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Regional Integration and Economic Convergence in the Post-Soviet Space: Experience of the Decade of Growth

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Abstract: This paper examines the dynamics of regional integration and economic convergence in the post-Soviet world during the period 1999-2008. This is the period, when FSU countries experienced rapid economic growth, following the "Big Bang" of the disintegration of the Former Soviet Union (FSU) and the deep economic recession of the 1990s. It starts by discussing a set of indicators reflecting various aspects of interaction of post-Soviet countries (trade, labor migration, integration in key functional markets and economic convergence in different areas) and examines the dynamics of these indicators for the whole region and sub-groups of countries, as well as potential causes and conclusions to be drawn. In addition, it looks at the clusters of regional integration and economic convergence using the hierarchical cluster analysis and attempts to identify the reasons for their formation. We find that during the period studied the trade integration experienced a negative trend, but at the same time we observe an unprecedented expansion of labor migration – thus suggesting that integration of factor flows can outperform integration of markets for goods and services. Finally, clustering processes of the post-Soviet states for the economic convergence and for the economic integration seems to be unaffected by each other.

1. Introduction

The conceptualization of the regional integration in social sciences usually refers to a number of different dimensions, ranging from regionalization through the interaction of businesses and individuals over state-promoted economic cooperation towards an increase of regional cohesion and convergence (Hurrell, 1995). The European integration experience assumes a specific sequence of these processes (if not the causal link between them) – from the integration of the markets of goods towards free movement and capital and labor and finally increasing convergence of regional economies. However, non-European regionalism sometimes reverses the sequence and demonstrates different combinations of the aspects of regionalization and regionalism. This paper aims to look at one particular case of this non-European regional integration, studying specifically the interaction between the integration of markets of goods, factor movements and economic convergence, studying the experience of the former Soviet Union (FSU) countries.

Studying FSU is relevant from three perspectives. First, the usual assumption of regionalism is that the regional integration proceeds from a relatively disjointed region towards a greater regional unity. It is to a certain extent true for Europe (although European regional awareness is much older than the Treaty of Rome), but is quite unlikely to be the case for other regions of the world, where "regional integration" usually masks a combination of "coming together" and "falling apart" processes, for example, from the old colonial heritage (which also established a specific pattern of regional interdependence, integration and even federalism) or even pre-colonial economic and political linkages. The FSU area seems to be a good field for analyzing these phenomena and their influence on the interaction of different aspects of regionalism.

Second, the design of the international cooperation in the FSU has been, at least formally, heavily influenced by the European experience, and the post-Soviet regionalism could be perceived as an attempt to copy the EU up to the letter– a situation which seems to have changed only recently with the advancement of the "open regionalism" thinking in the policy debate on the FSU integration (Kosikova, 2010). Hence, it is also interesting to look at the differences between the impact of very similar formal institutions given differences in economic environment.

Finally, the debate on the regional integration in the FSU as such is not trivial. The decrease of trade and economic activity between the former Soviet republics after the collapse of the Soviet Union has been neither surprising nor disputable. On the one hand, the disintegration of a state is deemed to create border effects between newly independent

countries (as documented by Djankov and Freund, 2002, for the post-Soviet world). On the other hand, the collapse of the Soviet Union coincided with the start of the transition to the market economy, which brought widespread disruption to Soviet economies because of the need to establish new coordination mechanisms between economic agents as old hierarchical planning mechanisms were abolished (Blanchard and Kremer, 1997). This problem, a major one for every one of the new independent states, was exacerbated by the emergence of borders and a lack of coordination between governments. Numerous attempts made by the former Soviet states to create an integrated economic area – beginning with the "Ruble zone" currency union of the Commonwealth of Independent States (CIS), the Eurasian Economic Community and the Union of Russia and Belarus – were unsuccessful during the economic crisis experienced by all post-Soviet countries in the 1990s (Olcott et al., 1999). During this period, the post-Soviet space continued to exhibit a very strong bias towards domestic trade, limiting disintegration in the region (Fidrmuc and Fidrmuc, 2003; Elborgh-Woytek, 2003).

However, following the deep transitional recession of the 1990s, in the 2000s the former Soviet Union (FSU) entered a period of rapid economic growth, from which almost all the region's countries benefited. This growth seems to have influenced the political and economic relations between the FSU countries. To start with, a stronger Russian government has devoted increasing attention to its "closest neighbors" (as discussed in Trenin, 2004, and Vinokurov, 2007), resulting in a number of new integration initiatives and the re-modelling of old regional structures, though with mixed success. In addition, economic growth in Russia and in Kazakhstan appears to have created a new generation of multinationals in these countries whose focus is the FSU (see Libman, 2007). The new growth centers in the CIS triggered migration flows from less developed countries, which, unlike the old "permanent migration" of ethnic minorities caused by wars and conflicts, were strongly economically motivated and in many cases were not permanent (Korobkov, 2007). A substantial bulk of shared infrastructure (railroad, electricity) remains, which, together with common culture and language, support further integration. Furthermore, it is often claimed that regionalism generally has more chance of succeeding during the boom periods than during the recession, when the temptation of protectionism is too strong (the Western Europe experience being a good example of this). It has therefore proved particularly interesting to study the impact upon economic integration and cooperation of this "golden age" for the post-Soviet region.

This paper considers the dynamics of the regional integration in the post-Soviet space during this period, using new data provided by the Eurasian Development Bank as part of its EDB System of Indicators of Eurasian Integration (SIEI) project (Vinokurov, 2010). The SIEI

aggregates information from a variety of sources, including the CIS Interstate Statistical Committee and national statistical and governmental agencies. We have examined the years between 1999 and 2008, i.e., the period of post-crisis recovery (from its origins during the global crisis of 1997-1998) until the new economic decline in 2008-2009. The region's economic integration is discussed on a dyadic level (looking at pairs of post-Soviet economies) and the regional level (for five groups of post-Soviet countries). Analyzing all twelve FSU countries that are not currently members of the EU (i.e., excluding Latvia, Lithuania and Estonia), we examine different facets of regional integration in the post-Soviet world. Integration is measured according to the relative volumes of the flows of goods and services across national borders in the FSU region. In addition, we will study the related issue of economic convergence between post-Soviet countries.

The following section of this paper provides a short description of the institutional details necessary for understanding the regional integration dynamics in the FSU in the 2000s. The third part presents our data and methodology. The fourth part outlines the key outcomes of our analysis at regional level. We then consider the key outcomes of dyadic integration across the region's twelve countries. The final part of the paper presents our conclusions.

2. Post-Soviet regionalism and regionalization

The development of the regionalism projects in the former Soviet Union started almost simultaneously with the collapse of the USSR. Hence, from the very beginning the regional integration in the FSU appeared as a combination of two distinct approaches. On the one hand, the "civilized divorce" logic dictated the use of the regional institutions to mitigate conflicts inevitably arising between the new independent states and to reduce the costs of the dissolution of the existing economic linkages. On the other hand, the regional projects in the FSU have been relatively often considered as a way to support a "new" form of regional integration in the FSU, which has been usually modeled from the example of the European Union. During the last two decades there have been several attempts to construct a regional integration agreement in this area – usually very similar in terms of aims and scope, but different in terms of membership. Usually the proliferation of the agreements was explained by the need of a "multi-speed" integration with an advanced "core"; however, so far search for the core has been almost unsuccessful.

Basically, three regional agreements should be mentioned: the Commonwealth of Independent States, the Eurasian Economic Community (EurAsEC) and the Union State of Russia and Belarus. The first encompasses all former Soviet republics subject to this study

and was established in 1991. The CIS exhibits a sophisticated and complex decision-making structure, including a total of 87 institutions, mostly engaged in sector-specific cooperation and coordination. Some of them directly parallel the European experience (the Eurasian Community of Coal and Steel). In the early 1994 the CIS free trade area, customs union, payment union and economic union treaties were signed, yet not implemented. The Eurasian Economic Community came into existence in the mid-1990s as a union of Russia, Belarus and Kazakhstan, yet gradually grew to include several new members (Kyrgyz Republic and Tajikistan, as well as in 2006-2008 Uzbekistan). The objectives of the group are very similar to the original agenda of the CIS (which slowly moves towards a stronger orientation on humanitarian and social issues, as well as sector-specific coordination in transportation), however, the advancements of the group seem to be somewhat larger; at the moment it has established a limited free trade area. The Union State of Russia and Belarus was formed in 1996, includes just these two countries and is probably the most ambitious project, which ultimately aims to create a confederation of Russia and Belarus with a common currency, foreign policy and citizenship. Indeed, there are only minor trade restrictions existing between these two countries (although both of them often use non-tariff regulations like medical control or restrictions on share of imported goods in domestic retail), however, policy coordination is underdeveloped.

It should be noted that there has been also a number of further integration projects in the FSU, which have been less institutionalized or (even) less successful (although the success of other projects is questionable as well). One initiative to be mentioned is the Single Economic Space (SES), which was agreed shortly before the "Orange Revolution" in Ukraine and which ultimately collapsed after the power shift in this country. Originally the SES was designed as a more flexible economic structure without the clear "EU-like" agenda of integration (with supranational institutions and binding treaties); however it eventually shifted its agenda towards the customs union discussion. The three largest members of the SES and EurAsEC – Russia, Belarus and Kazakhstan – can also be treated as an integration grouping on its own, particularly after 2010, when these countries initiated yet another customs union project among them. The Central Asian countries implemented a number of regional initiatives, which, however, never achieved even the stage of a limited free trade area. Finally, it is also necessary to mention the GUAM project of Georgia, Ukraine, Azerbaijan and Moldova, which, however, still has a very limited economic agenda and is mostly devoted to the political issues.

Overall it seems to be a consensus among the students of the FSU economic space that most of these projects are notorious for having fallen far short of their declared goals, even failing to abide by agreements and agreed roadmaps for their implementation (Kobrinskaya, 2007). Specifically, while the goals of already the CIS included the establishment of a full-fledge economic union, so far the region failed to set up even a free trade area; only the last attempt of a customs union (the 2010 project of Russia, Belarus and Kazakhstan – actually the second attempt of a customs union within this group) seems to move towards the implementation stage, although past experience calls for caution. It is possible, however, that given traditional links between companies in post-Soviet countries (Yudanov, 2000), and their shared infrastructure, private agents were able to overcome the shortcomings of cross-border cooperation. From that point of view it is also necessary to look at the informal economic and social ties in the FSU regions as the potential driving forces of integration even in spite of the low effectiveness of the formal integration agreements. The experience of regional integration in South-East Asia and Africa shows that informal networks of traders connected by common language and culture are very likely to cross the borders between countries even in a relatively protectionist world. In the FSU the traditional social ties, common background shared by entrepreneurs and managers from different countries, as well as Russian as lingua franca could have similar effect (Obydenkova, 2010). From that point of view a bottom-up integration approach in the FSU could remain interesting.

3. Data and methodology

One of the key problems for any study of post-Soviet economic integration has been the lack of comparative quantitative indicators of cross-border economic activity. In writing this paper we have benefited from the SIEI data made available only recently, which aggregates several key variables of our analysis. To begin with, this paper (as well as the SIEI) looks at the process of *market integration* rather than at formal cooperation between countries. It should be noted, nevertheless, that any rigorous analysis of market integration must examine price convergence in the countries of the region (O'Rourke and Williamson, 2002). As such information is not available for the post-Soviet space, we have used trade flow volumes as the second best indicator (or, indeed, as an indicator of the conditions necessary for market integration in its strictest definition).

The SIEI data utilizes five indices of market integration. Two of these relate to "general" trade and movement and measure "total trade" integration and "labor migration" integration. The three other indices are measures of integration in individual areas and are of

greater interest, since, to our knowledge, this information has never been used before in empirical papers on post-Soviet integration: they take account of integration in the agricultural sector (trade in grain), power utilities (trade in electricity) and education (mobility of students). Hence, three indices (total trade, agriculture and power utilities) refer to the trade in goods; mobility of students can be treated both as a measure of trade in (specific) services and as an indicator of mobility (since studying abroad has an obvious impact on subsequent decisions on work location). All indices are constructed in a similar fashion: trade flow volumes relative to the size of the economy (measured by GDP) or population, as shown in *Table A1* in the Appendix. The exception to this is the total trade index, which is an average of the indices which relate volume of inter-rational trade to total foreign trade turnover and to GDP. However, this exception does not appear to influence the results since both component indices strongly correlate (therefore total growth in trade for FSU countries appears to be closely related to increases in their GDP).

It is clear that at least one important indicator is missing from the list: there are no data to take into account the mobility of capital. The reason for this is that most published statistics on foreign direct investment (FDI) in the CIS are prohibitively poor. Data on FDI is reported only by individual country (the CIS Interstate Statistical Committee does not aggregate this information) and has numerous gaps. For countries on which data is available, enormous discrepancies are apparent between the data reported by the exporter and the importer for the same capital flow. For example, Russian investment in Kazakhstan in 2007 amounted to USD13.052m according to Russian statistics and USD772m according to data from Kazakhstan authorities. Similarly, Ukrainian data shows an investment flow from Ukraine to Russia of USD148.6m, versus USD23.8m according to Russian statistics. In 2008 the data of the Russian and Kazakhstan statistics for the investment flow from Russia to Kazakhstan was respectively USD 762.2m and USD9463.5m, for the investment flow from Russia to Ukraine Russian statistics reported USD 2397.8m and Ukrainian USD 390m! Moreover, a significant proportion of Russian investment is not recorded by established statistical channels. For example, transactions offshore are not registered as intra-regional investment (Kheyfets, 2005). Thus, quantitative analysis of these data can be misleading.

All indices are calculated in two ways. The first measures integration between pairings of post-Soviet countries, i.e., it looks at all possible pairs of the twelve FSU countries and estimates the degree of market integration between them. The second looks at integration at the regional level: here, integration is calculated for five groups of countries in the post-Soviet space. The first group includes all twelve countries and is henceforth referred to as CIS-12

(although it is not entirely accurate, given Georgia's decision to exit the CIS in 2009 and Turkmenistan's "observer" status in this institution; however, we refer to the CIS as a *region*, not an organization). The second group comprises Russia, Belarus, Kazakhstan, Kyrgyz Republic and Tajikistan, thereby including all members of the Eurasian Economic Community (EurAsEC-5). The third group includes the three largest economies of EurAsEC – Russia, Belarus and Kazakhstan (EurAsEC-3). The fourth group comprises the four largest CIS economies, i.e., the EurAsEC-3 countries and Ukraine. Given Ukraine's reluctance to participate in any formal integration project in the CIS, the only example of an attempt at closer cooperation within this club was the unsuccessful Single Economic Space – hence, the group is referred to as SES-4. The final group includes four Central Asian countries (Kazakhstan, Uzbekistan, Tajikistan and Kyrgyz Republic) but not Turkmenistan, which has consistently avoided any involvement in cross-border cooperation since 1991. Hence, the five sub-regions used to make up the data cover almost all possible combinations of "regional cooperation" which have been discussed in the post-Soviet space during the last two decades.[1]

The SIEI data include another set of variables, which is relevant to our analysis, allowing us to examine the issue of *economic convergence* between countries, i.e. the potential shrinking (or widening) of the gap between the key indicators which characterize their economies and economic policies. The relevance of economic convergence in the context of this study is twofold. Firstly, extreme asymmetries between post-Soviet countries, as well as strong differences in their economic policies, have often been considered a force for disintegration in the region (Grinberg, 2004). Secondly, economic convergence can (under certain conditions) be driven by regional integration; so, we also have an opportunity to compare patterns of convergence with patterns of market integration, what can also be treated as an indirect measure of the success of market integration in the FSU. The SIEI dataset includes four indices for economic convergence, evaluating macroeconomic indicators, monetary, fiscal and financial policies.

Once again, measures are calculated at the dyadic and at regional level. For the country pairings, the indicator is simply calculated as the Euclidian distance between two points ("countries") in the multidimensional space, where each dimension represents a particular measure of economic activity (see Appendix, *Table A2*). Specifically, assuming

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[1] Two additional alternative groups could be considered if we were to include Southern Caucasus (Armenia, Azerbaijan and Georgia) and the "Western flank" of the CIS (Moldova, Belarus and Ukraine); however, in both cases there is no evidence of attempts at closer cooperation – in the Caucasus it is prevented by conflict, and in the Western part of the CIS by strong political differences between two major players – Belarus and Ukraine.

that two countries A and B are characterized using two indicators each denoted as x_{1A} and x_{2A} and x_{1B} and x_{2B} respectively, the distance between these countries is obtained as:

$$D_{A,B} = \sqrt{(x_{1A} - x_{1B})^2 + (x_{2A} - x_{2B})^2}$$

Both x_1 and x_2 are standardized (i.e. from the actual observations one subtracts the mean for the whole sample and divides by the standard deviation) in order to ensure compatibility of dimensions used, if they use different measurement units (as it is almost always the case). For the sub-regions the simple measure of sigma-convergence is calculated as average absolute value of the variation coefficients (standard deviation over mean) for all variables included in a particular measure.

4. Regional-level analysis

As the starting point for our discussion, we consider integration and economic convergence at the regional level. *Table 1* shows the dynamics of the SIEI's five market integration indices for five post-Soviet regions. The results are straightforward: in three trade-related indices (total trade, agricultural trade and trade in electricity) indicators for all five regions fall throughout the "growth decade" of 1999-2008. This would indicate that the disintegration trend initiated by the "Big Bang" in the 2000s is still continuing. However, this outcome does not reflect the overall "reduction" of intra-regional trade in absolute terms: rather that intra-regional transactions seem to increase at a slower rate than post-Soviet economies. *Figure 1* below compares the dynamics of trade integration indices and total trade flow for the CIS-12 region in absolute terms. While total trade increased by more than 5 times between 1999 and 2000, the trade integration index decreased. As mentioned above, looking at both components of the index (using total trade or total GDP as a denominator) does not change the results. For trade in electricity (*Figure 2*), the results are less straightforward, since total trade has stagnated since the mid-2000s. Nevertheless, whilst trade in 2008 was almost the same as in 2002, the power utilities integration index fell dramatically. Trade in agriculture (*Figure 3*) follows a similar path but, in this case, the correlation between the index and total trade is more pronounced (probably because the total trade value is more volatile).

Figure 1, 2 and 3 about here

Table 1 about here

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There are two possible reasons for this relative decline in internal economic activity. On the one hand, the results may simply reflect the re-orientation of trade towards non-post-Soviet regions. This appears to be the case particularly for the "total trade" indicator, where the denominator is the trade turnover of the FSU countries. On the other hand, focusing on domestic development rather than on establishing cross-border links can also impair the growth of trade flows. This may be the case for trade in electricity. Currently, the post-Soviet space still has a significant shared technological infrastructure, which could potentially provide a foundation for a common electricity market. However, power utilities in the FSU countries are mostly controlled officially or unofficially by their governments, whose focus appears to be on reducing dependence upon potential foreign suppliers rather than benefitting from cross-border trade.

Central Asia provides us with a number of high-profile examples of such decisions. Over recent decades, Russia and Kazakhstan have efficiently managed extensive cross-border flows of electric power based on developed infrastructure and Kazakhstan's comparative advantage as a provider of low-cost electric power produced from Ekibastuz coal. While Ekibastuz power was exported and consumed by neighbouring Russian regions just across the border, western parts of Kazakhstan were supplied with Russian energy. This situation was perceived as a threat by Kazakh authorities. It led to the construction of the 500km-long 500kW "North Kazakhstan – Aktobe region" power line, which cost around USD180 mln to build in 2006-2007. Partly as a result of this, Kazakhstan's electric power imports from Russia fell from 5316 mln kW/h in 2004 to 2214 mln kW/h in 2008, while its exports to Russia remained virtually unchanged at 2379 mln kW/h, despite the vast export potential of Ekibastuz coal-fired power plants. This is four times lower than levels achieved in the 1980s (Vinokurov 2008).

Uzbekistan represents another striking example of the prevalence of the narrowly defined 'electric power security' over an economically more beneficial regime of transboundary electricity flows within existing regional power systems. This country withdrew from the Unified Energy System of Central Asia (UES-CA) on December 1st, 2009. This unilateral act was apparently in the planning for two years, as the Uzbek power system was getting interconnected. Because of Uzbekistan's central position, all Central Asian countries have been hit by this decision; Tajikistan, however, may be worst affected. For the last 70 years, Tajikistan has received a substantial proportion of its power supplies from neighboring Uzbekistan (its energy deficit in the fall-winter period constitutes around 2bn

kW/h; this is covered by 0.6bn kW/h of Uzbek energy and 1.2bn kW/h of Turkmen energy transited through Uzbekistan). Over the same period, Tajikistan has exported comparable amounts of electricity to Southern Uzbekistan in the spring-summer season, in the process of irrigating countries located downstream on major rivers. One of the solutions now being actively considered is to connect Khudzhand (Tajikistan), Datka (Kyrgyzstan) and Almaty (Kazakhstan) with a high-voltage power line, thus effectively bypassing Uzbekistan. This power line would, however, be longer than the existing one and require several years to build. Thus, Uzbekistan's withdrawal from the UES-CA has led to economically suboptimal production and the need for extensive capital investment. Uzbekistan will also be adversely hit by its own decision, as the country's own power consumption peaks will no longer be covered by daily trans-border power flows within the regional unified system. In addition, effective international regulation of water in Central Asia has now become an even more remote prospect.

With regard to the integration of labor migration and education, the situation is reversed (see *Table 1*). We observe an immense increase of labor migration flows in the CIS-12 and almost all other subregions (with the exception of CA-4, where data is available only for migration flows to Kazakhstan). It is worth noting that, in this case, the SIEI results provide a somewhat conservative estimate of migration flows, since a significant portion of labor migration is (semi-)illegal and hence not registered by any statistical authority. As for educational integration, the number of students studying abroad relative to total population also increased significantly after 2000 in all regions except CA-4. Nevertheless, Central Asia is still the most "integrated" region in terms of student exchange (as well as in two other integration functions discussed so far, i.e. trade in grain and electricity). The growth of these indices suggests an even stronger growth of the total migration flows and flows of exchange students in the post-Soviet world.

This result could be driven by several factors. To start with, it is possible that CIS integration in the factor markets (particularly, labor flows) is more successful than it has been for trade. This claim is indirectly supported by a large body of (largely anecdotal) evidence of increased outflow of Russian and Kazakhstani (also Ukrainian) capital from other CIS countries (Crane et al., 2005; RUSAL, 2006; Kuznetsov, 2008; Kheyfets and Libman, 2008; Skolkovo Business School, 2008). This result is not only significant for post-Soviet countries, but also influences our understanding of regional integration processes in general, since factor flows are usually considered to occur at a more "advanced" stage of regional integration than trade relations (if one adopts the standard Balassa approach to this issue).

We might speculate that the relatively higher concentration of labor migration than of trade flows in the CIS is due to a combination of factors. To start with, labor migration is facilitated by the relatively unrestricted movement of post-Soviet citizens across borders (most of the countries operate a visa-free zone for such citizens) and weak employment legislation (including regulation of employment of foreigners). However, in such conditions it may be easier to control cross-border trade than labor migration – while the former is transacted across only a few border points, the latter takes place throughout the territory of the countries involved. Finally, the relatively large geographical dimensions of the post-Soviet space limit the *relative* scope of semi-legal and illegal transactions in border regions (although they may be large in absolute terms, their significance relative to the size of post-Soviet economies in general may be smaller). It should be noted that informal border trade is still significant in individual sub-regions of the CIS, particularly Central Asia (see, for example, Byrd et al., 2006) and the Caucasus; some trade appears to take place even between countries engaged in hostilities, such as Armenia and Azerbaijan (Polyakov, 2001) or state-controlled closed economies like Turkmenistan (Badykova, 2005). In several cases (i.e., disputed states such as Abkhazia, Southern Ossetia and Transdniestria, see Libman, 2008) the distinction between formal and informal trade is hard to apply. The conflict over milk exports between Russia and Belarus in 2009 illustrated clearly that, during the 1990s, suppliers from Belarus were able to dominate trade in several border regions of Russia (e.g., Briansk, cf. Dunaeva, 2009). However, the "correction" for unofficial trade in the CIS appears to be substantially smaller than for other groups of developing economies such as Africa (where there is a likely 40 pp difference between the official and the unofficial shares in intra-regional trade, see Meagher, 1997).

It is important to adopt a cautious approach to some interpretations of the differences between the integration of migration and trade. The results obtained could simply reflect discrepancies in the way the indices are constructed. While cross-border trade flows are evaluated in relation to the size of the economy (i.e., GDP), cross-border flows of labor migrants and students are evaluated relative to population size, which, unlike GDP, has remained virtually constant. A comparison of intra-regional labor migration with the outflow of migrants from the CIS to other regions of the world would generate less favorable results for labor market integration. This is particularly the case for countries such as Moldova, but may also be relevant for Ukraine. Similarly, the increase in cross-border student mobility in the FSU may, in spite of its apparent significance, be significantly outstripped by the outflow of students from the FSU to other countries. Unfortunately, the comparable data that are

available are not sufficient to allow a proper evaluation of this possibility; however, it should certainly be taken into account in order to arrive at a meaningful interpretation of outcomes.

When evaluating economic convergence, it is more difficult to identify a general trend (see *Table 2*). With regard to macroeconomic convergence, which is probably the most useful indicator, an increasing divergence of the post-Soviet economies has been recorded, which is again present in all five sub-regions and has been strongest in Central Asia. However, indicators of convergence of financial and especially monetary policies show a clear trend towards a contraction of differences in the post-Soviet space. It has not been possible to draw conclusions regarding fiscal policy convergence because there are too many "gaps" in the data. Hence, where economic fundamentals are concerned, the development of post-Soviet countries is ambiguous, as are its potential consequences for the cross-border economic cooperation between governments. Divergence of macroeconomic variables may constitute a significant obstacle to this process because of increasing consensus-finding costs and problems of redistribution; the negative impact of economic asymmetry on cooperation potential is well documented in general articles (Mayer, 1981, Jensen, 1994, Fung and Schneider, 2005) and in literature relating specifically to the post-Soviet space (Libman, 2009). This will, in turn, have an impact on the barriers to market integration.

Table 2 about here

On the other hand, differences in monetary and banking policies between post-Soviet countries appear to be diminishing. It is, however, unlikely that this reduction is a consequence of market integration, a result, for example, of the development of an integrated market for financial services. Abalkina et al. (2010) indicate that although there is certain international expansion of Russian and Kazakh banks in the FSU, their impact on financial markets in the region's countries is still relatively limited. The effect may be boosted by domestic factors: most countries in the region appear to have achieved at least some degree of financial stabilization (compared to the much larger discrepancies observed in the 1990s).

However, at regional level, analysis suggests there are no differences in the development of each of five sub-regions – regardless of the indicator of market integration or economic convergence employed, and therefore it is difficult to analyze these processes separately. To make an attempt at this, we look at individual pairings of post-Soviet countries to try to find clusters of market integration and economic convergence.

5. Integration within individual dyads

In presenting the results for integration within country dyads, we have used the matrix of SIEI dyadic integration indices as a dissimilarity matrix for hierarchical cluster analysis (using Ward's clustering).[2] This allows us clearly to identify the countries that are more closely linked to one other in any particular type of regional integration and economic convergence. For the sake of simplicity, we have concentrated on a comparison of the clusters of macroeconomic convergence and integration of total trade and migration. The results of this cluster analysis are presented in the dendrograms in *Figures 4-6* below. Firstly we look at trade integration clusters. As may be expected, all correspond to the geographical sub-regions of the FSU. One cluster is formed by the Southern Caucasian countries, Azerbaijan and Georgia (Armenia is linked to this group via Georgia, since no direct trade between Armenia and Azerbaijan is officially reported). Another cluster is formed by three Slavic FSU countries (Russia, Belarus and Ukraine) and another by three Central Asian countries (Kazakhstan, Kyrgyz Republic and Tajikistan (no data is available for Uzbekistan and Turkmenistan). The only exception is Moldova, which is linked to Central Asia rather than Ukraine (although the Ukraine-Moldova dyad still displays relatively strong integration). With regard to migration integration, the tightest cluster identified was the pairing of Kazakhstan and the Kyrgyz Republic. This is certainly due to the cultural similarities between these two countries, which, supported by economic growth in Kazakhstan, encouraged migration in the region (Schmitz, 2009). Other clusters do not seem to be particularly pronounced.

Figures 4-6 about here

If we examine clusters of macroeconomic convergence, we find a completely different picture. In this field, we identified three main clusters. The first comprises Belarus, Turkmenistan and Azerbaijan. Although the first two of these countries are similar in terms of the very slow progress of their economic reform, Azerbaijan has a unique position in the post-

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[2] For the economic convergence, we take four original matrices of indicators as dissimilarity matrices. For market integration we transform the matrices to obtain dissimilarity matrices (i.e. matrices where higher value of an entry represents higher distance between observations) by multiplying all entries by (-1) and adding a positive number to obtain positive entry (specifically, 10 for trade, 0.1 for migration, 3 for agriculture, 360 for power utilities and 260 for education – since the size of the values of indicators is different in each case). Therefore the size of the dissimilarity is not comparable over different matrices (although the *relative* degree of similarity between individual countries can be compared). Some observations with absent data (mostly Turkmenistan) are dropped from some matrices.

Soviet space due to the strong growth this country saw in the mid-2000s following completion of several large oil pipeline projects. The second group comprises three large countries – Russia, Kazakhstan and Ukraine – all of which are much further along the road of economic reform. Kazakhstan is the country that is most similar to Russia. Georgia also forms part of this grouping, probably because its process of economic reform is also relatively advanced. The third group comprises other smaller economies of the CIS, (Georgia being the only exception) and Uzbekistan. While some sub-clusters in this group (e.g., the Kyrgyz Republic and Tajikistan) fit the pattern of geographical proximity, others do not. So, while the main driving force for trade and to a lesser extent migration seems to be geographical configuration, the more significant determinants of macroeconomic clusters are speed of reform and size of economy.

To conclude, market integration clusters do not appear to coincide with clusters of economic convergence, and therefore a causal link (either way) between these two phenomena in the FSU space seems unlikely. Similar results were obtained for other indicators of integration and convergence (as shown in *Appendix B*), although in these cases factors supporting convergence and integration seem to be different. For power utilities and education, the stronger clusters are once again geographical and located in Central Asia (Tajikistan – Uzbekistan and Uzbekistan – Kyrgyz Republic), because of greater interdependency on electricity and water resources and the position of the Kyrgyz Republic as a regional educational center. In agriculture, one of the most pronounced clusters (Belarus – Ukraine) is geographical. For the other cluster (Azerbaijan – Kazakhstan) the determining factor is the use by Kazakh investors of Azerbaijan's port and railway facilities for grain export. For the policy convergence clusters geography does not seem to have any significance.

6. Conclusion

The aim of this paper was to provide a quantitative assessment of regional integration among the FSU countries during the "growth decade" starting in 1999. Our particular focus was the expansion of trade and migration between countries rather than the establishment of formal integration initiatives. While the contraction of intra-regional trade in the 1990s was clearly apparent (though smaller than expected), during the 2000s, when the "Big Bang" effect of the USSR's disintegration had diminished, the results were less easy to interpret.

Using the new EDB System of Indicators of Eurasian Integration data, we came to four main conclusions. Firstly, in the trade sphere (including areas such as agriculture and

electricity) the post-Soviet world continued its trend towards disintegration. This was also true for particular FSU sub-regions, both geographical (e.g., Central Asia) and based on different regional integration projects (EurAsEC-3, EurAsEC-5). Our next conclusion, however, was that, over the same period, the degree of integration of migration and educational mobility in the post-Soviet space increased significantly. It is important to understand that the decline of integration indices for trade is relative: it indicates that the intensification of intra-regional linking was slower than the growth of national economies and of their extra-regional economic ties. Thirdly, we discovered varying evidence of economic convergence: while post-Soviet countries seem to diverge when it comes to economic growth, the trend is the reverse for monetary and financial activity. Finally, we examined convergence and integration at the dyadic level. We found that "integration club" and "convergence club" clusters do not coincide, and therefore there is no direct link between these two processes. While "integration clubs" seem to depend mostly on geography, for "convergence clubs" factors such as domestic economic policy, institutional environment and size of economy are more significant.

From this point of view, several more general conclusions are possible. To start with, the FSU provides us with interesting evidence that the more advanced "factor flow" integration can be more successful than traditional "first stage" trade integration, even in spite of extremely weak formal regionalism structures. Certainly, the result is related to the nexus of integration and disintegration processes described in the introduction: the increase of labor migration benefits a lot from traditional links between the FSU countries. Nevertheless, it is possible that in regions with established ties at the microlevel a good starting point for the regionalism debate is to encourage cooperation regarding cross-border factor flows, postponing the discussion of a free trade area or a customs union. Second, the results of the study show that economic convergence and regional integration can exhibit very different spatial patterns. While for "integration clubs" one could expect stronger "demand" for regional initiatives from the private sector, in the "convergence clubs" policy coordination is more likely because of the similarity of shocks and reaction to them. However, if these clubs do not coincide, the trade-off between economic benefits from the larger markets and political risks from the inability of country-specific reaction to shocks (Alesina and Perotti 1998) for the regionalism projects can become even more acute and difficult to solve.

This study acknowledges its limitations. We were forced to exclude data on FDI and capital movement because of the extreme incompatibility of national statistical data. We were thus unable to analyze a potentially significant element of market integration. Secondly, the

SIEI is still based primarily on official statistical data, which may in fact underestimate economic links (for example, by ignoring unofficial cross-border trade) and convergence (by ignoring the grey economy as a component of economic growth). Nevertheless, we believe that this study provides insights in the process of regional integration in the FSU during the recent period of economic growth. In 2008, expansion was crushed by the emerging economic crisis, which has affected almost all post-Soviet countries and the economic links between them. Other market integration trends in the FSU are yet to be studied.

Literature

Abalkina, Anna, Golovnin, Mikhail, Lyubskiy, Mikhail, Libman, Alexander, Klyusheva, Alexandra, and Oleg Rykhtikov (2010), *Vzaimodeistvie Finansovykh Sistem Stran SNG (Interaction of Financial Systems of the CIS Countries),* St. Petersburg: Aleteya

Alesina, Alberto, and Roberto Perotti (1998), "Economic Risks and Political Risks in Fiscal Union," *Economic Journal,* 108:989-1008

Badykova, Najia (2005), "Regional Cooperation in Central Asia: A View From Turkmenistan," *Problems of Economic Transition,* 48, 8:62-95

Blanchard, Oliver J., and Michael Kremer (1997), "Disorganization," *Quarterly Journal of Economics,* 112:1091-1126

Byrd, William, Raiser, Martin, Dobronogov, Anton, and Alexander Kitain (2006), "Economic Cooperation in the Wider Central Asia Region," World Bank Working Paper No. 75

Crane, Keith W., Peterson, D.J., and Olga Oliker (2005), "Russian Investments in the Commonwealth of Independent States," *Eurasian Geography and Economics,* 46:404-444

Djankov, Simeon, and Caroline Freund (2002), "Trade Flows in the Former Soviet Union, 1987 to 1996," *Journal of Comparative Economics,* 30, 1:76-90

Dunaeva, Olga (2009), "U Brianska Propalo "Malako" (Briansk Lost Its Milk)", *Novoe Vremya,* 24, June 22

Elborgh-Woytek, Katrin (2003), "Of Openness and Distance: Trade Developments in the Commonwealth of Independent States, 1993-2002," IMF Working Paper No. 03/2007

Fidrmuc, Jan, and Jarko Fidrmuc (2003), "Disintegration and Trade," *Review of International Economics,* 11, 5:811-826

Fung, K.C., and Patricia Higino Schneider (2006), "Asymmetric Integration," *International Journal of Applied Economics,* 2:83-110

Grinberg, Ruslan (2004), "Integration und Desintegration im postsowjetischen Raum," In: Cassel, D., and Paul J.J. Welfens (eds.): *Regionale Integration und Osterweiterung der Europäischen Union*, Stuttgart, Lucius & Lucius

Hurrell, Andrew (1995), „Regionalism in Theoretical Perspective", In: Fawcett, Louise, and Andrew Hurrell (eds.): *Regionalism in World Politics,* Oxford: Oxford University Press

Jensen, Henrik (1994), "Sustaining Policy Coordination Between Economies of Different Size," *Journal of International Economics,* 36, 3-4:289-307

Kheyfets, Boris (2005), "Vzaimnye Investicii v SNG (Mutual Investments in the CIS," *Ekonomist,* 8

Kheyfets, Boris, and Alexander Libman (2008), *Korporativnaya Integraciya: Al'ternativa Dlya Postsovetskogo Prostranstva (Corporate Integration: An Alternative for the Post-Soviet Space)*, Moscow: URSS

Kobrinskaya, Irina (2007), "The Post-Soviet Space: From the USSR to the Commonwealth of Independent States and Beyond," in: Malfliet, Katlijn, Verpoest, Lien, and Evgeny Vinokurov (eds.): *The CIS, the EU and Russia: Challenges of Integration*, London: Palgrave Macmillan

Korobkov, Andrei V. (2007), "Migration Trends in Central Eurasia: Politics versus Economics," *Communist and Post-Communist Studies,* 40, 2:169-189

Kosikova, Lidiya (2010), "Na Vsekh Parusakh (In Full Sail)", Pryamye Investicii, 2:22-25

Kuznetsov, Aleksei (2008), "Investicii v Central'noi Azii: Problemy Konkurencii Rossiiskikh i Zarubezhnykh TNK (Investments in Central Asia: Competition Problems of Russian and Foreign Multinationals)," in: *Konflikty Ekonomicheskikh i Politicheskikh Interesov na Postsovetskom Prostranstve (Conflicts of Economic and Political Interests in the Post-Soviet Space)*, Moscow: IMEMO

Libman, Alexander (2007), "Regionalization and Regionalism in the Post-Soviet Space: Current Status and Implications for Institutional Development", *Europe-Asia Studies,* 59, 3:401-430

Libman, Alexander (2008), "Moldova: Structural Changes, Trade Specialization and International Integration," in: Grinberg, R., Havlik, P., and O. Havrylyshyn (eds.): *Economic Restructuring and Integration in Eastern Europe: Experiences and Policy Implications*, Baden-Baden: Nomos

Libman, Alexander (2009), "Russian Federalism and Post-Soviet Integration: Divergence of Development Paths," MPRA Working Paper No. 12944

Mayer, Wolfgang (1981), "Theoretical Considerations on Negotiated Tariff Adjustments," *Oxford Economic Papers,* 33: 135-153

Meagher, Kate (1997), "Informal Integration or Economic Subversion? Parallel Trade in West Africa," in: *Regional Integration and Cooperation in West Africa: A Multidimensional Perspective*, Ottawa: IDRC

O'Rourke, Kevin H., and Jeffrey G. Williamson (2002), "When Did Globalization Begin?" *European Review of Economic History,* 6:23-50

Obydenkova, Anastassia (2010), "Multi-Level Governance in Post-Soviet Eurasia: Problems and Promises", in: Enderlein, Henrik, Walti, Sonja, and Michael Zurn (eds.): Handbook on Multi-Level Governance. Edward Elgar

Olcott, Martha Brill, Aslund, Anders, and Sherman W. Garnett (1999), *Getting It Wrong: Regional Cooperation and the Commonwealth of Independent States,* Wash.: Carnegie Endowment for International Peace

Polyakov, Evgeny (2001), "Changing Trade Patterns after Conflict Resolution in the South Caucasus," World Bank Policy Research Working Paper No. 2593

RUSAL (2006), "Russkie Idut: Zarozhdenie Razvivayushikhsya Rossiiskikh Transnacional'nykh Korporaciy (Russians Come: Emergence of Developing Russian Multinationals)," mimeo

Schmitz, Andrea (2009), „Kasachstan: Neue Fuehrungsmacht im postsowjetischen Raum?" SWP Studie S7

Skolkovo Business School (2008), "Rossiyskiy Biznes za Rubezhom: Dinamika Razvitiya (Russian Business Abroad: Development Dynamics", mimeo

Trenin, Dmitriy (2004), "Identichnost' i Integraciya: Rossiya i Zapad v XXI veke (Identity and Integration: Russia and the West in the 21st Century," *Pro et Contra,* 8, 3:9-22

Vinokurov, Evgeny (2007), "Russian Approaches to Integration in the Post-Soviet Space in the 2000s," in: Malfliet K., Verpoest L., Vinokurov E. (eds): *The CIS, the EU, and Russia: Challenges of Integration,* London: Palgrave Macmillan

Vinokurov, Evgeny (2008), "The CIS Common Electric Power Market," EDB Industry Report no. 3. Almaty: EDB

Vinokurov, Evgeny (2010, ed.), *The System of Indicators of Eurasian Integration*. Almaty: EDB. Available at www.eabr.org/eng/publications/projects/, as of January 2010.

Yudanov, Andrei (2000), "Economic Change and the National Question in Twentieth-Century USSR/Russia: The Enterprise Level," in: Teichova, A., Matis, H., and J. Patek (eds.): *Economic Change and the National Question in Twentieth-Century Europe*. Cambridge

Table 1: Integration of markets in five regions of the post-Soviet space

Indicators and regions	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
Trade										
CIS-12	0.21412	0.224097	0.213522	0.195411	0.201085	0.202334	0.174044	0.16899	0.172291	0.163872
EurAsEC-5	0.126179	0.134602	0.127207	0.116401	0.118982	0.123763	0.09582	0.095321	0.098051	0.094374
EurAsEC-3	0.120965	0.129563	0.12354	0.112848	0.11496	0.119421	0.09163	0.090835	0.092604	0.088898
SES-4	0.195221	0.197931	0.187011	0.16857	0.174898	0.181135	0.151745	0.146596	0.148378	0.144569
CA-4	0.059471	0.0449	0.042387	0.037666	0.03694	0.036924	0.030663	0.027812	0.034646	0.030163
Migration										
CIS-12	NA	0.396614	0.54904	0.754337	0.666859	0.821987	1.266581	1.976516	4.189221	6.451831
EurAsEC-5	NA	0.020486	0.025232	0.145761	0.028547	0.029931	0.031373	0.037066	0.052817	0.075533
EurAsEC-3	NA	0.058256	0.088545	0.265241	0.129144	0.21363	0.423831	0.791915	2.068706	3.290513
SES-4	NA	0.317979	0.449617	0.403983	0.508032	0.536851	0.696712	0.843425	1.038315	1.228716
CA-4	NA	0.002011	0.001642	0.002112	0.002918	0.042616	0.048282	0.085065	0.059274	0.052034
Power utilities										
CIS-12	NA	NA	NA	50.5994	46.67956	36.7153	28.96486	20.79685	15.02533	10.14866
EurAsEC-5	NA	NA	NA	26.87286	25.80586	20.4479	15.62039	9.537353	6.8638	4.018138
EurAsEC-3	NA	NA	NA	25.08239	19.96777	13.84555	11.31111	7.280713	5.794442	3.628337
SES-4	NA	NA	NA	23.13403	18.48647	12.98607	13.3116	9.104473	6.336079	3.850577
CA-4	NA	NA	NA	256.8841	241.2182	192.5408	147.6785	107.5481	78.92387	51.65543
Education										
CIS-12	NA	160.3218	224.5606	201.6453	233.1012	282.0446	306.9638	354.6405	364.7804	380.9233
EurAsEC-5	NA	137.5584	186.5123	160.3978	186.4389	200.4654	200.0706	229.7344	263.4358	272.0108
EurAsEC-3	NA	134.2881	148.8705	133.1075	159.2035	166.7507	166.2632	185.4927	218.8083	228.8707
SES-4	NA	127.7392	141.7435	125.917	148.7511	172.4759	175.9648	197.6943	222.9746	238.2815
CA-4	NA	70.59838	287.3453	272.7285	347.026	449.5387	521.7593	563.2523	496.3772	391.0104
Agriculture										
CIS-12	NA	NA	NA	6.432883	9.592314	6.748042	3.466841	3.892393	2.865693	2.030176
EurAsEC-5	NA	NA	NA	3.27852	2.770186	2.956347	1.256028	1.958551	1.077532	0.577149
EurAsEC-3	NA	NA	NA	2.107545	2.288755	2.735074	0.854466	1.552797	0.641843	0.269414
SES-4	NA	NA	NA	2.80742	7.412691	4.20831	1.328058	1.896875	0.763772	0.539101
CA-4	NA	NA	NA	16.33501	5.632302	4.225324	6.703841	6.183241	6.019463	4.512677

Note: higher value of the indicator represents higher level of integration. The details on the calculations are reported in Appendix A, Table A1

Source: SIEI

Table 2: Economic convergence in five regions of the post-Soviet space

Indicators and regions	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
Macroeconomic										
CIS-12	0.29797	0.327842	0.350826	0.366306	0.377869	0.393347	0.41504	0.431253	0.41189	0.418903
EurAsEC-5	0.345427	0.385849	0.401057	0.406214	0.397005	0.411752	0.431557	0.437204	0.429365	0.450715
EurAsEC-3	0.048564	0.150702	0.159527	0.143877	0.140012	0.156096	0.148552	0.155882	0.162875	0.194617
SES-4	0.155496	0.210504	0.21323	0.20382	0.206397	0.222834	0.222071	0.224163	0.223741	0.24389
CA-4	0.393655	0.442486	0.512494	0.55822	0.572445	0.60755	0.662566	0.700274	0.683769	0.711466
Monetary policy										
CIS-12	0.430089	0.311984	0.171127	0.184729	0.062619	0.044082	0.042431	0.044743	0.05357	0.058453
EurAsEC-5	0.374113	0.419254	0.173622	0.110258	0.083296	0.04802	0.029386	0.034164	0.044901	0.02327
EurAsC-3	0.375763	0.598084	0.211224	0.117298	0.086702	0.056232	0.015303	0.022471	0.037173	0.015765
SES-4	0.409141	0.483292	0.200656	0.126574	0.076437	0.046814	0.015577	0.021604	0.033509	0.039534
CA-4	0.075476	0.179956	0.1837	0.247707	0.066329	0.027762	0.033715	0.053944	0.05728	0.049495
Financial policy										
CIS-12	0.352851	0.333316	0.324175	0.322493	0.309053	0.332133	0.315131	0.349454	0.315807	0.292829
EurAsEC-5	0.349203	0.456407	0.480999	0.454449	0.44493	0.468835	0.467437	0.430808	0.345657	0.308535
EurAsEC-3	0.34678	0.378685	0.430648	0.422375	0.428788	0.394348	0.302502	0.203954	0.144281	0.15884
SES-4	0.419621	0.415221	0.403838	0.378595	0.348461	0.317324	0.275899	0.188536	0.131804	0.161529
CA-4	0.394335	0.261071	0.103928	0.474565	0.521081	0.541993	0.549751	0.491898	0.41923	0.37615
Fiscal policy										
CIS-12	NA	1.513864	2.053581	1.757057	1.671758	3.078558	2.309815	1.806819	1.681661	1.858032
EurAsEC-5	NA	2.114481	2.322771	5.703069	2.272686	2.209893	1.448267	1.355333	1.181072	1.107399
EurAsEC-3	NA	1.578893	2.585471	1.777911	1.547782	1.339206	1.111545	1.044591	1.088539	1.046757
SES-4	NA	1.266601	3.75359	1.248691	1.537721	5.640871	1.441183	1.227702	1.257041	1.190195
CA-4	NA	0.847233	1.564097	0.981815	0.985047	0.716869	1.467299	2.171179	0.996254	0.889845

Note: lower level of indicator represents higher level of convergence ("smaller distance").
The details on the calculations are reported in Appendix A, Table A2, and in Section 3 of
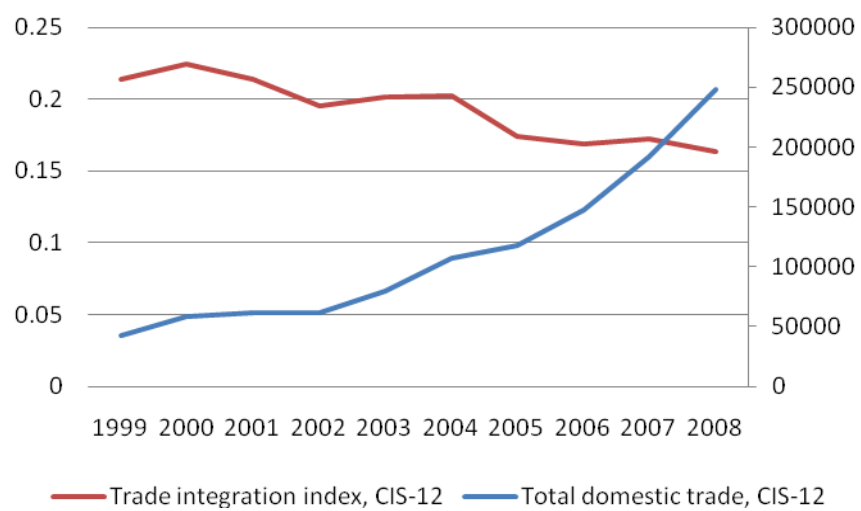the paper

Source: SIEI

Figure 1: Trade integration index and total trade (right scale, sum of exports and imports of all countries of CIS-12 from this region, mln. USD)
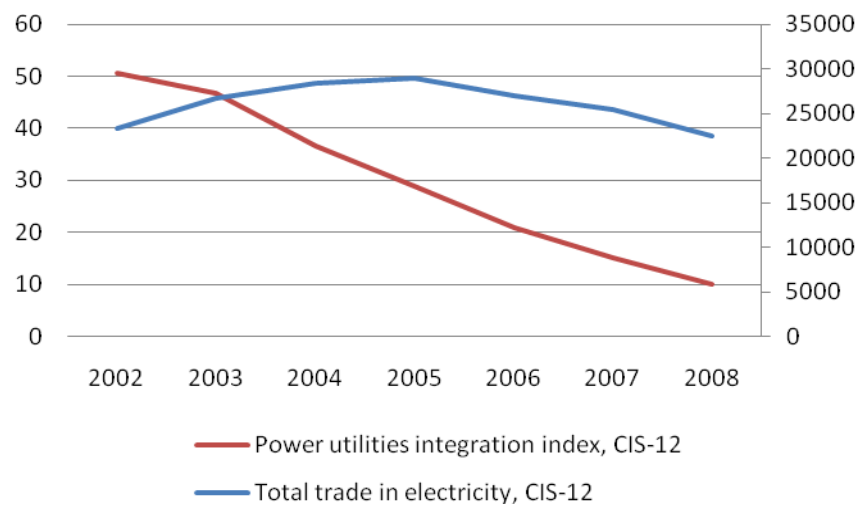
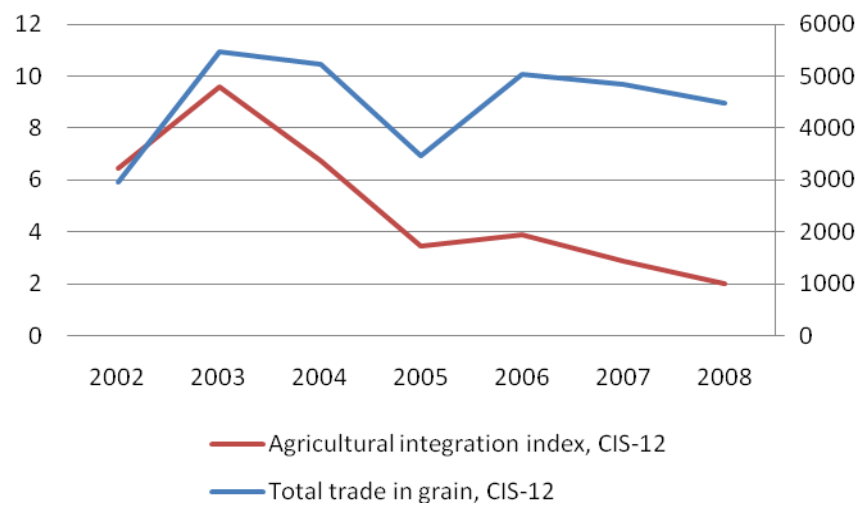Figure 2: Power utilities integration index and total trade in electricity (right scale, mln kWh)

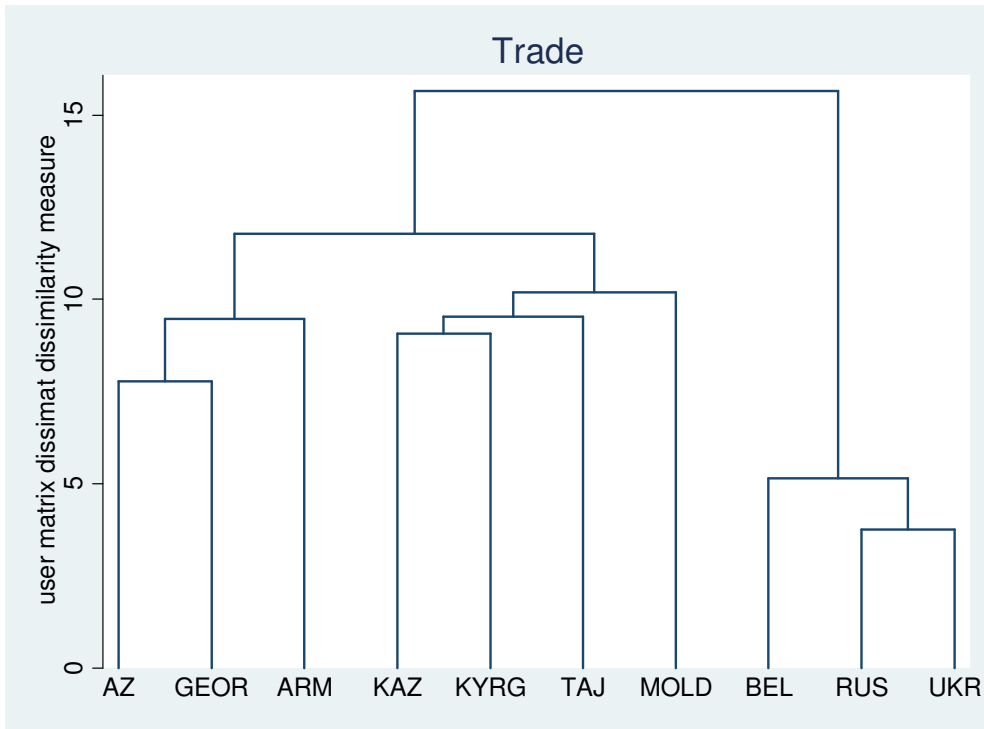Figure 3: Agricultural integration index and total trade in grain (right scale, '000 tons)

Figure 4: Clusters of trade integration, 2008

Note: AZ= Azerbaijan, GEOR=Georgia, ARM=Armenia, KAZ = Kazakhstan, KYRG = Kyrgyz Rep., TAJ = Tajikistan, MOLD = Moldova, BEL = Belarus, RUS = Russia, UKR = Ukraine
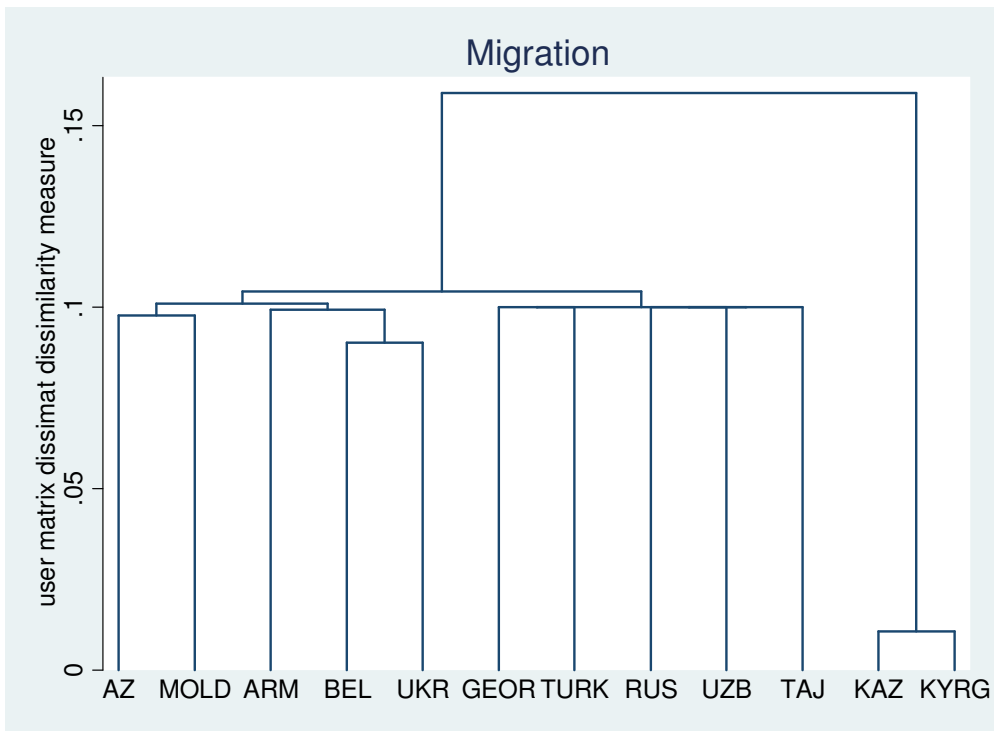
Figure 5: Clusters of labor migration, 2008

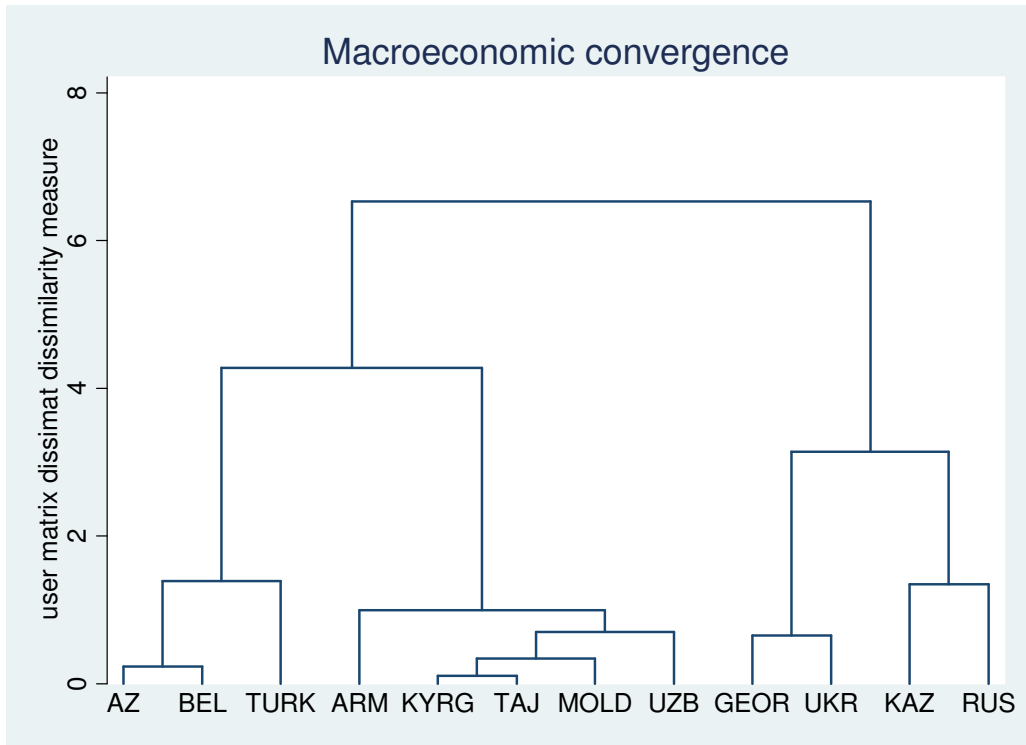Note: see Figure 4. TURK = Turkmenistan, UZB = Uzbekistan

Figure 6: Clusters of macroeconomic convergence, 2008

See Figure 5

Appendix A1: Components of indicators

Table A1: Indicators of market integration

Indicator	Dyad	Region
Total trade	(Country's share in the total foreign trade turnover of the country pair + country's share in the total GDP of the country pair) *100 / 2	(Share of the countries' mutual trade in their total foreign trade turnover + share of the countries' mutual trade in the region's total GDP) *100 / 2
Migration	Labour migrants from each country of the pair working in the other country (thousand people) / total population of the country pair (million people)	Labour migrants from all countries of the region working in other the countries of the region (thousand people)/ total population of the region (million people)
Electric power	Volume of trade in electric power between the countries of the pair (thousands kW/h) / their total GDP GDP (million USD)	Volume of trade in electric power between the countries of the region (thousands kW/h) / the region's GDP GDP (million USD)
Agriculture	Volume of trade in cereals between the countries of the pair (tonnes) / their total GDP (million USD)	Volume of trade in cereals between the countries of the region (tonnes) / the region's GDP (million USD)
Education	Number of students from each country of the pair studying in the other country (person) / total population of the country pair (million people)	Number of students from all countries of the region studying in other the countries of the region (person) / total population of the region (million people)

Note: The trade integration index is divided by 100 for convenience in presenting data and to ensure compatibility with the standard "share in foreign trade" indices, which are expressed as percentages

Table A2: Variables in the convergence indicators

Indicator	Variables
Macroeconomic indicators	GDP per capita (USD); annual GDP growth rates (%)
Monetary policy	average interest rate for deposits (%); average lending interest rate (%)
Fiscal policy	share of consolidated public budget expenditures in the GDP, (%) share of external debt in the GDP (%), share of consolidated budget surplus in the GDP (%), ratio of share of tax revenue in the GDP (%) and the GDP per capita (USD) (Frank index of the tax load on the economy)
Financial policy	annual growth rates of national currency exchange rate to the USD, annual inflation rate (%)

Note: all variables are standardized using the standard normal distribution for comparability

Appendix B: Clusters of integration of markets and economic convergence
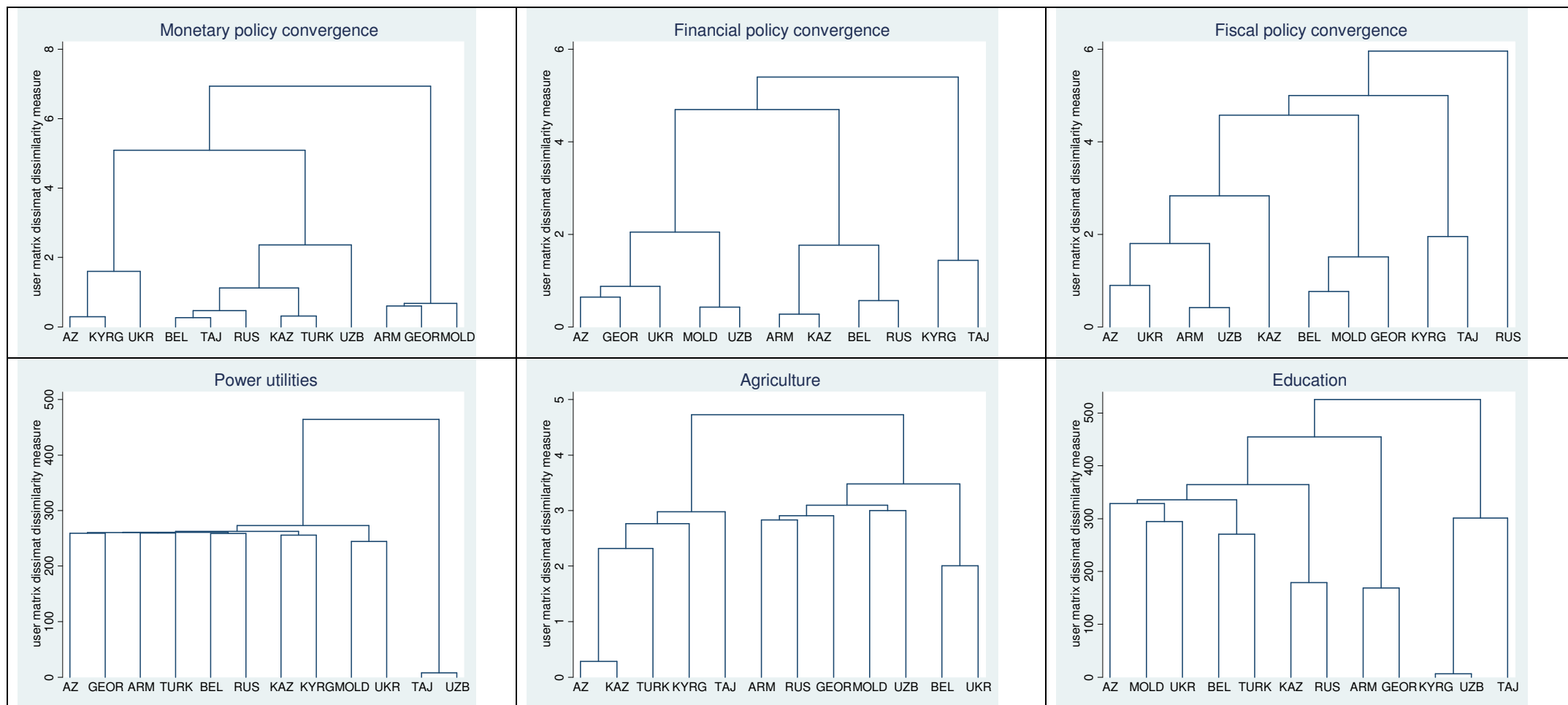

Figure B1: Clusters of economic policy convergence (financial, fiscal and monetary policy) and of trade in selected areas (power utilities, agriculture, education), 2008

Note: see Figure 5