The study of the influence of interregional integration on the level of digital development of the EAEU countries

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Abstract — The Eurasian Economic Union (EAEU) is quite a new regional integration association and it is not only faced with institutional challenges of growth (the opposition of the national elite, unification of rules and standards, specific model of resolving economic disputes), but also challenges posed by volatile situation on both national and global markets (the strengthening of trade war between the US and China). The problem is that all the running costs of the integration association are paid by the largest economy of the association, and in this case it's the Russian economy. Due to budget constraints related to the decline in federal budget revenues from raw material exports, the systemic disproportions of the national economy, the sanctions confrontation with the West, it becomes especially relevant to study how the EAEU functioning affects the mid- and long-term competitiveness of the member countries. The purpose of this study is to determine the impact of interregional integration processes on the level of digital development of the EAEU member countries. Based on the data taken from Global Innovation Index reports of the Eurasian Economic Commission for the period 2011-2018, we used the methods of economic and mathematical modeling to verify the hypothesis of evening out the level of digital development of the EAEU member countries due to the relative mobility of factors of production. The study showed that the hypothesis stated earlier was not confirmed in the long term.

Keywords — interregional trade, the EAEU, digital development, P. Krugman, integration, correlation analysis

I. INTRODUCTION

The creation of the Eurasian Economic Union (EAEU) in 2015 can be seen as the most significant economic event in the post-Soviet space after its collapse. In fact, the creation of the EAEU has finalized the borders of post-Soviet integration: Moldova, Georgia, Ukraine have formed a bloc of hypothetical "enemies" and made a choice in favor of European integration; Tajikistan is a potential candidate to widen the association; Azerbaijan, Turkmenistan, Uzbekistan remain neutral and balance between the power centers of the East (China) and the West (EU) [1].

The problem is that the objective difficulties of the EAEU institutionalization are exposed to exogenous shocks related to the slowdown of the global economic growth and the volatile situation in the global commodity markets. On top of this, Russia bears all economic running costs of the EAEU as its largest economy, on the one hand, and relays the challenges of the structural distortions of the economy, recession, and decline of real disposable income (due to the lack of growth drivers) to the economies of the EAEU member countries.

In these circumstances, the question remains what win-loss ratio is for the Russian economy due to participating in the integration processes in the post-Soviet economic space. The underestimation of the opportunity costs of integration, the lack of balanced economic feasibility study of creation of that kind of an integration association, in reality, leads to not only growth of prices and tariffs for the population or re-export of prohibited products, but often also to political confrontation of the leaders of union countries, which brings them to political bargaining and economic blackmail.

To date, the science of economics has accumulated a wealth of data, fundamental research that allow us to take a more sober look at the ratio between the benefits and the costs of creating an integration union, to anticipate, and thus minimize the negative effects of its creation and functioning.

On the one hand, there is a certain consensus in the economic literature – integration associations generate both positive and negative effects for the participating countries (Viner, 1950; Meade, 1955; Lipsey, Corden, Kraus, Mikaeli, 1960-70) [7-9]. On the other hand, if we talk about economic studies directly related to the assessment of the effects of integration within EAEU, it can be noted that, surprisingly, they are clearly politically biased. For example, a significant number of the Western researchers view the creation of the EAEU as part of restoring Moscow's hegemony within the post-Soviet space, as exclusively geopolitical and even Kremlin's post-imperialist project (Allison, 2008; Collins, 2009; Bugarski, 2004; Lucas,
The problem is that the assessment of the EAEU in the economic literature is usually theoretical due to the short period of its existence, the lack of a statistically significant accumulation of data, and unstable institutional framework.

In this sense, Nobel Prize winner for economics Paul Krugman's "Interregional and International Trade: Different Causes, Different Trends?" is particularly interesting due to the thesis that the causes of the international and interregional trade are fundamentally different [1]. In particular, the leading growth driver of the interregional trade is the effect of economies of scale, because the relative mobility of the production factors leads to smoothing the productivity and technology development levels [6].

The purpose of the study is to identify the impact of the interregional integration on the level of digital development of the EAEU member countries.

Hypothesis of study: the level of digital development of member countries of an integration association within interregional integration will be gradually leveled out due to open borders and free movement of production factors.

The hypothesis is supported by the fact that the national economies within the EAEU are about the same level of digital development (see Table 1). This digital gap creates opportunities for greater diversification of the commodity structure of trade flows within the EAEU than in foreign trade with other countries (which technological level may be higher).

II. STUDY METHODOLOGY

1. Study period – 8 years, long-term.
2. Studied parameters:
   - the economy's innovation performance, the score awarded in Global Innovation Index 2011-18;
   - foreign mutual trade of the EAEU, bln. USD;
3. Countries examined: Russia, Belarus, Kazakhstan, Armenia, Kyrgyzstan.
4. Research methods: the correlation analysis was used to test the hypothesis. The Chaddock scale was used to classify the correlation according to the value of the linear correlation coefficient. The presence or lack of correlation between the studied parameters can only be found after verifying the significance of the correlation coefficient. The significance level was set at 5% during the study to verify the significance of the correlation coefficient.
5. The "R-Studio" software product was used to conduct the correlation analysis in the study.

It is necessary to note several methodological caveats: 1) the study covers 2011-18 because it is the period of operation of the Customs Union of Russia, Belarus, and Kazakhstan (hereinafter – CU RBK), which became the institutional backbone of the EAEU; 2) the total share of Kyrgyzstan and Armenia in mutual trade of the EAEU member countries is less than 1%, and these data have no significant impact on the overall dynamics of the processes studied.

Data for correlation analysis are presented in Table 2.

III. MAIN PART

Visual analysis of the data is presented in Figure 1.

![Fig. 1. Scatter plot between the foreign mutual trade of the EAEU countries and their economies' innovation performance (Source: Made by the authors)](image-url)


<table>
<thead>
<tr>
<th>Countries</th>
<th>12th pillar: Innovation capability, Score</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Interaction and diversity</td>
</tr>
<tr>
<td>Russia</td>
<td>42.6</td>
</tr>
<tr>
<td>Kazakhstan</td>
<td>35.4</td>
</tr>
<tr>
<td>Armenia</td>
<td>40.6</td>
</tr>
<tr>
<td>Kyrgyzstan</td>
<td>29.5</td>
</tr>
</tbody>
</table>

* There are no data on Belarus in the WEF report.

**TABLE II. DATA FOR CORRELATION ANALYSIS, 2011-18**

<table>
<thead>
<tr>
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</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Foreign mutual trade (total export and import), bln. USD</td>
<td>126149.9</td>
<td>135633.1</td>
<td>128892.0</td>
<td>116942.5</td>
<td>91269.9</td>
<td>85387.5</td>
<td>108524.1</td>
<td>119993.9</td>
</tr>
<tr>
<td></td>
<td>Foreign external trade (total export and import)</td>
<td>907231.2</td>
<td>934586.0</td>
<td>932960.8</td>
<td>868696.6</td>
<td>579382.5</td>
<td>509372.7</td>
<td>634193.8</td>
<td>753525.4</td>
</tr>
<tr>
<td>Russia</td>
<td>Global Innovation Index</td>
<td>35.85</td>
<td>37.9</td>
<td>37.2</td>
<td>39.1</td>
<td>39.3</td>
<td>38.5</td>
<td>38.7</td>
<td>38.9</td>
</tr>
<tr>
<td>Belarus</td>
<td></td>
<td>n/a</td>
<td>32.9</td>
<td>34.6</td>
<td>37.1</td>
<td>38.2</td>
<td>30.3</td>
<td>29.9</td>
<td>29.35</td>
</tr>
<tr>
<td>Kazakhstan</td>
<td></td>
<td>30.32</td>
<td>31.9</td>
<td>32.7</td>
<td>32.7</td>
<td>31.25</td>
<td>31.51</td>
<td>31.50</td>
<td>31.42</td>
</tr>
<tr>
<td>Armenia</td>
<td></td>
<td>33.00</td>
<td>34.5</td>
<td>37.59</td>
<td>36.06</td>
<td>37.31</td>
<td>35.14</td>
<td>35.65</td>
<td>32.81</td>
</tr>
<tr>
<td>Kyrgyzstan</td>
<td></td>
<td>29.79</td>
<td>26.4</td>
<td>26.98</td>
<td>27.75</td>
<td>27.96</td>
<td>26.62</td>
<td>28.01</td>
<td>27.56</td>
</tr>
</tbody>
</table>

**Source: Compiled by the authors using the following data [2-3]**
Next, we present scripts which were used to calculate the correlation using the R language and the R-studio between:

- foreign mutual trade of the EAEU countries and their economies’ innovation performance.

```r
cor.test(FTMT,GII_RF)
##
## Pearson's product-moment correlation
##
## data:  FTMT and GII_RF
## t = -1.7111, df = 6, p-value = 0.1379
## alternative hypothesis: true correlation is not equal to 0
## 95 percent confidence interval:
## -0.9100836  0.2213108
## sample estimates:
## cor
## -0.5726712

cor.test(FTMT,GII_ARM)
##
## Pearson's product-moment correlation
##
## data:  FTMT and GII_ARM
## t = -1.1511, df = 5, p-value = 0.3018
## alternative hypothesis: true correlation is not equal to 0
## 95 percent confidence interval:
## -0.9004090  0.4507074
## sample estimates:
## cor
## -0.3576822

cor.test(FTMT,GII_KAZ)
##
## Pearson's product-moment correlation
##
## data:  FTMT and GII_KAZ
## t = 0.61155, df = 6, p-value = 0.5633
## alternative hypothesis: true correlation is not equal to 0
## 95 percent confidence interval:
## -0.5576274  0.8088389
## sample estimates:
## cor
## 0.2422277

cor.test(FTMT,GII_ARM)
##
## Pearson's product-moment correlation
##
## data:  FTMT and GII_ARM
## t = -1.2646, df = 6, p-value = 0.2529
## alternative hypothesis: true correlation is not equal to 0
## 95 percent confidence interval:
## -0.8791983  0.3634193
## sample estimates:
## cor
## -0.4587308

cor.test(FTMT,GII_KIRG)
##
## Pearson's product-moment correlation
##
## data:  FTMT and GII_KIRG
## t = -0.14064, df = 6, p-value = 0.8928
```

IV. STUDY RESULTS

1. The analysis of data of the EAEU countries in the given time interval has not confirmed the research hypothesis: there is no statistically significant connection between the dynamics of foreign mutual trade and the level of digital development of countries in the integration association.

2. There is one caveat: the study results should be interpreted with extreme caution, on the one hand, due to the lack of sampling for analysis, and on the other hand, due to exogenous shocks, the initial stage of the integration process within the EAEU, structural problems in the economies of the Union.

V. DISCUSSION OF STUDY RESULTS

The obtained study results made us turn to the analysis of mutual trade performance of the EAEU countries (see Table 3).

The data in Table 3 confirm our earlier conclusion: mutual trade of the EAEU countries has no significant impact on the level of digital development of economies of the integration association. Over the last 8 years, the share of high-tech equipment in the structure of mutual trade has remained virtually unchanged (with a significant reduction in the share of mineral products and metals in the trade structure).

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</thead>
<tbody>
<tr>
<td>The growth rate of mutual trade</td>
<td>33.9</td>
<td>7.5</td>
<td>-4.9</td>
<td>-9.3</td>
<td>-25.4</td>
<td>-5.8</td>
<td>27.4</td>
<td>10.1</td>
</tr>
<tr>
<td>(EAEU)</td>
<td>(31.1+12.7)</td>
<td>(3.7+12.7)</td>
<td>(2.9+12.7)</td>
<td>(4.9+12.7)</td>
<td>(11.7+12.7)</td>
<td>(14.7+12.7)</td>
<td>(27.4+12.7)</td>
<td>(10.1+12.7)</td>
</tr>
<tr>
<td>The share of mineral products and metals within the mutual trade</td>
<td>53.8</td>
<td>49.7</td>
<td>45.9</td>
<td>42.2</td>
<td>44.1</td>
<td>41.7</td>
<td>40.7</td>
<td>38.5</td>
</tr>
<tr>
<td>(41.1+12.7)</td>
<td>(37.4+12.7)</td>
<td>(32.9+12.7)</td>
<td>(30.5+12.7)</td>
<td>(33.3+12.7)</td>
<td>(27.0+12.7)</td>
<td>(27.5+12.7)</td>
<td>(28.5+12.7)</td>
<td>(38.5+12.7)</td>
</tr>
<tr>
<td>The share of machinery and equipment within the mutual trade</td>
<td>19</td>
<td>21.1</td>
<td>20.5</td>
<td>21.9</td>
<td>16.6</td>
<td>17.9</td>
<td>18.5</td>
<td>19.1</td>
</tr>
</tbody>
</table>

*** Mutual trade - total monetary value of export transactions of the EAEU member countries engaged in mutual trade.

**** Compiled by the authors using the EAEU statistics [2]

It should be noted that diversification of export-oriented economies is rarely done by moving up the vertical production chains. In practice, the diversification of economies takes place in the direction of goods that impose similar requirements to the used resources, equipment, human capital, and institutional environment (i.e. horizontal production chains) [5]. Since the structure of mutual (and external) trade of the EAEU countries...
is dominated by natural resources, and the distance from them to the nearest industrial (technological) goods is very large, a rapid diversification of trade should not be expected.

We hope that this paper stimulates a new wave of applied research of the effects of integration within the EAEU.

Acknowledgments

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References


