

Common Economic Area of Russia, Kazakhstan and Belarus: Spillover Effects

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Abstract

A Common Economic Area (CEA) formed by Russia, Kazakhstan and Belarus since January 1st 2012, following creation of the Customs Union between these countries in 2009, raises a number of topical questions on whether it can be sustainable, trade-stimulating between participating countries, efficient in terms of long-run economic growth etc. However, an important part in the effects of inter-country influence within such a union is played by the degree the countries are connected through other than trade policies - monetary policy in general and exchange rate policy in particular. The nature of such inter-connectedness is influenced by the proneness of these countries to 'resource curse' (or 'Dutch disease' broadly understood as reallocation of production inputs in the economy due to its dependence on natural resource exports). Existing literature on the countries forming the CEA seems to suggest that they are all, to some extent, subject to the Dutch disease, although might be at different stages of it, making resource rents an important factor in economic development of these countries. We construct a small inter-country forward-looking econometric model based on the New Keynesian Phillips curve formulated for the economies of Russia, Belarus and Kazakhstan. Being heavily inter-related, the model allows us to simulate spillover effects of various policy measures and pass-through effects of the 'Dutch disease' between the CEA countries. Simulation experiments demonstrate that Belarus is most dependent on the other two counterparts of the union.

Keywords: inter-country model, Dutch disease, Customs Union, Russia, Belarus, Kazakhstan

JEL-codes: E17, F44, F47, P52

1. Introduction

Creation of the Customs Union of Russia, Belarus and Kazakhstan is, perhaps, the most successful attempt at integration between the countries of the former Soviet Union since the latter has collapsed. One of the first attempts to the union including these three countries has been made as early as September 2003 when Russia, Ukraine, Belarus and Kazakhstan entered into the Agreement on

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Common Economic Area. This agreement had not resulted in any further integration steps since the change of political situation in Ukraine in 2004 made it clear that the agreement would have to be changed. This meant that integration (if any) was to be fostered by the remaining three countries. Russia and Belarus had entered into a number of agreements assuming economic integration, including potential introduction of the common currency, but none of these bilateral agreements had been followed by further practical steps.

In October 2007 Russia, Belarus and Kazakhstan signed the Custom Union agreement and since July 2010 the Customs Union had started its operations. This time a number of specific agreements have been introduced, a united customs area implemented with unified tariffs for the third countries. And since January the 1st 2012 the Customs Union has been officially replaced by the 'new integration project' – Common Economic Area (CEA). CEA represents the next step in economic integration of the three countries. The main officially stated idea underlying creation of the CEA is to increase living standards and economic efficiency of its members through unified economic policy. The main goals of CEA include²: (a) effective functioning of common (internal) market of goods, services, capital and labour; (b) creation of conditions for sustainable development and restructuring of the economies of member countries and increasing living standards; (c) unified tax, monetary, currency, financial, trade, custom and tariff policies; (d) development of unified transport, energy and information systems; and (e) creation of a common system of measures of state support of priority industries development, industrial and scientific cooperation.

To achieve these goals participating countries are expected to work out 52 legal documents supporting realization of 17 basic agreements underlying CEA³ by the end of 2015 so as to have CEA in full operation since January 1st 2016⁴. Consistent macroeconomic policies as well as unified rules of the game are viewed as being central to the success of the whole enterprise. The ambitions of the project go as far as to include other countries into this integration project and to form in the future the 'Eurasian union' with unified economic policy, possibly unified currency, and absence of internal borders. While at the beginning the first candidates to join CEA were named to be Kyrgyzstan and Tajikistan, later on Uzbekistan appeared as one of the interested parties, and currently only Kyrgyzstan has agreed with the CEA on the 'road map' of the process of joining in the union and it is expected that by December 2013 there will be a firm plan on Kyrgyzstan's integration into the CEA. No limits to the participating countries are set with the implied notion that all current NIS countries can (will) join in. The perspective for the Eurasian union is seen in making it a serious regional player participating in decision-making process forming global rules of the game for the future.

² <http://www.evrazes.com/customunion/eepr>

³ <http://tsouz.ru/Pages/Default.aspx>

⁴ <http://www.evrazes.com/customunion/eepr>

Generally the process of economic integration among the former Soviet Union countries is fragmented. There is the Custom Union between Russia, Kazakhstan and Belarus, underlying the Common Economic Area and forming the core of the Eurasian union. At the same time there is free-trade zone agreement that legally started on September 20th 2012 when it was ratified by Russia, Belarus and Ukraine. Among the goals of this FTZ is to develop fully operational free-trade zone in accordance with the rules and regulations of WTO and to decrease tariffs on all trade within the FTZ⁵. The FTZ continues to grow: Armenia has joined it in October 2012, Kazakhstan and Moldova – in December 2012. Interestingly, Kyrgyzstan and Tajikistan, though aiming to join the CEA, stay currently out of this FTZ. Official reports claim that there are negotiations with Vietnam on the issue of its joining in the FTZ, and another country considered for potential joining in is the New Zealand. Russia's membership in the WTO means that the FTZ and CEA will have to adapt the trade rules in accordance with the WTO rules, which might require further substantial work on tariffs within the Customs Union.

Creation of the Custom Union and replacing it Common Economic Area was based more on political than economic considerations, and in many aspects we might reasonably expect that political decisions will outweigh economic ones. While economic cooperation within the European Union, though going hand in hand with political rhetoric and considerations, was guided by certain economic criteria that the countries had to fulfill in order to join the EMU, the CEA, it seems, has been created not only without any threshold values on economic indicators of participating countries, but without any consistent analysis of its members' economies. No thorough studies of interdependencies, differences and similarities of the countries have been made, and this might lead to future potential problems.

Creation of the CEA raises a number of practical questions, including those of achievability of the goals set, potential stability of the union, expectations on further integration steps, and priority directions of continued integration. Since the final integration stage assumes common economic policy (and even common currency in a not too distant future), it is topical to have a closer look at the economies of the three countries and their interdependencies that might ease or aggravate potential problems. And one of the most relevant questions concerns the differences in resource endowments (and rents gained from these resources) and existing spillover effects between the three countries. The paper is organized as follows. Section 2 discusses existing evidence of resources' influence on economic developments of the CEA countries and existing research of on the Customs Union. Section 3 discusses the inter-country model developed in this paper as well as some background papers justifying the model structure. Section 4 presents briefly data used on our study, estimation method and estimation results. Section 5 describes several simulation experiments and their results. Section 6 concludes.

⁵ Though Russia and Ukraine are likely to have serious arguments over Russian export tariffs on oil and gas as pricing of oil and gas products is officially stated to remain beyond the FTZ framework.

2. Literature review

The three countries forming the Customs Union are quite different in their economic structure, which might influence stability of the union in response to external shocks. While Russia and Kazakhstan heavily rely on their oil and gas resources, the drivers of economic growth in Belarus are light and food industries. Dependence of at least two of the three countries on resource extraction raises the question of potential proneness to the 'resource curse' (and 'Dutch disease' as one of its main manifestations).

The general evidence concerning influence of natural resources abundance on economic development of the country is quite mixed. In their seminal paper Sachs and Warner (1995) demonstrated that natural resources might be detrimental for economic growth. Their conclusion has been supported by several subsequent studies (e.g. Leamer et al (1998), Sala-i-Martin and Subramanian (2003), Gylfason (2001, 2004), Suslova and Volchkova (2006)), while several other studies have proved otherwise (e.g. Alexeev and Conrad (2005), Stijns (2005), Brunnschweiler (2006)). Some recent studies (e.g. Polterovich, Popov, Tonis (2010)) find that the influence of resources on growth depends on a number of factors and can be either negative or positive with the quality of institutions playing a decisive role. A recent study by Brunnschweiler and Bulte (2008) demonstrate that resource abundance is often proxied in empirical studies as resource dependence. And while the latter does not affect growth, the former positively affects growth and institutions quality. Hence, even from this brief description, it is easy to see that there is no consensus among economists on whether or not resources hamper economic growth.

The hypothesis of 'resource curse' is not proved nor disproved, and the question of potentially negative influence of natural resources of high demand on growth remains one of the most studied in the field. The various ways in which resources might slow down economic growth can be summarized as follows: resource-abundant countries usually have to cope with market failures (including the so-called Dutch-disease) resulting in usage of natural capital less efficiently than other types of capital, abundance of natural resources prevents economic growth when coupled with low quality of institutions (which tends to deteriorate), and, at the most practical level, resource abundance influences the quality of economic growth and economic policy. Accordingly, a number of studies studied the issues of natural resource influence for Russia and Kazakhstan and almost none for Belarus (on the grounds of absence of serious resource endowments).

For Russia the first studies of the questions of natural resources influence on economic growth (and, more specifically, of Dutch disease signs) appeared in the early 2000s when oil prices began to increase. Spatafora and Stavrev (2003) concluded that real exchange rate appreciation of ruble could be explained by Balassa-Samuelson effect. Merlevede, Aarle and Schoors (2004) found no noticeable effect of exchange rates on tradables sector. Kronenberg (2004) studied the issues of 'resource curse' in

transition economies and found no clear signs of Dutch disease, though corruption and neglect of education policies were found to be the driving factors of potential 'curse'. Roland (2005) concluded that it was premature to speak about Dutch disease in Russia. Ahrend (2005) on the basis of his analysis stated that Dutch disease was potentially threatening Russia in medium to long-run. Westin (2005) also concluded there was no yet Dutch disease in Russia and found that manufacturing sector was growing faster than resource-related sector. Volchkova (2005) also reached the conclusion that there was no Dutch disease in Russia yet at the time, but it was possible in the future. Egert (2005) studied real exchange rate behavior in Russia and found that real effective exchange rate was in Russia more or less at equilibrium value. Aslund (2005) mentioned that there were Dutch-disease signs in increasing real wages of oil-related sector, and this could not be held as conclusive concerning the Dutch disease diagnosis. His major conclusion was that Russia should and might do a number of steps to make the resource a blessing rather than a curse. Gaddy and Ickes (2005) in the same year wrote that at that moment in Russia the widely held view was that resource sector was a source of rents (with redistribution potential), but no development investments or serious consideration of development of this sector or usage of rents wealth was held.

Since mid-2000s the authors studying influence of resources on Russian economic development more often than not started to conclude that it was likely that Russia had Dutch disease. Desai (2006) studied influence of real exchange rate appreciation on manufacturing sector and found it inconclusive. Algieri (2006) found signs of Dutch disease in Russia. Beck, Kamps and Mileva (2007) found symptoms of the Dutch disease, including growing service sector and real exchange rate appreciation, but mentioned that all these symptoms can have another explanation. Oomes and Kalcheva (2007) found the 4 symptoms of the Dutch disease but also concluded that they could be explained by other factors. Ahrend and Thompson (2007) compared Russia with Ukraine (similar countries with similar Soviet past but with different resource endowments) and found some evidence of de-industrialisation in Russia, though mentioned that evidence in favour of the Dutch disease could as well be explained by other factors. Sosunov and Zamulin (2007) found that assumption of Dutch disease existence in Russia allowed consistent modeling of Russian monetary authorities behavior. Barisitz and Ollus (2008) found signs of import reliance and de-industrialisation in the Russian economy. Egert (2009) studied the issue of Dutch disease in the countries of the former Soviet Union and concluded that a number of them, including Russia were subject to Dutch disease.

For Kazakhstan the issue of natural resource dependence also became topical since the beginning of 2000s. Kuralbaeva, Kutan and Wyzan (2001) found evidence of terms of trade influence on real exchange rate and concluded that the country was vulnerable to Dutch disease in the future. Mahmudov (2002) surveyed a number of papers prior to 2002 that were concerned with the possibility of Dutch disease in Kazakhstan, summarizing that most of them did not found Dutch disease evidence.

Cohen (2003) discussed policy advice to Kazakhstan assuming Dutch disease presence. In the already mentioned paper by Kronenberg (2004) no clear signs of Dutch disease were found for Kazakhstan. Kutan and Wyzan (2005) concluded that in medium to long-run the country might be vulnerable to Dutch disease. Frankel (2005) found evidence that real exchange rate appreciation might be the symptom of the Dutch disease. Libman (2006) in his analysis assumed Dutch disease on the basis of stylized facts provided. Egert and Leonard (2007) concluded that by 2005 Kazakhstan was shielded from Dutch disease, but prone to it in the future. In the study of former Soviet Union countries Egert (2009) concluded that for Kazakhstan, among some other countries, Dutch disease was clearly diagnosed.

For the case of Belarus the issue of resources influence on the country's economy was very rarely addressed since the country has been considered as non-resource dependent one. The two already mentioned earlier studies of Dutch disease in transition economies (Kronenberg (2004) and Egert (2009)) included Belarus, but the evidence for this country was inconclusive. In the paper by Chernookiy (2005) the response of Belorussian real effective exchange rate to the shock in oil prices was found to be twice lower than for Russian REER indicating that Belarus was better shielded at the time from oil shocks. However, the paper by Charemza et al (2009) suggested the importance of studying spillover effects from neighbouring countries on Belarus leading to its higher dependence on resources of neighbouring countries than could be assumed from stylized facts about Belorussian economy. Hence, recent empirical evidence supports the idea that two out of the three countries forming CEA might be subject to adverse consequences of resource dependence, and the third one might be vulnerable as well through potential spillover effects. This implies the necessity of a more careful investigation of the inter-connectedness between the three countries in order to predict the implications of shocks (both external and internal) on the behavior of these economies.

Until now the studies of Customs Union (or CEA) are scarce and mostly speculative in nature. During 2000s a number of attempts to evaluate if some of the NIS countries were ready for a currency union with Russia had been made, as talks about Russia and Belarus plans on currency unification were in and out of fashion. One of the first inquiries in the integration potential of NIS countries has been made in 2004 by Drobyshevskiy et al. Their study was devoted to studying optimal currency zones both for the case of the European Union (with the new members that were to join eurozone in the future) and for the case of NIS countries. They studied how exchange rates volatilities depended on a number of factors characterizing proximity of the countries in terms of their exchange rates movements with different specifications for EU and NIS cases. Their conclusion was that in 2004 countries most ready for the currency union with Russia were Moldova, Kazakhstan and Ukraine.

The paper by Chernookiy (2005) investigated potential currency union between Russia and Belarus. He considered the effect of energy resources prices on the dynamics of real equilibrium

exchange rate between the two countries on the basis of simulation experiment when the two countries joined the currency union using panel data. He found that the effects were strong for Belarus and had adverse influence on its industrial structure. Therefore he concluded that some stabilization mechanism had to be introduced in Belarus in order to mitigate the negative consequences from currency unification.

György (2010) described in details the history of Customs union creation, analysed the economic situation in the CU member countries at the end of 2008 and concluded that data on macroeconomic situation, economy openness, inter-country trade etc. indicated that the Customs union formation was incomplete. He demonstrated that the CU creation did not result in economic diversification, there was no decrease in import reliance of the member states, no increase in intra-union trade, with the intra-union trade flows slightly reallocated and almost none created in addition to existing ones. The general conclusion of the paper was that prospects of the union were rather gloomy.

Amirov (2010) considered cooperation of Russia and a number of Central Asian countries, looking in details onto potential WTO acceptance of Russia and Kazakhstan, and (to a lesser extent) of Belarus, considering individual or joint (as the Custom union) accession. The Customs union in this paper is mentioned briefly but is characterized as ad hoc and not functioning properly. Tochitskaya (2010) analysed the effects of the Customs union on Belorussian economy, its trade flows, tariff changes, potential for WTO entry and foreign direct investments. Since she based her analyses on the situation before the Customs union has been launched into full operation, the conclusions of the paper are indeterminate and rather vague.

A very recent paper by Isakova and Plekhanov (draft version as of May 2012) inquired into the impact of the Customs union on Kazakhstan's imports and concluded that the effect was at best moderate. The changes in tariffs and customs rules induced by the Customs union resulted for Kazakhstan in reduced imports from China and increased imports from within the CU. The author suggest that the major benefits from the CU for Kazakhstan might come with liberalization of the service sector and production factor markets expected as part of unification of economic policies process under CEA. A report by Leontiev Centre on the Customs Union and border-area cooperation between Kazakhstan and Russia (2012) does not report significant changes in the border-areas trade between the two countries, and provides a number of recommendations on developing further integration between bordering regions, mostly of administrative character. This means that the effect of integration was not immediate and strong for the bordering regions, and, by now, remains insignificant for the countries forming the Customs Union.

Hence, all the papers about the Customs Union or pre-CU cooperation efforts or speculations mostly concerned themselves with looking into various specific aspects of real or potential cooperation

or in a descriptive way at a number of economic indicators. We would like to add to this pool of papers by inquiring into the potential effects of differences in resource endowments and resource rents and their spillover effects between the three countries.

3. Inter-country model

Often spillover effects are studied using models with trade linkages. Among the seminal papers, studying inter-country effects one can mention Mundell's (1961) paper on optimal currency areas. His theoretical ideas were further developed by e.g. Frankel and Rose (1998) who continued the analysis of optimal currency areas by looking closer at the business cycles synchronization. They considered that as the country enters currency union, it is subject to strong changes in its business cycle, but these changes can be in either direction. If countries are more sensitive to specific shocks in certain industries, they start after currency unification to specialize more on those industries where they have comparative advantage, and then business cycles become less synchronized. However, if demand shocks (or some other 'common' shocks) prevail or the increase in trade flows is mostly due to intra-industrial trade, synchronization is increased. The authors considered the second scenario to be more realistic, and checked their hypothesis on the sample from 20 countries within 30 years span confirming that the more trade there is between countries, the more synchronized are business cycles. A vast literature on business cycles literature usually uses various forms of VARs (including structural and, more recently, VARs with factors structure – FSVAR, see e.g. Stock and Watson 2005) to examine how shocks from one country propagates to others, or how countries respond to various forms of external shocks. However, such studies do not allow accounting for the economic policy actions within the countries and only concentrate on measuring the level of 'correlation' between real GDP (or another indicator chosen to represent business cycles movements).

Other studies of trade impacts include, for example, papers by Abeyasinghe (1998, 2001), Abeyasinghe and Forbes (2001, 2005) where structural VAR models are developed to study through impulse-response matrices how shock in one country might affect economic development of its trading partners. This is done also when the effects of oil prices are studied for a number of countries considered jointly: along these lines the paper by Korhonen and Ledyeva (2010) using the trade linkages matrix assesses the impact of oil price shocks on countries that are net oil importers and net oil exporters. They studied both direct effects concluding, for example, that oil price increase of 50% boosts Russian GDP by 6%, and indirect effects, with the largest negative ones for Russia, Finland, Germany and the Netherlands. While trade linkages are important, they are not the only possible channel of shocks' transmission from one country to another, and besides, trade statistics is far from being perfect. Besides, such models, relying on VAR methodology, require large datasets with a large number of parameters to be estimated making the method less suitable for using in small samples.

Therefore, in our paper we use the framework of small inter-country model developed by Charemza et al (2009), substituting Ukraine in their model for Kazakhstan and suggesting several modifications in the data used. The model is a forward-looking simultaneous equations one with the dominating economy (Russia). Belarus, for the purposes of this model, can be considered as a small open economy, and the microfoundations for this type of model can be found in the extension of the New Keynesian DSGE model to small open economy setting by Gali and Monacelli (2005) or in Benigno and Benigno (2006), Lubik and Schorfheide (2007) and similar papers. For Russia an appropriate framework can be derived following the argument in Sosunov and Zamulin (2007) and Charemza et al (2009). For the estimation purposes the equations will be almost the same, but prior expectations of the signs of the estimated coefficients might change. Kazakhstan can be regarded as a somewhat 'middle' case, since in terms of economy size it is closer to Belarus, but in terms of expected macroeconomic dependencies it can be reasonably considered closer to Russia with a potential threat of the Dutch disease.

The model contains two layers of links between the countries. The more explicit layer related the countries through mutually depending exchange rates (as described by (5)). A more implicit layer connects countries through inter-country averages suggested in the framework of GVAR methodology by Chudik and Pesaran (2007). In Charemza et al. (2009) it has been shown that GVAR methodology can be successfully applied to cases of small samples and domineering country.

The model can be described as follows. For each country we estimate three equations. Two more equations for each country are needed to close the model. The closing equations are related to the definition of the real effective exchange rate (REER) and bilateral exchange rates. The real effective exchange rate in the model is defined as consisting of the two parts – external and internal. The former is the part of REER related to the 'world' outside of the model; it is proxied as the weighted average of bilateral real exchange rates of the country i with USD and Euro. The internal part of REER is a weighted average of bilateral real exchange rates between the country i and the other two countries of the model (that is, Russia, Belarus and Kazakhstan). The weights for the REER are calculated on the basis of external trade statistics. Generally, there are two ways to find appropriate weights:

- One is straightforward on the basis from imports and exports (this methodology is suggested in Loretan (2005)). For this purpose we assume that the trade within the CU is conducted in the currencies of the Union's countries, the trade with the Eurozone countries is in euros, and the rest of the external trade is in US dollars. This method for calculating weights can rely on trade data provided by e.g. IMF's DOT database.
- Another way to calculate weights for the REER (more realistic) is to estimate how much trade is done in different currencies between the CU countries, since part of it is in USD, part in Euros,

and only part is in local currencies. This method requires more information on the trade structure in terms of currencies. For this method additional information on the currency structure of Belorussian, Russian and Kazakh trade was found in special reports by Belorussian statistical office and other official publications of the three countries. For the years with missing data the currency structure of trade was assumed to develop in a linear manner in relation to the periods of known data.

We used both methods to calculate weights. The difference in the resulting weights and their dynamics over time is negligible, and the results of estimations and simulations remain largely the same. Therefore, the results in this paper are for the first method when we do not have to make additional assumptions to fill in missing data. More details on the datasets used are provided in the Appendix 1.

Thus, (logarithmic) REER for the country i can be defined as

$$q_{it} = q_{it}^x + q_{it}^in = \omega_{it}^{(eur)} re_{it}^{(eur)} + \omega_{it}^{(usd)} re_{it}^{(usd)} + \sum_{j \neq i, j \in 1,2,3} re_{it}^{(j)} w_{it}^{(j)} \quad (1)$$

where q_{it}^x stands for external part of REER, q_{it}^in is the internal part of REER, $w_{it}^{(j)}$ denotes appropriate weights (in our model they are allowed to change over time unlike in the model of Charemza et al. (2009)), $re_{it}^{(j)}$ is the corresponding bilateral real exchange rate. Further details on data and modifications can be found in the next section and in the Appendix 1.

The second set of closing equations is related to bilateral real exchange rates and requires that (accounting for logarithmic transformation of data) real bilateral exchange rate between countries i and j is negative to the real bilateral exchange rate between countries j and i :

$$re_{it}^{(j)} = -re_{jt}^{(i)}, \quad i \neq j, \quad i, j \in 1, 2, 3 \quad (2)$$

We now turn to the estimated equations describing output gap, non-systematic part of inflation and real bilateral exchange rate. The output gap is modeled as:

$$y_{it} = f_{i,y} \left(\underbrace{y_{it-L}}_{(+)}, \underbrace{\{y_{jt-L}^*\}}_{(+)}, \underbrace{y_{t-L}^w}_{(+)}, \underbrace{q_{it-L}}_{(+,?)}, \underbrace{h_{it-L}}_{(+)}, \underbrace{r_{it-L}}_{(-,?)} \right) \quad (3)$$

where L is lag operator, q_{it-L} is REER, $\{y_{it-L}\}$ is output gap, h_{it-L} is a proxy for capital flows available to the country i , r_{it-L} is base interest rate, y_{t-L}^w is 'world' output gap, $\{y_{jt-L}^*\}$ stands for output gaps of other countries in the model approximated through trade-weighted (time-varying) average as suggested in Chudik and Pesaran (2007) and Charemza et al (2009). The signs in parentheses refer to the signs of theoretically expected sums of partial derivatives for the corresponding groups of variables. While in most cases the signs are straightforward from the baseline macroeconomic theories,

we might expect differences for some variables for some countries. Initially our concern was with potential differences of signs for Russia, however, since Kazakhstan is also prone to Dutch disease, we do not have prior expectations for it as well.

The reason of why for Russia the signs of REER and base interest rate can be different is related to the monetary policy stance and macroeconomic conditions of this economy. Bank of Russia's major goal is to fight inflation. At the same time it has been controlling (more or less explicitly) rouble exchange rate so as to prevent the loss of competitiveness by the country's industries other than mining. Since until mid-2006 Russian exporters were obliged to exchange a substantial part of their revenues in foreign currencies for the rouble and due to high oil prices, this created inflationary pressure and the Bank of Russia had to pursue tight monetary policy for most of the 2000s. Creation of the Stabilisation Fund lessened inflation pressure, but not entirely. Besides, changes in real exchange rate resulting from high oil prices and excessive inflows of foreign currency might negatively influence output in the economy. Hence the 'wrong' signs that might be expected for Russia and for Kazakhstan (as a country in largely similar circumstances).

The second estimated equation is related to non-systematic part of inflation:

$$\pi_{it} = f_{i,\pi} \left(\underbrace{y_{it-L}}_{(+)}, \underbrace{E_t \pi_{it+L} - \pi_{it+L}^T}_{(+)}, \underbrace{\{\pi_{jt-L}^*\}}_{(+)}, \underbrace{\pi_{it-L}}_{(+)}, \underbrace{q_{it-L}}_{(-,?)} \right) \quad (4)$$

where π_{it} is current non-systematic inflation part, $E_t(\pi_{it+L} - \pi_{it+L}^T)$ measures expected at time period t deviation of target inflation from its current level at time $t+L$, $\{\pi_{jt-L}^*\}$ is similar to $\{y_{jt-L}^*\}$. The signs in parentheses refer as before to the signs of expected sums of partial derivatives for the corresponding groups of variables, and question marks can be applicable again both to Russia and Kazakhstan as the two clearly oil-dependent countries.

And, finally, bilateral exchange rates are modelled using monetary-type equation:

$$re_{it}^{(j)} = f_{i,re} (y_{it-L}, y_{jt-L}, q_{it-L}, q_{jt-L}). \quad (1)$$

4. Data, estimation method and estimation results

The period chosen for the study included data from 1996:1 to 2010:2, all data are quarterly (or converted appropriately into quarterly data). We've chosen not to advance into the period of Custom's Union operation leaving this period as potentially useful for comparisons or real and simulated patterns. The set of data used and all data transformations prior model estimation is described in details in Appendix 1. Briefly the data list for each country (Russia, Belarus, Kazakhstan) contains:

- CPI (for calculating inflation π_{it}),
- GDP (for calculating output gap),
- PPI (for calculating real exchange rates – this measure of price index was chosen for exchange rate transformations following considerations in Chinn (2006)),
- real base interest rate (adjusted from nominal base (refinancing) interest rates of the corresponding Central Banks),
- inflation targets (on the basis of official documentation of national Central Banks, used for forward-looking part of the model),
- bilateral nominal exchange rates,
- data on external trade (with the countries of the CU, Eurozone, other countries; for calculation of weights).

Additionally the following data were collected:

- international capital flows,
- GDPs of major trade partners of the CU countries (as a proxy to calculate ‘world’ output gap),
- PPI for the Eurozone and USA (for calculating real exchange rates).

The most obvious measure of capital flows available for the country i is its FDI. However, as suggested in the literature (Corbo and Tessada (2005)) using FDI alongside with GDP raises problems with endogeneity. Therefore, we construct instead a measure of sum of foreign direct investment abroad for USA, UK, Japan, and Eurozone (11) divided by the total GDP of these countries – such a measure should be exogenous in relation to GDP.

The model was estimated first through estimation of each equation separately by GMM adjusted for models with forward-looking expectations and heteroscedasticity with instruments including in the subsequent equations residuals from already estimated ones to ensure orthogonality of the estimated residuals. Each equation was checked for the appropriateness of instruments used, validity of results in terms of residual autocorrelation, information criteria, signs and amplitude of the coefficients. With few minor exceptions the signs were as predicted from theoretical considerations. All equations (3) and (4) contain corresponding inter-country averages, thus increasing validity of our estimation results. Table 1 provides summary of estimated equations.

The estimated equations are parsimonious in terms of parameters, and almost all of them include 4th lag of some regressor suggesting that dynamics as of year ago is important. In the forward-looking part of the model (equation (4) for each country) only one lead was significant, which probably reflects inherent instability of the considered period (including two crisis – last global financial crisis and

crisis of 1998 in Russia that seriously hit neighbouring countries). Interestingly, in estimations of equation (3) international capital flows were significant only for Belarus, while world GDP was significant for all countries. This difference stresses the main difference of Belarus from the other two countries of CEA – it can and should be modeled as a small open economy. For non-systematic part of inflation (equation 4) inter-country linkages of $\{\pi_{jt-L}^*\}$ have a deep lag of 4 indicating that in all countries inflation is persistent and inter-dependent, though to a different extent: the sum of estimated partial derivatives for Russia is about 0.03, Kazakhstan – 0.13, Belarus – 1.57. Most equations contain from 1 to 3 dummy-variables related to crisis periods of 1998 and/or 2008-2009. The baseline solution of the model is consistent with the actuals indicating that the chosen estimation strategy has worked well.

Table 1. Estimation summary

	# of regressors /highest lag	# significant at 1%	# significant at 5%	# significant at 10%
Eq(3), Russia	9/4	9	0	0
Eq(3), Kazakhstan	12/4	9	3	0
Eq(3), Belarus	9/4	5	2	2
Eq(4), Russia	11/4	7	0	4
Eq(4), Kazakhstan	8/4	8	0	0
Eq(4), Belarus	9/4	5	1	3
Eq(5), Russia	6/4	2	4	0
Eq(5), Kazakhstan	7/4	4	0	3
Eq(5), Belarus	6/2	5	1	0
	77	54	11	12

5. Simulation experiments and discussion

In order to inquire into whether resource rents received by Russia and Kazakhstan influence Belarus we conducted several simply simulation experiments using our model. Our preliminary hypothesis was that Belarus should be affected by spillover effects from the other two countries from the Customs Union since it enjoyed, for the most part of our estimation period, low crude oil prices for its purchases from Russia with substantial gains from re-export of Russian oil in the form of oil-processed products. We modeled potential changes in the resource rents in Russia and Kazakhstan by adjusting exogenous parts $q_{it}^{(x)}$ of their REERs. The first set of experiments assumed that the oil price remained at about the same level as it used to be at the beginning of the year 1999 through until the beginning of 2007. Accounting for high correlation between nominal exchange rates of Russian ruble and Kazakh tenge and oil prices, nominal exchange rates were adjusted first, with subsequent re-

calculation of $q_{it}^{(x)}$ and REER for using in simulation experiments of the first type. We checked for the differences in reaction of major economic indicators (output gap and non-systematic part of inflation) compared to baseline model solution for the cases: (a) only Russian $q_{it}^{(x)}$ was affected, (b) the same for Kazakhstan only, (c) both Kazakhstan and Russia's external REER's affected. Results are presented on figures 1 and 2.

Panels (a) – (c) of figure 1 demonstrate by how many percentage points the output gap will deviate from the baseline solution under simulation experiments described above. As we can see from these simulation experiments, Belarus is much more dependent on Russia – its output gap absolute changes and volatility are higher for the cases of (a) and (c) when Russia is assumed to be directly affected as compared to the case (b) where only Kazakhstan is assumed to have been subject to a pre-set oil price. The spike in 2004 suggests some potential instability of our model, which should not be totally surprising for the model covering two crises and accounting for the problematic quality of statistics in the studied countries, especially in Belarus.

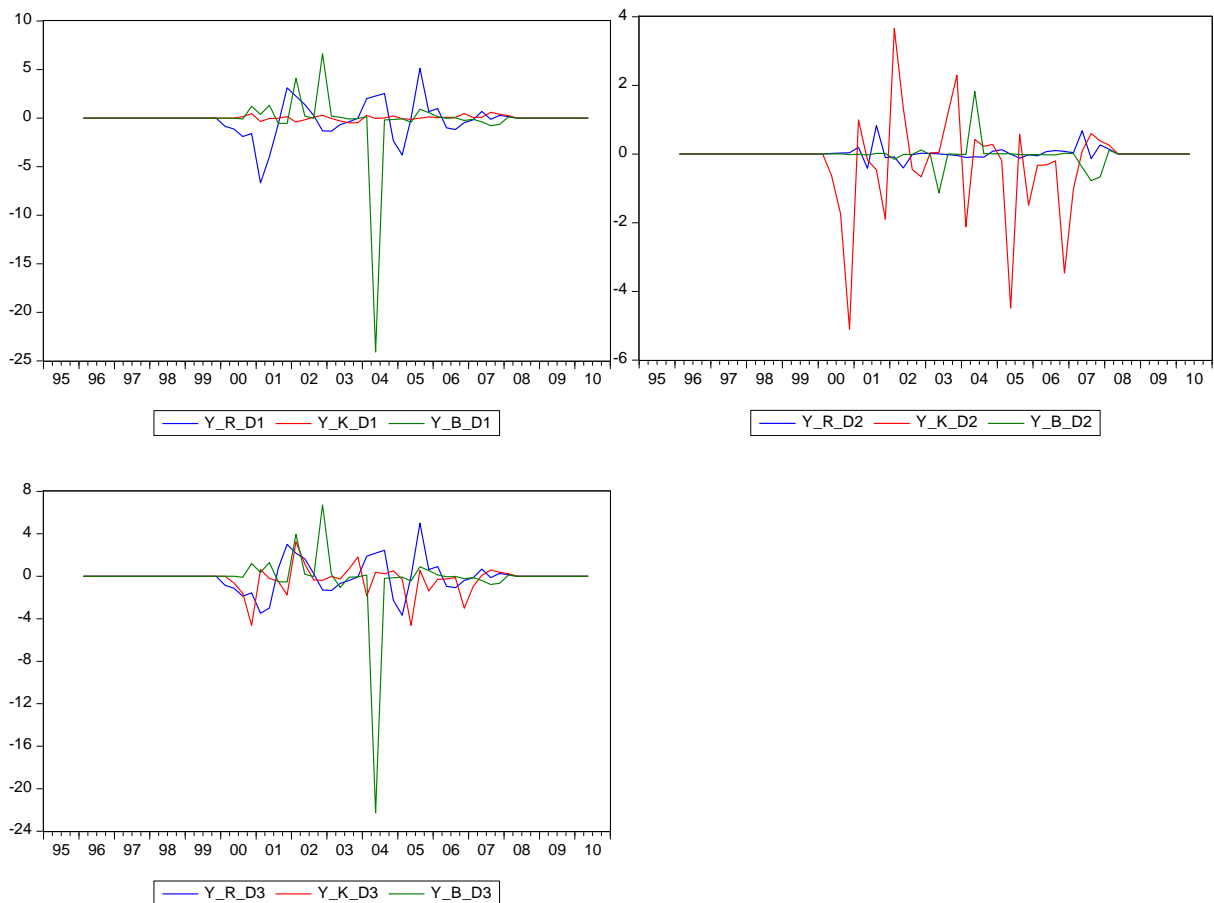


Figure 1 (a) – (c): output gap changes compared to baseline scenario following experiments (a) – (c)

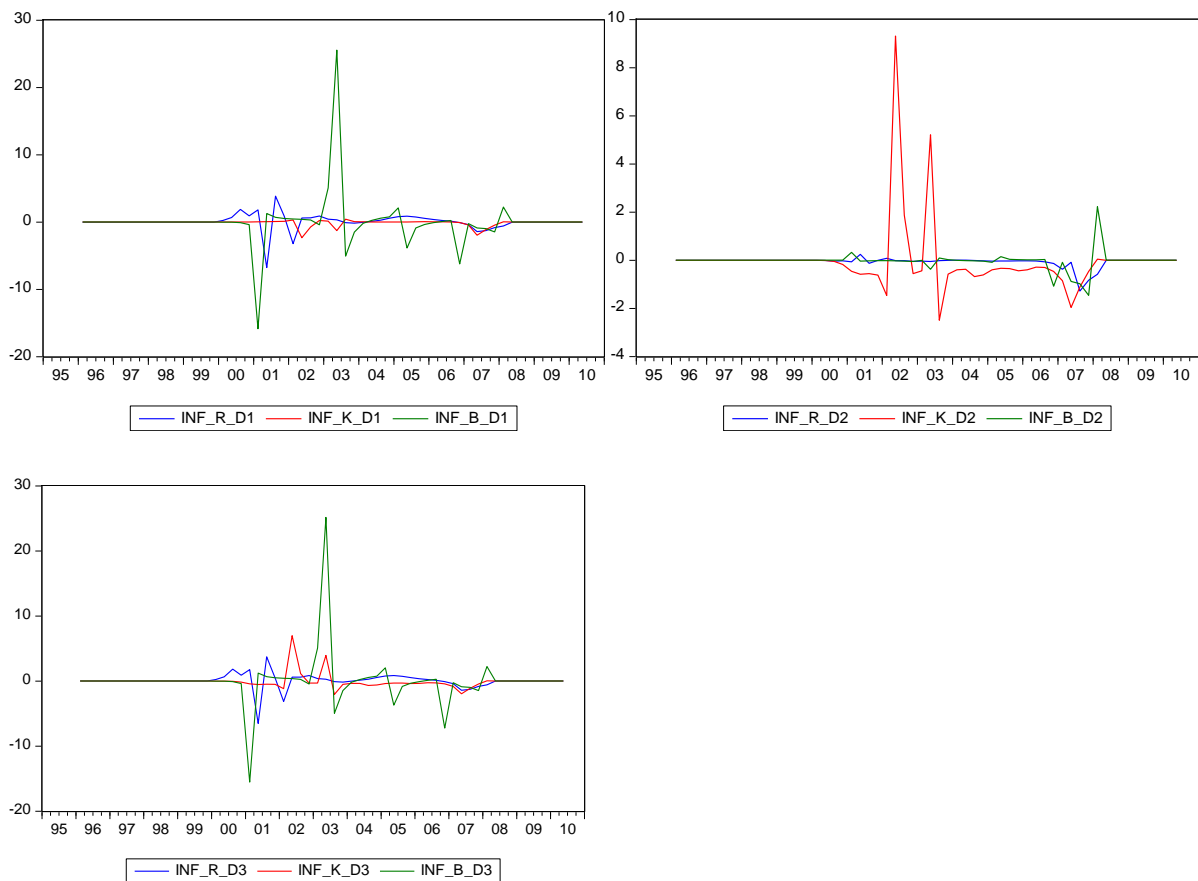


Figure 2 (a) – (c): non-systematic inflation part changes compared to baseline scenario following experiments (a) – (c)

The same sort of conclusions can be derived from studying reaction of non-systematic part of inflation on the simulation experiments (figure 2, panels (a) – (c)). Inflation in Belarus becomes much more volatile in response to changes involving changes in Russian conditions, implying that Russia influences significantly the stance of Belarusian economy.

The next set of experiments included the hypothetical cycle of sinusoidal pattern when first we assumed that oil prices will be increasing from their end of 2001 level, reaching a pick and then declining with a symmetric decrease and following correction. Again, this was modeled by using $q_{it}^{(x)}$ as a proxy for oil-price changes in the economies concerned. Case (d) assumed that oil prices changed only for Russia, (e) – only for Kazakhstan, and (f) – for both countries in the same way. Corresponding calculations were the same, and results are presented in figures 3 and 4. Again, it is clearly visible that Belarus responds more to the cases when Russia is affected, and Belarusian output gap and inflation trends become very volatile.

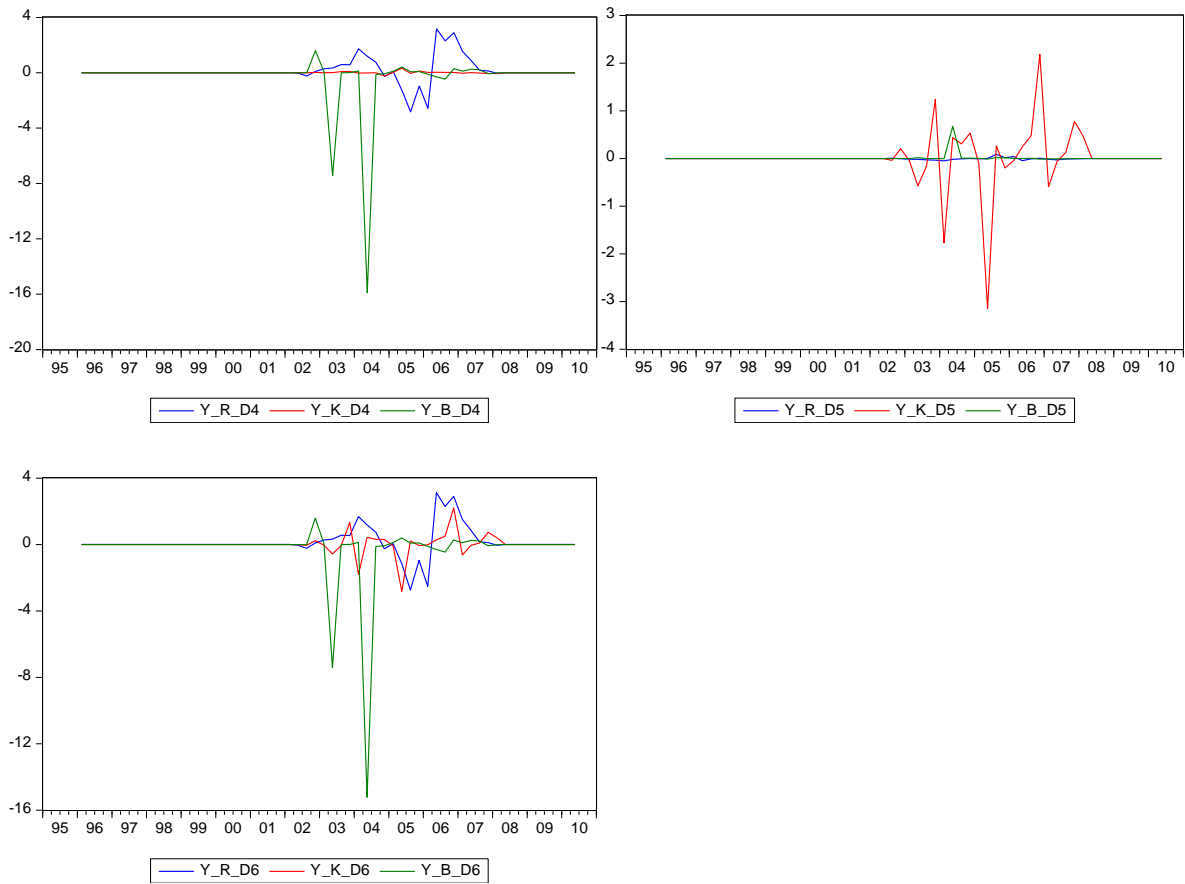


Figure 3 (d) – (f): output gap changes compared to baseline scenario following experiments (d) – (f)

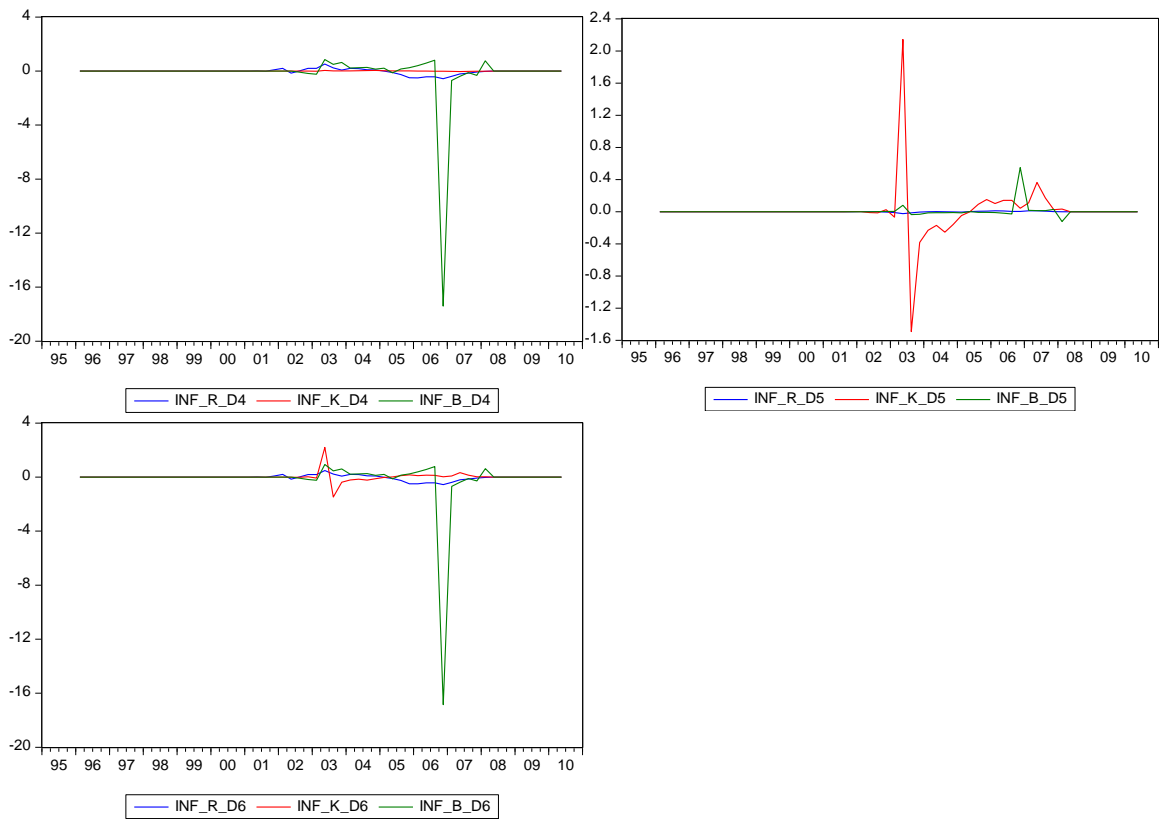


Figure 4 (d) – (f): non-systematic inflation part changes compared to baseline scenario following experiments (d) – (f)

The results of these experiments suggest that the issue of Russia influence on its CEA neighbours should be studied in more details. In particular, we plan to introduce into the model into equations 3, 4 and 5 for each country oil prices and relative oil prices (that is world oil price in relation to local oil price, or world oil price in relation to local oil export price within the CEA) to see how (and if) the results will seriously change. The next stage would be to include directly monetary policy rule for each country.

6. Conclusions

In this paper we inquired into the spillover effects that resource rents, enjoyed by Russia and Kazakhstan as a result of high oil prices, on the third country of the Common Economic Area – Belarus. The hypothesis that there should be some influence from changing conditions in oil prices for Russia and Kazakhstan on the situation in Belarus has been supported in several simulation experiments made within a small inter-country model of the three economies. It was found out that Russia's influence on Belarus is much more pronounced than that of Kazakhstan. These results imply that in planning common economic policies within CEA in the future, its authorities should be paying particular attention at the potential interaction of the economies, and especially at the changes in Russia that imply serious changes for Belarus. These results also suggest that if intra-union trade increases, the spillover effects will only increase between the countries leading to more volatility within the CEA area.

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Appendix 1: Detailed data description and sources

IMF IFS stands for International Monetary Fund International Financial Statistics database.

IMF IFS DOT stands for International Monetary Fund International Financial Statistics data on directions of trade.

CPI

Russia - IMF IFS data taken as is with 2005=100; 1995:1 – 2010:3;

Kazakhstan - IMF IFS data are taken as is with 2005=100; 1995:1 – 2010:3;

Belarus - IMF IFS data on quarterly changes used to recover the data in levels, using 1995:1 as a scale; then rescaling to 2005=100*4.

GDP (all transformed into 2005=100*4 (real))

Russia - IMF IFS quarterly data taken as is with 2005=100 (index value) 1995:1 – 2009:3; for 2009:4 – 2010:2 index of physical volume to the corresponding quarter of the previous year is taken from Rosstat, and the continuation of the index is calculated;

Kazakhstan - State Statistical Committee of Kazakhstan; data on GDP in constant prices of 1994; index made with reference to 1994; index rescaled to 2005=100.

Belarus - IMF IFS quarterly data taken as is with 2005=100 (index value) 1995:1 – 2010:2.

PPI

Russia - IFS data on quarterly changes used to recover the data in levels, using 1995:1 as 100; then rescaling into 2005=100*4;

Kazakhstan - IMF IFS data are taken as is with 2005=100; 1995:1 – 2010:3;

Belarus - IMF IFS data on quarterly changes used to recover the data in levels, using 1995:1 as a scale; then rescaling to 2005=100*4;

Eurozone - OECD database, taken as is, 2005=100 (16 countries);

USA - OECD database, taken as is, 2005=100.

Base interest rate (refinancing interest rate)

By the model's assumptions this should be the rate under control of monetary authorities. We take refinancing rate for all three countries at the end of each quarter.

Russia – IMF IFS and Bank of Russia (data checked);

Kazakhstan - IMF IFS and National Bank of Kazakhstan (data checked);

Belarus - National Bank of Belarus.

Inflation target

Officially announced by the Central Bank; in case of an interval announced, the upper limit of the interval was used.

Russia - prior to 2000 target inflation was guesstimated from the results of official inflation, assuming that the target was lower than achieved inflation. Since 2000 the upper limit of the announced inflation interval was chosen from official basic guidelines of unified state monetary policy of the Bank of Russia for the appropriate year (envisaged for the purposes of monetary policy control).

Projected (targeted) inflation

2000: 18%

2001: 12-14%

2002: 12-14%

2003: 10-12%

2004: 8-10%

2005: 7.5-8.5%

2006: 6-9%
2007: 6.5-8%
2008: 6-7%
2009: 7-8.5%
2010: 9-10%

Kazakhstan - On the basis of NBK official documents on the major directions of state monetary policy for the corresponding year (available as in most other countries since 2000). Prior to 2000 target inflation was guesstimated from the results of official inflation, assuming that the target was lower than achieved inflation.

2000 – 9-10%
2001 – 6-8%
2002 – 5-7%
2003 – 4-6%
2004 – 4-6%
2005 – 4,9-6,5%
2006 – 5,7-7,3%
2007 – 7,3-8,3%
2008 – 7,9-9,9%
2009 – 7,5-9,5%
2010 – 6-8%

Belarus - Prior to 2001 target inflation was guesstimated from the results of official inflation, assuming that the target was lower than achieved inflation. Since 2001 inflation target was taken from National Bank of Belarus inflation forecast (taken as a proxy for inflation target).

2001: 34% - guess from the statement that not more than 2.5% on the month-to-month basis should be allowed
2002: 27% - upper limit (taken from analysis on 2003)
2003: 18-24%
2004: 14-18%
2005: 8-10%
2006: 7-9%
2007: 6-8%
2008: 6-8%
2009: 9-11%
2010: 8-10%

Nominal exchange rate

Important note – for full compatibility of the model the nominal exchange rates between Russia, Kazakhstan and Belarus were adjusted to be fully reverse (up to 0.0001). Mostly they coincided up to 0.001, so the corrections are minor. Nominal exchange rates were taken at the end of period (last day of a quarter) from the corresponding Central Banks' rates.

Russia

Nominal exchange rate of ruble to USD taken from the bulletin of banking statistics, monthly issues; last quoted official exchange rate of the last day of the quarter.

Nominal exchange rate of ruble to Euro: since 1999:1 – official quotation (as for USD); prior to 1999 – the coefficient to obtain proxy for euro from German mark for 1996-1997 is **1.9560** times German mark.

Nominal exchange rate of ruble to Belorussian ruble – official exchange rate end of period; except 1 year – 1998:2 – 1999:1; approximation made through USD interrelations; approximate closeness of values is attained.

Nominal exchange rate to tenge – official exchange rate end of period; no problems except to rescale since 1998.

Kazakhstan

Nominal exchange rate with USD taken from IMF IFS; checked with NBK (for 2003:2 – 2010:3);

Nominal exchange rate with Euro – official, end of period, 1999:1 – 2010:3; rest of euro exchange rate was calculated using Russian exchange rates with USD and euro, and Kazakh exchange rate with USD.

Nominal exchange rate with Russian ruble – official, end of period; adjusted for scale; no detailed data for 1995 – 1997, only end of period data; NBK. Since the close resemblance is found, the data will be taken from Russian ruble-tenge exchange rate for consistency.

Nominal exchange rate with Belorussian ruble – official, end of period, 2004:4 – 2010:3; almost no changes; better to model through the reversal course. The exchange rate will be taken from Belorussian ruble.

Belarus

Nominal exchange rate to USD taken from IMF IFS and checked with NBR.

Nominal exchange rate to Euro prior to cashless Euro is approximated with German mark times **1.96** (from the cross-comparison between the German mark and Euro official quotes for the period of cashless Euro); no exchange rate in 1995 – if needed can be calculated through other currencies.

Nominal exchange rate to Russian ruble – official, checked with RUR; for 1995 – recalculated as inverse to Russian ruble.

Nominal exchange rate to tenge – official; rescaling made once the baseline Belorussian ruble changed.

Proxy for International Capital Flows

As suggested in various types of relevant literature instead of using FDI into each country (to avoid endogeneity issues with GDP of each country), we construct the following measure: sum of foreign direct investment abroad for USA, UK, Japan, and Eurozone (11) divided by the total GDP of these countries; such a measure should be exogenous (according to Corbo and Tessada, 2005).

GDP and FDI data taken from IMS IFS (on foreign direct investment abroad from these countries).

GDP of trade partners - proxy

As main trade partners of the countries in question the following were taken: EU countries (16), USA, Japan, UK; China. On the basis of IMF statistics a composite index of GDP with 2005=100 was composed.

Weights for second-layer Pesaran-Chudik type links

Weights were made trade-related: from IMF IFS DOT export statistics was taken. For each country (Russia, Belarus and Kazakhstan) the sum of its exports to the two other countries was calculated. Then the total exports between the three countries was calculated, and weights were calculated as country's *i* export to the two other countries in the total intra-CU export. Statistics on export was taken instead of import statistics, since it showed more coherence (in some cases there was 0 import from Russia to Belarus) and less omissions.

Trade shares

As it was already mentioned, there are two ways to calculate trade shares for REER:

- One is straightforward: on the basis of import-export statistics (methodology described Loretan 2005); DOT statistics on import-export was used for the purpose; imports between the Customs Union countries were taken as corresponding exports (see explanation above) as was in the case of Chudik-Pesaran weights. Otherwise trade with eurozone was used as a proxy weight for Euro, and the rest trade (apart from Eurozone and the CU countries) provided weights for USD.
- Another way is to concentrate more on how much trade is actually done in the corresponding currency. Euro share is straightforward – from the total trade turnover data related to trade with eurozone. The share of USD was taken as the external trade apart from the Eurozone and the CU countries. The issue remained to proxy data on trade in currencies within the CU. Major source of statistics for all countries was again IMF IFS DOT.

Russia

It is assumed that 30% of Russian exports to Belarus is in Russian rubles, remaining is in USD. 65% of imports from Belarus is in Russian rubles, remaining is in USD. With Kazakhstan it is roughly assumed that 50% of both exports and imports are in USD. The shares were estimated on the basis of additional information on the currencies used in the Belorussian external trade (information from the National Bank of Belarus).

Kazakhstan

Trade share is RUR is 50% of trade turnover with Russia. With Belarus it is assumed that the trade goes entirely in local currency (tenge and Belorussian ruble).

Belarus

It is assumed that the trade share of Belorussian imports in Russian rubles is 30%, the rest is in USD. Of Belorussian exports to Russia the share of Russian rubles is 65%, the rest is USD (taken from 2005 and 2006 Balance of Payments with Russia statistics of NBB). With Kazakhstan it is assumed that all trade is taking place in local currencies (tenge and Belorussian ruble) as otherwise the share becomes absolutely negligible.

Oil indicators

Oil prices: nominal - From IMF IFS stats for UK Brent

Oil price index (price 2005=100) - Taken from IMF IFS as is for UK Brent

Both indicators were used for the first set of simulation experiments.