry

In the aggregate level, almost all indices except RCA2 after 2006 reveal comparative/competitive advantage (RCA/RC) for the full period (see Table 3). Brülhart-B index shows that this group is export oriented, which means that this sector increases Kazakhstan’s competitiveness. The results are coherent with the idea that Kazakhstan is raw material exporting country.

Table 4 presents the results of three-digit level disaggregated data for raw material intensive industries to be able to get rid of the well-known drawbacks of using aggregated data.

In the three digit disaggregated level, in 2014 RCA1 index shows that 21 out of 79 industries (26.6%) of the raw materials intensive industry group reveal comparative advantage, while in 1998 these 29 industries reveal comparative advantage. It is important to note that all indices show that Kazakhstan has decreased its number of industries in trade with the CU countries, which have comparative advantage, since the creation of the CU.

**Table: 4**  
**Raw Materials Intensive Industry: Disaggregated Findings for Kazakhstan to the CU- at the Three Digit Level (1998-2014)**

	RCA1 (CEP)		RCA2		RCA3		RC	
	Ind.	%	Ind.	%	Ind.	%	Ind.	%
1998	29	36.7	35	44.30	28	35.4	33	41.8
1999	29	36.7	30	37.97	23	29.1	35	44.3
2000	28	35.4	24	30.38	19	24.1	34	43.0
2001	28	35.4	25	31.65	24	30.4	35	44.3
2002	25	31.6	25	31.65	22	27.8	32	40.5
2003	29	36.7	28	35.44	22	27.8	34	43.0
2004	30	38.0	29	36.71	24	30.4	34	43.0
2005	30	38.0	26	32.91	23	29.1	33	41.8
2006	28	35.4	23	29.11	22	27.8	33	41.8
2007	29	36.7	21	26.58	26	32.9	35	44.3
2008	32	40.5	27	34.18	26	32.9	35	44.3
2009	25	31.6	23	29.11	25	31.6	32	40.5
2010	28	35.4	22	27.85	27	34.2	30	38.0
2011	26	32.9	17	21.52	24	30.4	29	36.7
2012	19	24.1	16	20.25	23	29.1	26	32.9
2013	20	25.3	17	21.52	24	30.4	27	34.2
2014	21	26.6	21	26.58	25	31.6	29	36.7

Source: UN COMTRADE authors calculations.

## 4.3. Findings of Trade Measures and Competitiveness in the Labour Intensive Industry

Unlike the raw materials intensive industry, all indices in the aggregated level of the labour intensive industry reveal comparative disadvantage (see Table 5). The results show that revealed comparative disadvantage mostly remains unchanged in this the period. Brulhart B index also shows that change in this group’s trade is import oriented. The creation of the CU and the global economic crisis do not have impact on this group.

**Table: 5**  
**Labour Intensive Industry: Aggregated Findings for Kazakhstan to the CU (1998-2014)**

	RCA1 (CEP)	RCA2	RCA3	RC	Brulhart B	
1998	0.3	-0.7	0.2	-1.8	-0.9	-0.9
1999	0.2	-0.7	0.2	-1.9		
2000	0.2	-0.9	0.1	-1.5		
2001	0.3	-0.7	0.3	-1.4		
2002	0.3	-0.7	0.3	-1.4		
2003	0.4	-0.8	0.2	-1.1		
2004	0.4	-0.8	0.2	-1.1		
2005	0.5	-0.8	0.3	-0.7		
2006	0.5	-0.8	0.2	-0.9		
2007	0.5	-0.9	0.2	-0.9		
2008	0.4	-0.8	0.2	-1.1		
2009	0.4	-0.9	0.2	-1		
2010	0.2	-0.9	0.1	-1.8	-0.9	
2011	0.2	-0.8	0.2	-1.8		
2012	0.3	-0.8	0.2	-1.5		
2013	0.2	-0.8	0.3	-1.8		
2014	0.2	-0.9	0.2	-2		

Source: UN COMTRADE authors' calculations.

Analyzed at the three-digit disaggregated level, when RCA1 is taken into consideration, only 5 out of 62 industries (8.1%) reveal comparative advantage in 2014 (within the labour intensive industry). In line with RCA1 index, other three indexes also show a low number of industries, which reveal comparative advantage. The number of industries of all indices ranges from its minimum 2 to its maximum 13 (3.2%-16.5%). The results obtained from disaggregated level mostly matches with the results obtained from aggregated level.

**Table: 6**  
**Labour Intensive Industry: Disaggregated Findings for Kazakhstan to the CU- at the Three Digit Level (1998-2014)**

	RCA1 (CEP)		RCA2		RCA3		RC	
	Ind.	%	Ind.	%	Ind.	%	Ind.	%
1998	6	9.7	7	11.3	5	8.1	7	11.3
1999	7	11.3	10	16.1	4	6.5	7	8.9
2000	3	4.8	2	3.2	3	4.8	4	5.1
2001	4	6.5	2	3.2	3	4.8	4	5.1
2002	5	8.1	2	3.2	3	4.8	5	6.3
2003	6	9.7	3	4.8	3	4.8	5	6.3
2004	4	6.5	3	4.8	4	6.5	6	7.6
2005	4	6.5	2	3.2	3	4.8	9	11.4
2006	4	6.5	3	4.8	4	6.5	8	10.1
2007	4	6.5	4	6.5	4	6.5	6	7.6
2008	5	8.1	4	6.5	4	6.5	6	7.6
2009	6	9.7	3	4.8	3	4.8	13	16.5
2010	6	9.7	4	6.5	3	4.8	8	10.1
2011	5	8.1	6	9.7	3	4.8	12	15.2
2012	6	9.7	4	6.5	3	4.8	8	10.1
2013	3	4.8	3	4.8	3	4.8	7	8.9
2014	5	8.1	2	3.2	4	6.5	6	7.6

Source: UN COMTRADE authors' calculations.

#### 4.4. Findings of Trade Measures and Competitiveness in the Capital Intensive Industry

In the aggregated level, the RCA1 and RC indices in all periods reveal comparative advantage, while RCA2 reveals comparative disadvantage at the same period. RCA3 index shows interesting results. Between 1998-2009 Kazakhstan had revealed comparative disadvantage, while since 2010 the index has revealed comparative advantage. However, Brulhart B index shows that change in trade at this industry after 2010, i.e. in the CU era, has been import-oriented resulting a decrease in the country's competitiveness while in the previous period (1998-2009) country had export oriented trade.

**Table: 7**  
**Capital Intensive Industry: Aggregated Findings for Kazakhstan to the CU (1998-2014)**

	RCA1 (CEP)	RCA2	RCA3	RC	Brulhart B	
1998	1.3	-0.7	0.2	0.5	0.3	-0.2
1999	1.4	-0.8	0.1	0.8		
2000	1.5	-0.6	0.3	0.7		
2001	1.5	-0.6	0.4	0.7		
2002	1.4	-0.5	0.5	0.6		
2003	1.3	-0.5	0.6	0.5		
2004	1.1	-0.5	0.6	0.3		
2005	1.1	-0.6	0.5	0.2		
2006	1.1	-0.6	0.6	0.1		
2007	1.1	-0.6	0.7	0.1		
2008	1.1	-0.4	0.9	0.1		
2009	1	-0.5	0.9	0		
2010	1.1	-0.3	1.1	0.3	-0.1	
2011	1.3	-0.2	1.4	0.4		
2012	1.3	-0.3	1.3	0.4		
2013	1	-0.5	1	0.2		
2014	1	-0.5	0.8	0.3		

Source: UN COMTRADE authors' calculations.

**Table: 8**  
**Capital Intensive Industry: Disaggregated Findings for Kazakhstan to the CU- at the Three Digit Level (1998-2014)**

	RCA1 (CEP)		RCA2		RCA3		RC	
	Ind.	%	Ind.	%	Ind.	%	Ind.	%
1998	9	24.3	8	21.6	8	21.6	11	29.7
1999	9	24.3	7	18.9	9	24.3	9	24.3
2000	10	27.0	7	18.9	10	27.0	12	32.4
2001	10	27.0	6	16.2	9	24.3	10	27.0
2002	10	27.0	7	18.9	9	24.3	9	24.3
2003	11	29.7	9	24.3	9	24.3	10	27.0
2004	12	32.4	10	27.0	9	24.3	9	24.3
2005	10	27.0	8	21.6	9	24.3	12	32.4
2006	10	27.0	8	21.6	9	24.3	10	27.0
2007	11	29.7	7	18.9	9	24.3	10	27.0
2008	10	27.0	8	21.6	10	27.0	9	24.3
2009	10	27.0	9	24.3	10	27.0	11	29.7
2010	10	27.0	8	21.6	10	27.0	8	21.6
2011	12	32.4	10	27.0	10	27.0	10	27.0
2012	10	27.0	8	21.6	10	27.0	8	21.6
2013	9	24.3	8	21.6	10	27.0	8	21.6
2014	9	24.3	8	21.6	10	27.0	9	24.3

Source: UN COMTRADE authors' calculations.

The results obtained at three digits disaggregated level shows that in capital intensive industry nearly 25% of industries reveal comparative advantage. In 2014, RCA1 index shows that 9 out of 37 industries (24.3%) reveal comparative advantage, and this number was the same in 1998. In line with RCA1, RCA2 index shows the same number of industries in 1998 and in 2014. Unlike these two indices, RCA3 index shows 8 industries (21.6%) in 1998, while in 2010 the index shows 10 industries (27%). However, RC index had adverse results, with 11 industries (29.7) in 1998 and with 9 industries (24.3%) in 2014.

#### 4.5. Findings of Trade Measures and Competitiveness in the Easy to Imitate Research Intensive Industry

In the aggregate level, RCA1, RCA2 and RCA3 indices show that Kazakhstan's trade reveals comparative advantage in 2014 while RC index reveals comparative disadvantage. However, in 1998, all indices revealed comparative advantage. Brühlhart-B index also confirms that change in trade at this industry after 1995, i.e. in the CU era, has been import-oriented resulting a decrease in the country's competitiveness.

**Table: 9**  
**Capital Intensive Industry: Aggregated Findings for Kazakhstan to the CU (1998-2014)**

	RCA1 (CEP)	RCA2	RCA3	RC	Brulhart B	
1998	1.7	0.1	1.5	0.3	-0.1	-0.2
1999	1.6	0.2	1.7	0.3		
2000	0.4	-0.6	0.3	-1.7		
2001	0.5	-0.6	0.4	-1.4		
2002	0.9	-0.7	0.3	-0.3		
2003	0.7	-0.6	0.4	-0.7		
2004	0.6	-0.5	0.5	-1		
2005	0.7	-0.3	1.2	-1		
2006	1	-0.3	1.4	-0.6		
2007	1	0	2.6	-0.6		
2008	1.1	-0.1	1.7	-0.4		
2009	1.7	-0.2	1.8	0.1		
2010	1.7	-0.1	1.7	-0.3	-0.5	
2011	1.2	-0.5	0.8	-0.4		
2012	1.4	-0.1	2.3	-0.2		
2013	1.3	-0.2	1.9	-0.4		
2014	1.2	0	2.4	-0.3		

Source: UN COMTRADE authors' calculations.

When RCA1 is taken into consideration 3 out of 28 industries (within the easy to imitate research intensive industry) revealed comparative advantage (10.7 %) in 2014, while in 1998, 4 industries revealed comparative advantage (14.3 %). If RCA2 is examined instead of RCA1, 6 out of 28 industries (21.4 %) revealed comparative advantage in 2014. RCA3 index is in accord with RCA1 index. According to the results, 3 out of 28 industries (10.7%) in 2014 and 4 out of 28 industries (14.3%) in 1998 revealed comparative advantage. According to RC index, the number of industries revealing competitive advantages increases significantly from 2 in 1998 (7.1%) to 5 in 2014 (17.9 %).

**Table: 10**  
**Easy to Imitate Research Intensive Industry: Disaggregated Findings for Kazakhstan to the CU- at the Three Digit Level (1998-2014)**

	RCA1 (CEP)		RCA2		RCA3		RC	
	Ind.	%	Ind.	%	Ind.	%	Ind.	%
1998	4	14.3	3	10.7	4	14.3	2	7.1
1999	7	25.0	4	14.3	4	14.3	6	21.4
2000	4	14.3	4	14.3	5	17.9	5	17.9
2001	5	17.9	1	3.6	4	14.3	5	17.9
2002	6	21.4	1	3.6	3	10.7	5	17.9
2003	7	25.0	2	7.1	3	10.7	5	17.9
2004	6	21.4	2	7.1	2	7.1	6	21.4
2005	4	14.3	4	14.3	3	10.7	6	21.4
2006	4	14.3	2	7.1	3	10.7	5	17.9
2007	3	10.7	2	7.1	3	10.7	6	21.4
2008	4	14.3	3	10.7	3	10.7	4	14.3
2009	3	10.7	4	14.3	3	10.7	3	10.7
2010	2	7.1	3	10.7	3	10.7	4	14.3
2011	3	10.7	4	14.3	3	10.7	3	10.7
2012	3	10.7	5	17.9	3	10.7	4	14.3
2013	2	7.1	4	14.3	3	10.7	3	10.7
2014	3	10.7	6	21.4	3	10.7	5	17.9

Source: UN COMTRADE authors' calculations.

#### 4.6. Findings of Trade Measures and Competitiveness in the Difficult to Imitate Research Intensive Industry

In the aggregate level, all indices in Table 11 show revealed comparative/competitive disadvantage. It is also important to note that indices do not change significantly in this period. Brulhart-B index is also confirmative in the sense that change in trade within this group is import-oriented resulting a decrease in Kazakhstan's competitiveness.

Below, we examined revealed comparative advantage in three-digit disaggregated level. Although the aggregated data shows comparative disadvantage, specific industry may reveal comparative advantage.

**Table: 9**  
**Capital Intensive Industry: Aggregated Findings for Kazakhstan to the CU (1998-2014)**

	RCA1 (CEP)	RCA2	RCA3	RC	Brulhart B	
	1998	0.4	-0.6	0.3	-1.2	-1
1999	0.5	-0.5	0.4	-1.1		
2000	0.3	-0.7	0.2	-1.7		
2001	0.3	-0.7	0.3	-1.7		
2002	0.2	-0.8	0.2	-2.1		
2003	0.2	-0.8	0.2	-2		
2004	0.2	-0.8	0.2	-2.2		
2005	0.3	-0.8	0.3	-1.8		
2006	0.5	-0.8	0.3	-1.4		
2007	0.5	-0.8	0.3	-1.3		
2008	0.5	-0.8	0.3	-1.4		
2009	0.2	-0.9	0.2	-2.2		
2010	0.2	-0.8	0.2	-2.7	-0.6	
2011	0.3	-0.9	0.2	-1.6		
2012	0.3	-0.8	0.2	-1.7		
2013	0.3	-0.8	0.3	-1.9		
2014	0.4	-0.8	0.3	-1.3		

Source: UN COMTRADE authors' calculations.



According to RCA1 and RC indices, in three-digit disaggregated level, 7 out of 52 (13.5%) industries reveal comparative advantage in 2014. For the two indices the number of industries, which reveal comparative advantage, was also 7 in 1998. RCA2 index reveals comparative advantage in 7 out of 52 (13.5%) industries in 1998. This number decreased from 7 to 3 in 2014, showing the decreasing number of industries which have comparative advantage.

**Table: 12**  
**Difficult to Imitate Research Intensive Industry: Disaggregated Findings for Kazakhstan to the CU- at the Three-Digit Level (1998-2014)**

	RCA1 (CEP)		RCA2		RCA3		RC	
	Ind.	%	Ind.	%	Ind.	%	Ind.	%
1998	7	13.5	7	13.5	5	9.6	7	13.5
1999	6	11.5	9	17.3	5	9.6	11	21.2
2000	4	7.7	3	5.8	0	0.0	6	11.5
2001	5	9.6	4	7.7	1	1.9	6	11.5
2002	6	11.5	2	3.8	0	0.0	5	9.6
2003	5	9.6	4	7.7	2	3.8	6	11.5
2004	3	5.8	1	1.9	2	3.8	5	9.6
2005	2	3.8	4	7.7	2	3.8	6	11.5
2006	3	5.8	4	7.7	2	3.8	3	5.8
2007	3	5.8	3	5.8	2	3.8	5	9.6
2008	4	7.7	5	9.6	2	3.8	5	9.6
2009	2	3.8	3	5.8	1	1.9	3	5.8
2010	2	3.8	4	7.7	1	1.9	2	3.8
2011	5	9.6	2	3.8	1	1.9	3	5.8
2012	2	3.8	2	3.8	1	1.9	6	11.5
2013	3	5.8	3	5.8	1	1.9	4	7.7
2014	7	13.5	3	5.8	2	3.8	7	13.5

Source: UN COMTRADE authors' calculations.

Because we use different indices, there may be a doubt that the results are consistent. There is a huge literature on the consistency of these indices. For example, Simsek et al. (2010) conducted various types of consistency tests (Spearman Rank Correlation Coefficient, Kruskal-Wallis test, Dichotomous consistency test) for these indices, to find out whether the results are consistent. Authors found that the indices are suitable for neither cardinal nor ordinal measurements since the results are not consistent. However, the test results offer more support if the results of the indices are used to measure the binary comparative advantages. In conclusion, we can say that these indices are more suitable to determine whether the industry has comparative advantage or not, rather than in determining the degree of comparative advantage in the industries.

## 5. Conclusion

This paper provides evidence on the competitiveness of Kazakhstan in the CU market. We have conducted our analysis by using different types of indices (RCA1, RCA2, RCA3, RC, TE and Brulhart B index), calculated for 1998-2014 period. We have used different types of indices because all calculated indices show different aspects of trade competitiveness. To observe revealed comparative advantage, we employed Balassa's revealed comparative advantage indices (RCA1, RCA2, RCA3) and Vollrath's revealed competitiveness index (RC). As an intra-industry trade measure, we have employed Brülhart B Intra-Industry Trade Index. In addition, we have employed Trade Entropy Index (TE) as

a measure of trade concentration/dispersion. It is also important that RCA calculations are based on observed (revealed) trade data, which can be perverted by government trade policies. However, in our case, the CU member countries do not implement protective trade policies against each other.

The results in aggregated level show that raw materials intensive industry reveal comparative advantage of Kazakhstan's trade in the CU market. In aggregated level, all indices of labour intensive industry reveal comparative/competitive disadvantage. In capital intensive industry, original Balassa's index and Volrath's RC index reveal comparative advantage while other Balassa's indices reveal comparative disadvantage. In easy-to-imitate research-intensive industry, two Balassa's indices reveal comparative advantage, while RCA2 and RC mostly reveal comparative/competitive disadvantage in the period. On the other hand, all indices in the difficult-to-imitate research-intensive industry reveal comparative disadvantage. To eliminate the aggregation problem, we also analyzed sectors in three-digit disaggregated level. For example, despite the fact that in aggregated level, industry shows comparative disadvantage, some of the industries may reveal comparative advantage, and analysis in disaggregated level allows observing such industries. We also examined Trade Entropy Index, which shows that Kazakhstan's trade in the CU market is highly concentrated.

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## Appendix A

### Raw Materials Intensive industry

SITC 0 Food and Live Animals

SITC 2 Crude Material, Inedible, Except Fuels (excluding 26)

SITC 3 Mineral Fuels, Lubricants and Related Materials (excluding 35)

SITC 4 Animal and Vegetable Oils, Fats and Waxes

SITC 56 Fertilizers (Other Than Those of Group 272)

### Labour Intensive industry

SITC 26 Textile Fibres (Other Than Wool Tops and Other Combed Wool) and Their Wastes (Not Manufactured Into Yarn or Fabric)

SITC 6 Manufactured Goods Classified Chiefly by Material (excluding 62, 67, 68)

SITC 8 Miscellaneous Manufactured Articles (excluding 88, 87)

### Capital Intensive industry

SITC 1 Beverages and Tobacco

SITC 35 Electric Current

SITC 53 Dyeing, Tanning and Colouring Materials

SITC 55 Essential Oils and Resinoids and Perfume Materials; Toilet, Polishing and Cleansing Preparations

SITC 62 Rubber Manufactures, n.e.s.

SITC 67 Iron and Steel

SITC 68 Non-Ferrous Metals

SITC 78 Road Vehicles (Including Air-Cushion Vehicles)

### Easy to Imitate Research Intensive industry

SITC 51 Organic Chemicals

SITC 52 Inorganic Chemicals

SITC 54 Medicinal and Pharmaceutical Products

SITC 58 Plastics in Non-Primary Forms

SITC 59 Chemical Materials and Products, n.e.s.

SITC 75 Office Machines and Automatic Data-Processing Machines

SITC 76 Telecommunications and Sound-Recording and Reproducing Apparatus and Equipment

### Difficult to Imitate Research Intensive industry

SITC 57 Plastics in Primary Forms

SITC 7 Machinery and Transport Equipment (excluding 75, 76, 78)

SITC 87 Professional, Scientific and Controlling Instruments and Apparatus, n.e.s.

SITC 88 Photographic Apparatus, Equipment and Supplies and Optical Goods, n.e.s.; Watches and Clocks

## Appendix B

### I. Raw Material Intensive industry

#### Full period three-digit level sectors revealing RCA/RC when all indices examined

041 wheat (including spelt) and meslin, unmilled (RCA1, RCA2, RCA3, )

046 meal and flour of wheat and flour of meslin (RCA1, RCA3, RC,)

211 hides and skins (except furskins), raw (RCA1, RCA3, RC,)

263 cotton textile fibers

268 wool and other animal hair (including wool tops) (RCA2, RCA3, RC,)

273 stone, sand and gravel (RCA1, RC,)

278 crude minerals, N.E.S.

281 iron ore and concentrates (RCA1, RCA2, RCA3, )

282 ferrous waste and scrap; remelting ingots of iron or steel (RCA3, RC,)

287 ores and concentrates of base metals, n.e.s. (RCA1, RCA2, RC,)

321 coal, pulverized or not, but not agglomerated (RCA2, RCA3, )

322 briquettes, lignite and peat (RCA2, RCA3, )

333 petroleum oils and oils from bituminous minerals, crude (RCA1, RCA3, )

#### Sectors changing from RCD to RCA during the period (1998-2014)

042 rice (2013 onwards - RCA1, RC,)

212 furskins, raw (including furskin heads, tails and other pieces or cuttings, suitable for furriers' use) (2010 onwards - RCA3, RC,)

222 oil seeds and oleaginous fruits used for the extraction of soft fixed vegetable oils (excluding flours and meals) (2013 onwards - RCA1, RCA3, RC,)

223 oil seeds and oleaginous fruits, whole or broken, of a kind used for extracting other fixed vegetable oils (including their flours and meals, n.e.s.) (2008 onwards - RCA1, RCA3, )

274 sulfur and unroasted iron pyrites (2003 onwards)

283 copper ores and concentrates; copper mattes; cement copper (2004 onwards)

285 aluminum ores and concentrates (including alumina) (2000 onwards - RCA1, RCA3, RC,)

288 nonferrous base metal waste and scrap, n.e.s. (2009 onwards)

292 crude vegetable materials, n.e.s. (2010 onwards - RCA1, RC,)

322 briquettes, lignite and peat (2012 onwards - RCA1, RC,)

342 liquefied propane and butane (2013 onwards - RCA1, RCA3, RC,)

343 natural gas, whether or not liquefied (2007 onwards - RCA2, RCA3, )

344 petroleum gases and other gaseous hydrocarbons, n.e.s. (2010 onwards)

#### Sectors changing from RCA to RCD in the during the period (1998-2014)

001 live animals other than animals of division 03 (2010 onwards - RCA1, RC,)

011 meat of bovine animals, fresh, chilled or frozen (2010 onwards)

012 meat, other than of bovine animals, and edible offal, fresh, chilled or frozen (except meat and meat offal not suitable for human consumption) (2008 onwards - RCA1, RCA2, RC,)

024 cheese and curd (2003 onwards - RCA2, RC,)

034 fish, fresh (live or dead), chilled or frozen (2010 onwards - RCA1, RCA2, )

035 fish, dried, sld r in brine; smkd fish (wheth r nt cookd before or durng the smokng process); flours, meals n pellets r fish, fit f human consumpnt (2006 onwards - RCA1, RCA3, )

037 fish, crustaceans, molluscs and other aquatic invertebrates, prepared or preserved, n.e.s. (2006 onwards - RCA1, RCA3, RC,)

044 maize (not including sweet corn) unmilled (2007 onwards - RCA1, RCA2, )

045 cereals, unmilled (other than wheat, rice, barley and maize) (2009 onwards - RCA1, RC,)

048 cereal preparations and preparations of flour or starch of fruits or vegetables (1999 onwards - RCA1, RC,)

056 vegetables, roots and tubers, prepared or preserved, n.e.s. (2002 onwards - RCA2, RC,)

059 fruit juices (incl. grape must) and vegetable juices, unfermented and not containing added spirit, whether or not containing added sweetening matter (2010 onwards - RCA1, RC,)

061 sugars, molasses, and honey (2007 onwards - RCA1, RCA2, RC,)

231 natural rubber, balata, gutta-percha, guayule, chicle and similar natural gums, in primary forms (including latex) or in plates, sheets or strip (2009 onwards)

269 worn clothing and other worn textile articles; rags (2000 onwards - RCA1, RCA2, )

273 stone, sand and gravel (2009 onwards - RCA2, RCA3, )

284 nickel ores and concentrates; nickel mattes, nickel oxide sinters and other intermediate products of nickel metallurgy (2009 onwards - RCA1, RCA2, )

291 crude animal materials, n.e.s. (2010 onwards - RCA1, RCA3, )

335 residual petroleum products, n.e.s. and related materials (2010 onwards - RCA2, RCA3, RC,)

421 fixed vegetable fats and oils, soft, crude, refined or fractionated (2005 onwards - RCA1, RC,)

#### Industries revealing RCA/RC but losing competitive power in time according to Brühlhart-B index (import-oriented change in time)

211 hides and skins (except furskins), raw (RCA1, RCA3, RC,)

263 cotton textile fibers

268 wool and other animal hair (including wool tops) (RCA2, RCA3, RC,)

273 stone, sand and gravel (RCA1, RC,)

333 petroleum oils and oils from bituminous minerals, crude (RCA1, RCA3, )

#### Industries revealing RCD/RC but gaining competitive power in time according to Brühlhart-B index (export-oriented change in time)

232 synthetic rubber; reclaimed rubber; waste, pairings and scrap of unhardened rubber (RCA1, RCA2, RCA3, RC,)

244 cork, natural, raw and waste (including natural cork in blocks or sheets) (RCA1, RCA2, RCA3, RC,)

## **II. Labour Intensive**

### Full period three-digit level sectors revealing RCA/RC when all indices examined

671 pig iron and spiegeleisen, sponge iron, iron or steel granules and powders and ferroalloys (RCA1, RCA3, RC,)

673 iron or nonalloy steel flat-rolled products, not clad, plated or coated (RCA1, RCA3, RC,)

682 copper (RCA1, RCA3, RC,)

685 lead (RCA1, RCA3, RC,)

686 zinc

689 miscellaneous nonferrous base metals employed in metallurgy and cermets (RCA1, RCA3, RC,)

### Sectors changing from RCD to RCA during the period (1998-2014)

611 leather (2001 onwards - RCA3, RC,)

674 iron and nonalloy steel flat-rolled products, clad, plated or coated (2000 onwards - RCA1, RCA3, RC,)

684 aluminium (2009 onwards - RCA2, RCA3, )

### Sectors changing from RCA to RCD in the during the period (1998-2014)

642 paper and paperboard, cut to size or shape, and articles of paper or paperboard (2010 onwards - RCA1, RC,)

651 textile yarn (2010 onwards - RCA3, RC,)

692 metal containers for storage or transport (2004 onwards - RCA1, RC,)

844 women's or girls' coats, capes, jackets, suits, trousers, dresses, underwear, etc. (except swimwear and coated etc. apparel), knitted or crocheted (2010 onwards - RCA3, RC,)

891 arms and ammunition (2000 onwards - RCA1, RCA3, )

896 works of art, collectors' pieces and antiques (2010 onwards - RCA1, RCA3, )

### Industries revealing RCA/RC but losing competitive power in time according to Brühlhart-B index (import-oriented change in time)

682 copper (RCA1, RCA3, RC,)

685 lead (RCA1, RCA3, RC,)

### Industries revealing RCD/RC but gaining competitive power in time according to Brühlhart-B index (export-oriented change in time)

NONE!

## **III. Capital-Intensive industry**

### Full period three-digit level sectors revealing RCA/RC when all indices examined

NONE!

### Sectors changing from RCD to RCA during the period (1998-2014)

111 nonalcoholic beverages, n.e.s. (2013 onwards - RCA1, RC,)

### Sectors changing from RCA to RCD in the during the period (1998-2014)

122 tobacco, manufactured (whether or not containing tobacco substitutes) (2006 onwards - RCA1, RCA2, RC,)

533 pigments, paints, varnishes and related materials (2008 onwards - RCA1, RC,)

551 essential oils, perfume and flavor materials (2010 onwards - RCA1, RC,)

### Industries revealing RCA/RC but losing competitive power in time according to Brühlhart-B index (import-oriented change in time)

NONE!

### Industries revealing RCD/RC but gaining competitive power in time according to Brühlhart-B index (export-oriented change in time)

NONE!

## **IV. Easy-to-Imitate Research industry**

### Full period three-digit level sectors revealing RCA/RC when all indices examined

524 inorganic chemicals, n.e.s.; organic and inorganic compounds of precious metals (RCA2, RCA3, )

### Sectors changing from RCD to RCA during the period (1998-2014)

525 radioactive and associated materials (2005 onwards)

### Sectors changing from RCA to RCD in the during the period (1998-2014)

511 hydrocarbons, n.e.s. and their halogenated, sulfonated, nitrated or nitrosated derivatives (2001 onwards - RCA3, RC,)

522 inorganic chemical elements, oxides and halogen salts (2008 onwards - RCA1, RCA2, RC,)

524 inorganic chemicals, n.e.s.; organic and inorganic compounds of precious metals (2009 onwards - RCA1, RC,)

591 insecticides, fungicides, herbicides, plant growth regulators, etc., disinfectants and similar products, put up or packed for retail sale, etc. (2001 onwards - RCA1, RC,)

597 prepared additives for mineral oils etc.; liquids for hydraulic transmissions; antifreezes and deicing fluids; lubricating preparations (2008 onwards - RCA1, RC,)

598 miscellaneous chemical products, n.e.s. (2007 onwards - RCA1, RC,)

### Industries revealing RCA/RC but losing competitive power in time according to Brühlhart-B index (import-oriented change in time)

NONE!

### Industries revealing RCD/RC but gaining competitive power in time according to Brühlhart-B index (export-oriented change in time)

593 explosives and pyrotechnic products (RCA1, RCA2, RCA3, RC,)

**V. Difficult-to-imitate Research-Intensive industry**

Full period three-digit level sectors revealing RCA/RC when all indices examined

NONE!

Sectors changing from RCD to RCA during the period (1998-2014)

579 waste, parings and scrap, of plastics (2013 onwards)

737 metalworking machinery (other than machine tools) and parts thereof, n.e.s. (2013 onwards - RCA1, RC.)

746 ball or roller bearings (2002 onwards - RCA1, RCA2, RC.)

752 automatic data processing machines and units thereof; magnetic or optical readers; machines transcribing coded media and processing such data, n.e.s. (2011 onwards - RCA1, RCA2, RC.)

Sectors changing from RCA to RCD in the during the period (1998-2014)

572 polymers of styrene, in primary forms (2009 onwards)

722 tractors (other than mechanical handling equipment) (2000 onwards - RCA2, RCA3, )

724 textile and leather machinery, and parts thereof, n.e.s. (2009 onwards - RCA1, RCA2, RC.)

725 paper mill and pulp mill machinery, paper cutting machines and machinery for the manufacture of paper articles; parts thereof (2009 onwards - RCA1, RCA2, RC.)

726 printing and bookbinding machinery, and parts thereof (2009 onwards - RCA1, RC.)

727 food-processing machines (excluding domestic) (2002 onwards - RCA1, RC.)

728 machinery and equipment specialized for particular industries, and parts thereof, n.e.s. (2002 onwards - RCA1, RC.)

733 machine tools for working metal, sintered metal carbides or cermets, without removing material (2003 onwards - RCA1, RCA2, RCA3, )

742 pumps for liquids, whether or not fitted with a measuring device; liquid elevators; parts for such pumps and liquid elevators (2000 onwards)

744 mechanical handling equipment, and parts thereof, n.e.s. (2000 onwards - RCA1, RC.)

761 tv receivers (including video monitors & projectors) wheth r nt incorp radiobroadcast receivers or sound or video recording or reproducing apparatus (2010 onwards)

762 radio-broadcast receivers, whether or not incorporating sound recording or reproducing apparatus or a clock (2008 onwards - RCA1, RCA2, RC.)

774 electro-diagnostic apparatus for medical, surgical, dental or veterinary sciences and radiological apparatus (2006 onwards - RCA1, RCA2, RC.)

Industries revealing RCA/RC but losing competitive power in time according to Brühlhart-B index (import-oriented change in time)

NONE!

Industries revealing RCD/RC but gaining competitive power in time according to Brühlhart-B index (export-oriented change in time)

714 engines and motors, nonelectric (other than steam turbines, internal combustion piston engines and power generating machinery); parts thereof, n.e.s. (RCA1, RCA2, RCA3, RC.)