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# The effect of Soviet monetary disintegration on the collapse of trade between members of the Commonwealth of Independent States

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## Abstract

The collapse of the ruble zone in 1992–1994 imposed bilateralism and induced a payment system failure. This prohibited the smooth transition to a more efficient trade equilibrium and contributed to a blind decline of trade between members of the Commonwealth of Independent States (CIS). The consequent dead weight economic cost seems rather high when compared to the benchmark of post-World War II (post-WWII) Europe. A temporary ‘Soviet Payments Union’ (SPU) might have mitigated this cost. A form of SPU was founded. It was never operational, probably in order to prohibit the Central Bank of Russia (CBR) to credit former republics and indirectly Russian exporters.

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## 1. Introduction

Trade integration has increased worldwide during the last two decennia and has gone hand in hand with monetary integration in Europe and North America. The idea that monetary integration will stimulate trade within the monetary union is one of the driving forces behind the European Monetary Union. Monetary disintegration on the other hand imposes higher costs on trade between former members of a monetary union and will therefore inhibit trade. I study the monetary disintegration in the Soviet Union in 1990–1994, which coincided with

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Table 1  
CIS-trade disintegration

CIS-country	Share of CIS-trade in total foreign trade (%)			
	1990	1993	1994	1995
Azerbaijan	85	65	54	37
Armenia	78	71	60	52
Belarus	83	81	64	64
Georgia	83	75	58	44
Kazakhstan	84	77	59	60
Kyrgyzstan	83	75	66	67
Moldova	86	79	72	65
Russia	57	27	23	22
Tajikistan	84	33	34	37
Turkmenistan	87	63	69	73
Uzbekistan	83	72	58	40
Ukraine	78	72	64	57

Source: Klotsvog (1998, p. 84).

an implosion of trade between the former republics. This was especially the case for trade between Russia and the other republics (see Table 1). This collapse has been put in perspective in the literature. Goldberg et al. (1994) mention that prices of interrepublican trade deviate from world prices, hiding substantial implicit subsidies. Tarr (1994) uses Goskomstat data for 1989 and 1990 to estimate the effect of a shift to world prices. He finds that the winners of this shift in the terms of trade would be Russia, Turkmenistan and Kazakhstan, while the biggest losers are estimated to be the Baltic states, Belarus and Moldova. His findings support the idea that raw material and energy exporters would gain at the expense of machinery builders and other sectors, as could be expected because of the distortion of relative prices under central planning. Hence, moving to world prices was expected to lead to an adjustment of interrepublican trade flows. The fact that the Soviet economy was over-integrated only reinforced this. The expected adjustment has been roughly estimated by means of gravity models of international trade, as in Gros and Dautrebande (1992), or Gros and Steinherr (1994). These models suggest that the interrepublican trade collapse was to some extent a rational redirection of trade from the initial skewed Soviet trade structure to a normal market structure based on market prices. One could argue that the fall in interrepublican trade simply reflects an economically rational redirection of trade in line with the new price structure and the new comparative advantage that follows from it. In this reading of the facts, the fall in interrepublican trade enhances economic efficiency.

However, in order to allow this new and more efficient equilibrium to materialize, one needs functioning international markets of goods, services, capital and labor. These markets were absent at the time. The paper devotes attention to one of the major market failures, namely the blackout of the payment system for payments between economic agents from different CIS-countries. The results indicate that part of the observed trade collapse was probably not as much a redirection of trade to a new equilibrium, but rather a trade loss, most likely caused by a payment system failure. This payment system failure was unnecessary, inefficient and probably costly in terms of welfare. Indeed, that part of the interrepublican

trade collapse that can be attributed to the payment system failure constitutes a deadweight economic loss, which delayed the transition of intra-CIS-trade to a more efficient market equilibrium, rather than making it more efficient. I propose an estimation of the direct cost of this payment system failure and indicate how this failure might have been avoided without abandoning economic independence by founding a payments union of the European Payments Union (EPU)-type. This fits into a body of literature on the question whether a Soviet Payments Union (SPU) could have mitigated the cost of unraveling the ruble zone. To evaluate this option, I compare the economic cost of unraveling the ruble zone to the historical benchmark of the EPU. I describe how an alternative to abrupt disintegration was formulated in the form of a payments union and how the lack of credit policy discipline of the CBR induced the Russian authorities to introduce immediate full convertibility in July 1993.

The paper is organized in the following way. First, I address the genesis and nature of the payment system failure. Then I show why and how this failure affected interrepublican trade. The next step is to estimate the cost of bilateralism imposed on trade, as compared to the historical benchmark of post-World War II (post-WWII) Europe. In the last section, I describe how a CIS payments union was conceived and founded and why it was never operational. The basic proposition of the paper is not that a payments union would have been an appropriate substitute to full convertibility. On the contrary, I believe that full convertibility and free trade are the ultimate goals, because they allow a more efficient trade equilibrium that reflects the new structure of prices and comparative advantage. This paper, however, lends support to the thesis that the transition to this more efficient equilibrium was hindered by a blind payment system failure and that a balanced SPU might have been a useful though temporary instrument to avoid this failure and accommodate the sudden shift from monetary union to full convertibility.

## 2. The ruble zone chaos in 1990–July 1992

In the second half of the 1980s, interrepublican payments were identical to domestic Russian payments. They were routed through the inefficient Soviet inter-branch-settlement-system (MFO-system).<sup>1</sup> The only technical difference was the additional involvement of the republican branches of Gosbank (GB) in the settlement process.

The early nineties were characterized by the power struggle between Gorbachev and Yeltsin (elected president of the Russian Republic in June 1990), or in other words between the Soviet center and its republics. The conflict was mirrored in the structure of the banking system. This ‘bank war’ culminated in December 1990, when the Yeltsin Government pushed a law on banking through the Russian parliament just days before a comparable but in crucial respects contradictory law was voted in the Union parliament. The Russian law

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<sup>1</sup> Since 1988, a lot of state enterprises founded their own house banks for the management of their financial activities. These banks had initially no access to the payment system of Gosbank (later the CBR). Also the former monobank was split into a number of independent commercial banks. As a consequence of these reforms a system of direct payment settlement between bank branches through a network of correspondent accounts (MFO) arose. Gradually, more and more payments were routed through this MFO-system. The MFO-system grew out of control of Gosbank and proved to be slow and ineffective. Payment delays of several weeks were not unusual (for further details see Schoors, 1998).

explicitly transformed the Russian branch of the Gosbank (GB) into the Central Bank of Russia (CBR), which de facto means that the republican branches of the former GB became republican central banks (see Schoors, 1998, for a comparison of these laws). Officially the CBR was still subordinate to the GB according to the Union law. In practice, the CBR behaved independently from GB as a genuine central bank. The IMF (1992a) describes how eventually the CBR unilaterally assumed GB's remaining centralized powers on 22 November 1991, including the ruble printing press. This environment of growing centrifugal powers resulted in the lack of coordination between the de facto central banks of different republics and was the prelude of the disintegration of the ruble zone.

This process of disintegration escalated in December 1991, when the SU ceased to exist and all republics became independent (new independent states or NIS). GB ceased to exist as a unified structure and its former republican branches now officially became the central banks of the NIS. These new central banks continued to supply credits to agricultural enterprises, state-owned industrial enterprises, banks and governments. A hybrid monetary constitution emerged. The creation of cash rubles was the prerogative of the CBR since November 1991, but non-cash rubles could be issued by each of the new central banks of the NIS (Schoors, 1998). This Soviet version of the prisoner's dilemma gave birth to an evident free rider problem. Every NIS could be expected to expand central bank credit, since the benefits of monetary expansion would accrue to the expansionary NIS, while the burden of inflation could be expected to spill over to the other members of the ruble zone through payments for intra-republican trade (see Havrylyshyn and Williamson, 1991, for more details). This perverse incentive to expand is stronger for small republics, since they can reap a given benefit in percentage of net material product (NMP) at a smaller opportunity cost in terms of higher inflation. In order to reap an equal benefit as a share of NMP, larger republics need to create more money and, hence, the inflation cost will be higher, both for the expansionary republic and for all other members of the ruble zone. This setup carries a lot of inflationary potential and was commonly referred to as "the worst monetary constitution one can imagine".<sup>2</sup>

### 3. The genesis of the correspondent accounts

This hybrid monetary system was soon abolished. Dabrowski (1997) analyses the reasons for the collapse of the ruble zone in detail. Part of the explanation was the fear at the heart of the CBR that the smaller republics would reap the benefits from money expansion, while the cost would spill over to the entire ruble zone in the form of higher inflation. This was legitimate because monetary policy of the CBR was in fact quite strict in the first half of 1992 with Matyukhin at the head of the CBR. Unfortunately, the hybrid system was replaced by an even worse system. Granville (1993) describes how already on 1 January 1992 Russian commercial banks were obliged to settle all transactions with former republics through correspondent accounts at the CBR. Settlement was in theory conditional to the availability of funds. Nevertheless, the NIS could accumulate large payment deficits in their trade with Russia during the first half year of 1992. These deficits were automatically credited to the

<sup>2</sup> This dictum is commonly attributed to Stanley Fisher.

recipient Russian enterprises by the CBR since there was no efficient system to record them. This followed from the inherited Soviet payment system. The IMF (1994) explains the matter more in detail: “. . . , each branch of Gosbank had correspondent accounts with virtually every other branch, so that it was always possible to know whether a given branch was in deficit or in surplus with the rest of Gosbank. However, the system was not set up to track ‘regional’ balance of payments as opposed to ‘branch’ balance of payments” (IMF, 1994, p. 33). As a consequence, the CBR was informed only afterwards about the balances. In the meanwhile, trade balances were automatically financed by CBR payment overdraft (which is in fact pure non-cash ruble expansion) and interstate inter-enterprise debt. In April 1992, the processing of interstate payments was centralized in the regional offices of the CBR.<sup>3</sup>

On 12 June 1992, Ukraine gave its economy a huge credit injection to solve inter-enterprise arrears (IEA). Russia feared Ukraine’s credit expansion for the inflationary impact on its own economy and for its exemplary function to other ruble zone countries. To solve this problem, all interrepublican payments were centralized in Moscow in July 1992 on the so-called ‘correspondent accounts’. At this point of time, the Baltic countries had already founded their own currencies and, hence, the system only applied to the Commonwealth of Independent States (CIS). Raschotnye Kassovyie Tsentry (RKT or settlement cashier centers) outside Moscow could no longer handle any CIS payments.<sup>4</sup> According to Sensenbrenner and Sunderarajan (1994), the CBR even founded a special department for inter-CIS payments as part of the Information Technology Department of the CBR. The installation of centralized correspondent accounts allowed the CBR to monitor the dynamics of payment imbalances in interrepublican trade and restrain their possible adverse effects on Russia’s domestic money supply. Two measures were crucial to the decree. First, the correspondent accounts had to be balanced at all times. This implies that the CIS-countries could only credit the correspondent accounts (pay for Russian imports) if they had sufficient funds on the debit side (from export to Russia). By requiring bilateral balancing, Russia could prohibit net inflows of funds from other NIS to Russia, and credit emission in those NIS could therefore not affect the money supply in Russia. Of course one could not expect balance right away. Therefore, the second crucial point of the decree was that Russia granted every CIS-country a line of credit at the start in order to provide room for structural adjustment.

For various reasons the credit lines were exhausted quickly, for some countries already within 3 months after the establishment of the credit lines. One reason might be the zero interest rate on these technical credits. A more important reason may have been the soft creditor reputation of the CBR. The CIS-countries probably gambled that the CBR would be weak and raise the credit limit, as it had done in the past. They rightly did so because Viktor Gerashenko had been appointed Chairman of the CBR in July 1992 and he indeed allowed technical credits above the credit line. Granville (1994) shows that at the end of June (before the appointment of Gerashenko) the stock of credits to former republics was 325 billion rubles, while at the end of 1992 the stock reached 1545 billion rubles. So, in the second half of 1992, credits to the republics rose with 375%, which was substantially more

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<sup>3</sup> See the letter of the CBR of 30 April 1992, no. 4.

<sup>4</sup> See the decree of the Russian Federation of 21 June 1992 (effective 1 July) and the letter of the CBR of 9 July 1992, no. 14.

Table 2  
The Russian correspondent accounts by end 1992

CIS-country	Correspondent account balance by end 1992 in billion rubles		
	Excluding cash rubles (1)	Including cash rubles (2)	(1) as percentage of GDP [(3) = (1)/GDP]
Armenia	9	35	12.8
Azerbaijan	34	51	17.4
Belarus	69	102	7.2
Georgia	38	69	28.4
Kazakhstan	235	407	14.8
Kyrgyzstan	20	42	10.9
Moldova	18	27	7.5
Tajikistan	17	36	42.5
Turkmenistan	111	172	34.4
Ukraine	862	862	21.7
Uzbekistan	117	292	28.1

Source: Adapted from IMF (1994, p. 26).

than inflation in this period (175%), or the growth agreed with the IMF (66%). The central problem for Russia was the soft policy of Gerashenko. This also applied to cash rubles. While before July 1992, there had been a severe cash squeeze, this changed radically in the second half of 1992 and cash was delivered on demand to the ruble zone countries. Note, however, that cash deliveries were also accounted for as technical credits by the CBR. Because of the double-edged role of the CBR in mid 1992–April 1993, the system of bilaterally balanced correspondent accounts combined with technical credits did not stop the flow of credit from Russia to the republics, as seen from Table 2. Still, the system meant a major blow to interrepublican trade.

The system was changed in April 1993. All standing technical credits were converted into state to state debts, denominated in US dollars, with LIBOR interest rates and managed by the Ministry of Finance instead of the CBR. Also credit lines were opened for the remainder of 1993, but they were tied credits for buying specific Russian goods and they were subject to approval by the CBR (Granville, 1993). These changes limited the discretionary power of the CBR's president Gerashenko.

#### 4. Why the correspondent accounts were a costly option?

##### 4.1. Technical and practical problems

Duchêne (1994), and Gros and Steinherr (1994) describe how the system worked in practice. Every CIS-based importer of Russian goods transferred payment orders for import from Russia to its local bank, which in turn sent it to the country's national bank. The respective CIS national banks periodically sent a batch of payment orders to the CBR in Moscow. The payments from the CIS importer were booked on the liability side of the correspondent account with the country concerned, while Russian payments for

Russian imports from that country were booked on the asset side of the correspondent account.

This approach of correspondent accounts had some substantial disadvantages. In practice, there was a lot of confusion and additional delay due to the reform. The implementation of a more centralized system increased the payments volume and jammed the payments traffic between Moscow and the Russian regions. Several Russian bankers mentioned on the occasion of personal interviews in May and November 1995 that a lot of payment documents got lost between the two systems and had to be rerouted.<sup>5</sup>

In addition, all interrepublican payments effected through the correspondent accounts had to pass the RKT<sup>6</sup>-system and were subject to all its problems. Already on November 23, 1990, the former GB issued regulations for the organization of a network of regional settlement cashier centers (RKT) and computer centers. This RKT-system was intended to replace the MFO-system. Every bank could open correspondent accounts with the RKT and effect payments through these accounts. Every RKT covered a certain region. The RKT-system became fully operational only in October 1991, just before the dissolution of the FSU and the price liberalization in Russia. It coexisted with the MFO-system until April 1992 when the CBR made the RKT-system compulsory for all interbank payments (Coopers and Lybrand, 1992). It was mainly G. Matyukhin, the new and inexperienced chairman of the CBR, who insisted on this excessively high degree of centralization in payment settlement (Åslund, 1993). This obligatory use of the RKT-system led to congestion in several RKT, payment delays and a build-up of arrears, and urged the CBR to withdraw the requirement in May 1992 (Sensenbrenner and Sunderarajan, 1994). This meant the 're-introduction' of the MFO-settlement-system, which has functioned parallel to the RKT-system ever since. This system had some distinctive weaknesses. Because of the pyramid structure of RKT-payments (for interregional payments two to four RKT were involved), problems in only one RKT could slow down the whole chain of payment settlement. Second, the lack of automatization and telecommunication and the huge flow of documents reduced the efficiency of the system, certainly for interregional payments. Indeed, the system was still based on sending documents by mail, which consumes a lot of time in a large country like Russia. Sometimes unclear procedures and regulations aggravated this. Third, the brain drain of (relatively) experienced staff from the central bank to the emerging commercial banking sector left the RKT-system with relatively inexperienced staff. This continuing loss of knowledge must have contributed to the delays in payment settlement. Fourth, some specific Russian events jammed the RKT. Schoors (1998) shows that the clearing of inter-enterprise debt (IED) and the subsequent flow of documents in the second half of 1992 constituted a serious blow to the efficiency of the system. Sensenbrenner and Sunderarajan (1994) show that the net credit of the CBR to the government slowed down payments through the RKT-system. They found a stable and significant relationship

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<sup>5</sup> In 1995, I interviewed a number of bank officers and central bank officers, the most important ones of which were Velisava T. Sevruck (chief of Division of Statistics of the Central Bank of Russia), Sergei J. Zatsepilov (director of Public Relations of Inkombank), Elena N. Kondatriuk (head accountant of Promstroibank), Michael I. Lyalkov (chief economist in the Economic Department of Sberbank), and Tatiana Paramonova (former president and current vice-president of the CBR).

<sup>6</sup> RKT is the abbreviation for Raschotnye Kassovye Tsentry, which literally means settlement cashier centers.

between changes in RKT-float and changes in CBR-credit to the government. The intuition behind this finding is that the irregular waves of state credit are transferred to the receivers through the RKT-system and cause capacity problems and bottlenecks. Schoors (2001) cannot reject empirically that the very large excess reserves in the Russian banking system in 1992–1994 are partially explained by payment system inefficiencies.

Another disadvantage is that the settlement of intra-CIS payments via correspondent accounts became unreliable. Example given, if an Ukrainian company paid a Russian exporter through the system, its payment could be blocked at the central bank level, because the correspondent account of Ukraine as a whole was in deficit. This unpredictable blocking of payments was very ineffective and constituted a serious barrier to trade, because it affected payments of all enterprises alike, be they liquid or not. Even liquid enterprises could in some cases not purchase the required Russian inputs because their country was in deficit and thus payments were blocked.

#### 4.2. *Bilateralism*

The problems described above are due to technical and operational problems that can be solved. The fundamental problem with the system of correspondent accounts is that it puts the additional and unnecessary constraint of bilateral balancing on intra-CIS-trade. Such a crackdown from multilateral balancing to bilateral balancing harms trade and welfare. Assume that a country A has a deficit with Russia but a surplus with other CIS-countries, with its intra-CIS balance of payments in equilibrium. Bilateral balancing would reduce country A's import from Russia and its export to all other CIS-countries. Country's domestic producers would be hurt by lower revenues from export to CIS-countries and lower supplies of intermediary and primary goods from Russia.

There are indications that the harm done by bilateral balancing is substantial. There existed a centrally planned pattern of regional specialization of industrial production, which was not based on market equilibrium outcomes but on the distortions of central planning. Wagener and van Selm (1993) find support for the hypothesis that planners overestimated the advantages of scale and underestimated the cost of distance and thus over-integrated the Soviet economy. This distortion of over-integration was mirrored in the monopolistic production infrastructure and distribution infrastructure, which contributed to the stickiness of the structure of interrepublican trade. The introduction of the correspondent accounts in July 1992, however, abruptly enforced bilateral balancing. The stickiness of the Soviet trade structure suggests that the optimal adjustment path to a new structure of trade would have been more gradual than the actual shock adjustment in 1992–1993, as can be seen from some well-known examples.<sup>7</sup> On the other hand, it is clear that the trade pattern had to change

<sup>7</sup> Kazakhstan produces crude oil and also operates refineries. These refineries were situated close to the Russian border and traditionally refined Russian oil, while its own oil was refined elsewhere. This was a structural dependence because there were pipelines to bring the Russian crude to the Kazakh refineries, but not from the domestic oil production to the domestic refineries. So, the refineries could not switch to domestic oil in the short run, while the breakdown of interrepublican trade urged Russian oil producers to export their oil to other destinations. As a result, the Kazakh refineries stood idle. In this example the Kazakh refineries are the main losers. There are however plenty examples where both parties got hurt. The cotton producers in Uzbekistan and the Russian textiles industry were for example mutually dependent and the breakdown of trade meant a major blow for both.

anyway in order to free the economy from the distortions of central planning. The new and more efficient equilibrium can only be reached if enterprises can use functioning markets to respond to altered incentive structures. The artificial crackdown of interrepublican trade due to a payment system failure hindered this adjustment process, rather than being its symptom. Payments to the CIS were settled slowly and unreliably or became impossible. Compared to this, payments to third countries were relatively simple and fast.

## 5. Measuring the cost of bilateralism

### 5.1. Approach

In this section, I estimate the cost of bilateralism to the CIS-countries and to Russia in particular, as compared to the benchmark of that of post-WWII Europe. I estimate the loss of trade that would have occurred if the shift to world prices and the constraint of bilateral balancing had occurred in January 1988, because the last really trustworthy data on interrepublican trade are from end 1987. This estimation is a good indication of the order of magnitude of the shock in 1992, especially because of the stickiness explained above. Another analytical option would be to try and construct the new international equilibrium that would emerge under the new price structure, taking into account changed comparative advantage and resource flows. However, the construction of this counterfactual seems too heroic an exercise because of the many market imperfections that affect the equilibrium. It does not seem likely therefore that the CIS will reach this equilibrium any time soon. This paper instead focuses on the cost of the major imperfection that existed in 1992–1994, namely the payment system failure. This imperfection continued even after the introduction of independent currencies (realized in all countries by end 1994) because the new currencies were not immediately convertible, which implied continued trade disruptions. This situation of inconvertible currencies and international payment system failure invokes memories of post-WWII Europe, which is the appropriate benchmark for several reasons. After WWII, the European economy was a war economy. Several characteristics are analogous to those of the post-Soviet CIS economies, such as obsolete capital stocks, lack of capital investment, high inflation, conversion of the military industrial complex to civil purposes, the lack of consumption goods and trade on the basis of inconvertible currencies and bilateral agreements. It is interesting that Europe countered bilateralism by establishing the European Payments Union (EPU) in July 1950. The EPU was among other things a multilateral clearing agreement that stimulated multilateral trade in Europe. It also provided technical credits to facilitate adjustment of deficit countries. It should be interpreted as a temporary transition mechanism to avoid bilateralism, since in late 1958, the EPU was dissolved and current account convertibility was generally restored.

### 5.2. Data

For the CIS-countries I use interrepublican trade data from 1987. This dataset was collected by Goskomstat in tempore insuspecto and is the only reliable and complete dataset

available. [Heleniak \(1995\)](#) gives matrices for 1989, 1991 and 1993, but these are incomplete, inconsistent and increasingly unreliable. Because of the stickiness of the Soviet trade structure the 1987 data should still be a good approximation of the structure of interrepublican trade in 1991–1993.<sup>8</sup> Note, however, that I exclude the Baltic countries (Estonia, Lithuania and Latvia) from the analysis because these countries never were a member of the CIS and already left the ruble zone by introducing their own currencies in early 1992. Note that Ukraine also issued its own currency (the Karbovanets) by end November 1992, as a reaction to the unilateral installation of the correspondent account system by Russia. The data on net material product (NMP) are also collected from Goskomstat.

For the EPU, I collected data on trade flows between the original 16 EPU-countries.<sup>9</sup> The only difference is that I use Gross National Product (GNP) instead of NMP. I constructed a matrix for trade flows between EPU-countries. Trade data are imports in dollars from *Directions of Trade Statistics* (IMF) for 1949, 1950, 1951, 1952, 1953, 1954 and 1955. This gives seven  $16 \times 16$  matrices of EPU-trade. GNP-data are from *International Financial Statistics* (IMF).

### 5.3. Constructing the counterfactual data

As a first step I converted the ruble denominated Goskomstat data to world prices to control for the effect of world prices on interrepublican trade. Goskomstat supplies data on export prices received by the FSU. These prices are representative for world market prices and were used to convert the matrix for interrepublican trade in export prices. The result is a  $12 \times 12$  matrix of all trade flows between NIS (the Baltic countries excluded) at world export prices in 1987. This matrix is identical to the one used by [Gros and Dautrebände \(1992\)](#). I refer to these data as matrix 1. [Table A.1](#) in [Appendix A](#) shows matrix 1 in detail. Matrix 1 takes the form of  $A$ :

$$A = \begin{bmatrix} 0 & X_{1i} & X_{1j} & X_{1n} \\ X_{i1} & 0 & X_{ij} & X_{in} \\ X_{j1} & X_{ji} & 0 & X_{jn} \\ X_{m1} & X_{mi} & X_{mj} & 0 \end{bmatrix}$$

with  $m = n = 12$ , for the 12 former republics with the exclusion of the Baltic States, and  $X_{ij}$  denoting the export from republic  $j$  to republic  $i$ . All diagonal elements equal zero by definition, since there is no trade of a republic with itself. [Table A.1](#) in [Appendix A](#) reveals

<sup>8</sup> I checked this conjecture as follows. I used aggregated trade data of Goskomstat for 1987 and the first quarter of 1993 (when the crisis of interrepublican payments fully arose) and I calculated the interrepublican trade balance for every republic as a proportion of interrepublican trade:  $(\text{interrepublican exports} - \text{interrepublican imports}) / ((\text{interrepublican exports} + \text{interrepublican imports}) / 2)$ . Then I regressed 1993-data on 1987-data and included a dummy for Tajikistan, which was in civil war at the time. I found 1%-significance and an adjusted  $R^2$  of more than 80%. This prospective analysis supports the idea that the 1987 trade structure was still strongly representative for 1993. This suggests again the high level of stickiness of the Soviet trade structure.

<sup>9</sup> These were in alphabetical order Austria, the Belgian–Luxemburg Economic Union, Denmark, Germany, Greece, France, Iceland, Ireland, Italy, The Netherlands, Norway, Portugal, Sweden, Switzerland, Turkey and the United Kingdom.

that Russia had a structural interrepublican trade surplus. Name Russia country  $r$ , then I see that

$$\sum_{i=1}^m X_{ir} - \sum_{j=1}^n X_{rj} > 0,$$

with  $\sum_{i=1}^m X_{ir}$  = export from Russia to all other CIS-countries,  $\sum_{j=1}^n X_{rj}$  = export to Russia from all other CIS-countries.

This surplus is mainly due to Russia's net exports of gas, oil, coal and power. Expressed in world export prices, this yields a structural Russian surplus. Because of trade liberalization and price liberalization, one expects this export to be redirected to the domestic Russian market or to the more profitable Western markets. Therefore, I should eliminate the structural Russian surplus from the dataset. I propose two methods to perform this correction:

- (1) Starting from matrix 1, I construct a matrix where Russia is assumed in multilateral balance with the other CIS-countries (i.e. Russia's CIS exports equal its CIS imports) by proportionally reducing Russian exports to other CIS-countries (see [Appendix B](#) for technical details). This yields a new matrix, named matrix 2.

Matrix 2 is a new trade matrix that is multilaterally balanced for Russia but still allows the other CIS-countries to be multilaterally unbalanced and allows all CIS-countries, including Russia, to be bilaterally unbalanced. Anecdotal data (see [Table 2](#)) show that in 1992–1993 Russia was still running a surplus in its trade with the CIS. Therefore, I add hypotheses about the proportion by which Russia reduces its surplus, say 100% (matrix 2a), 85% (matrix 2b), 70% (matrix 2c) and 50% (matrix 2d).

- (2) The proportional attribution of the Russian trade surplus may be too rough an approximation, since the Russian surplus was largely due to oil, gas and coal. It may be possible to do better by using reliable data for interrepublican trade in oil, gas and coal in the period under study. There exists no reliable matrix for interrepublican trade in 1990, but there is a reliable dataset on interrepublican trade in energy in 1990 (mainly power, coal, gas, oil, and other fuels), because these goods were still strongly controlled by the state. I use the Goskomstat dataset on interrepublican trade in energy, as reported by [Michalopoulos and Tarr \(1992\)](#). For every CIS-country, I calculate the 1990 interrepublican balance for trade in oil, gas and coal. These balances are used to construct weights, neglecting the surplus countries. Dividing the negative balance of a given country  $j$  by the sum of all negative balances yields country  $j$ 's weight  $\beta_j$  (see [Table 3](#)). Surplus countries receive a zero weight.

The surplus countries were—next to Russia—Uzbekistan, Azerbaijan and Turkmenistan. The structural Russian surplus in matrix 1 is then dissolved by subtracting it from Russian exports to the various NIS, in proportion with the weights  $\beta_j$  shown in [Table 3](#) (see [Appendix C](#) for technical details). In this way, the energy trade adjusted matrix 3 is derived.

Matrix 3 fits reality better than matrix 2. One could object to the zero weights for Azerbaijan, Turkmenistan and Uzbekistan. Our rationale for the zero weights is two-fold: these countries may have had a surplus in energy trade, but did not have a structural overall surplus in CIS-trade. They need their CIS energy exports to finance ditto imports. Also,

Table 3  
Energy-corrected weights  $\beta_j$  to construct trade matrix 3

CIS-country	$\beta_j$ (%)
Ukraine	58.2
Belarus	17.5
Uzbekistan	0.0
Kazakhstan	11.9
Georgia	3.3
Azerbaijan	0.0
Moldova	3.2
Kyrgyzstan	2.2
Tajikistan	1.6
Armenia	2.2
Turkmenistan	0.0
Total	100.0

they were not able to redirect energy exports to the West quickly, because the necessary infrastructure (pipelines, harbors, etc.) was absent. Only Russia could do this redirection immediately.

Again it seems reasonable to assume that Russia reduced its structural energy surplus only partially, for Russia kept running surpluses throughout 1992–1994. Therefore, I let the structural deficit decrease with 100% (matrix 3a), 85% (matrix 3b), 70% (matrix 3c) and 50% (matrix 3d).

#### 5.4. Methodology

This leaves me with one dataset (see [Table A.1](#) in [Appendix A](#)) adjusted to world prices and eight datasets that are additionally corrected for the structural Russian surplus according to various assumptions (see [Appendices B and C](#) for details). All data matrices still have the basic structure of *A*. Starting from the data matrices I can analyze the effect of bilateral balancing on trade. I propose two methods to perform this:

- (1) A first method is to calculate a bilaterally balanced trade matrix. This allows the calculation of the export loss percentage and the loss of export in percentage of NMP that follow from the bilateral balancing constraint (see [Appendix D](#) for technical details). This method fits the system of correspondent accounts that indeed enforced bilateral balancing. The two measures (export loss and export loss as a percentage of NMP) are calculated for the FSU and reported in [Table 4](#), panel a, columns 2 and 3. I also calculate the export loss for Russia separately. The results for Russia are reported in [Table 4](#), panel a, columns 6 and 7. [Table A.2](#) in [Appendix A](#) shows the bilaterally balanced matrix *B* that follows from data matrix 1 and the calculations for export loss both as a percentage of export and as a percentage of NMP. [Table A.2](#) in [Appendix A](#) also reports the separate export losses of all former republics. The export loss should be interpreted as a loss and not as a redirection of trade, because it is caused by a payment system failure that is blind to changed prices or comparative advantage.

Table 4  
The possible harm done by bilateral balancing

Dataset	CIS-countries <sup>a</sup>					Russia <sup>a</sup>	
	Trade/NMP (%)	Export loss (%) (see Eq. (D.3))	Export loss/NMP (%) (see Eq. (D.3))	KS1 (see Eq. (E.5))	KS2 (%) (see Eq. (E.5))	Export loss (%) (see Eq. (D.3))	Export loss/NMP (%) (see Eq. (D.3))
	1	2	3	4	5	6	7
Matrix 1	27.5	24.9	6.8	1.3	2.9	38.3	8.6
Matrix 2a	22.1	15.2	3.3	1.8	2.9	10.9	1.5
Matrix 2b	22.9	13.7	3.1	1.4	1.9	13.2	2.0
Matrix 2c	23.7	14.0	3.3	1.3	1.6	16.9	2.8
Matrix 2d	24.8	17.2	4.3	1.4	2.6	24.2	4.4
Matrix 3a	22.1	23.0	5.1	1.9	4.7	20.8	2.9
Matrix 3b	22.9	20.3	4.6	1.6	3.4	21.1	3.2
Matrix 3c	23.7	17.9	4.2	1.4	2.2	21.4	3.5
Matrix 3d	24.8	16.8	4.1	1.2	1.5	23.7	4.3
	European Payments Union <sup>b</sup>					United Kingdom <sup>b</sup>	
	Trade/GNP (%)	Export loss (%) (see Eq. (D.3))	Export loss/GNP (%) (see Eq. (D.3))	KS1 (see Eq. (E.5))	KS2 (%) (see Eq. (E.5))	Export loss (%) (see Eq. (D.3))	Export loss/GNP (%) (see Eq. (D.3))
1949	6.9	20.7	1.4	2.1	1.5	15.9	0.8
1950	7.0	19.2	1.4	2.3	1.5	20.9	1.0
1951	8.0	21.3	1.7	1.7	1.4	13.2	0.7
1952	7.3	17.7	1.3	1.8	1.1	10.7	0.5
1953	7.2	19.5	1.4	2.2	1.5	13.0	0.6
1954	7.2	21.2	1.5	1.8	1.3	22.2	1.0
1955	7.6	20.3	1.5	1.9	1.5	20.1	0.9

Source: Results of own calculations.

<sup>a</sup> Panel a: CIS-countries.

<sup>b</sup> Panel b: EPU-countries.

- (2) [Kaplan and Schleiminger \(1989\)](#) propose an alternative method. They compare the absolute value of bilateral balances (AVB) to the absolute value of multilateral balances (AVM) (see [Appendix E](#) for technical details). Specifically, they calculate the ratio of bilateral to multilateral balances (KS1) and the difference between bilateral and multilateral balances, divided by NMP (KS2) as shown in detail in [Appendix E](#). KS1 and KS2 are calculated for all datasets. The interpretation is straightforward. Both ratios are measures of the barrier to trade, formed by bilateralism. The rationale is that all balances have to be financed. Bilateralism *ceteris paribus* induces higher balances to be financed and thus, in the presence of financial constraints, hampers trade. Results for the CIS are reported in [Table 4](#), panel a, columns 4 and 5. [Appendix A](#) gives a full report of calculations on the original trade matrix 1 in order to illustrate the methodology.

I calculated the export loss indicators (see [Appendix D](#)) and the Kaplan and Shleiminger measures (see [Appendix E](#)) also for the seven  $16 \times 16$  matrices of trade between the original 16 EPU-countries, using GNP-data instead of NMP-data, and I separated the United Kingdom (UK) as the leading EPU-country. The results for the EPU are in panel b of [Table 4](#), in the same columns as for the CIS.

## 6. Results and interpretation

The interpretation of the results in [Table 4](#) is subtle. Column 1 shows that the CIS was much more dependent on intra-CIS-trade than the EPU was on intra-EPU trade. While NMP and GNP are not identical,<sup>10</sup> it is still clear that CIS-dependence on CIS-trade is much larger than EPU-dependence on EPU-trade. This is among others due to historical circumstances. European countries were still recovering from WWII and were typically isolated and disintegrated economies. The starting point was relative disintegration. The Soviet Union on the other hand was isolated from the world economy and developed a very integrated economy with high interdependency, as argued before. Neglecting the strongest assumptions (matrices 1, 2a and 3a), we see that the CIS-export loss due to bilateral balancing (panel a, column 2) may have been somewhere between 15 and 20%, while in percentage of NMP (panel a, column 3), the loss must have been between 3 and 5%. These numbers are not trivial. If the CIS could have avoided this fall in NMP of 3–5%, the cost of transition would have been mitigated considerably. The fact that this is an unnecessary deadweight loss reinforces this point.

Comparing to the EPU-experience (panel b), illustrates the non-triviality of the economic cost of bilateralism in the CIS. The export loss due to bilateralism in the EPU would have been slightly more severe in terms of percentage of lost exports (around 20% in 1949–1951), but clearly less severe in terms of lost GNP (always around 1.5%). This paradox is explained by the different degrees of trade integration in the CIS and the EPU. Looking at KS1 and KS2 I arrive at equivalent conclusions. In terms of GNP (see column 5), the additional barrier of bilateral balancing seems to have been higher in the CIS than in the EPU. Also note

<sup>10</sup> GNP is according to most sovietologists roughly comparable to  $1.3 \times$  NMP.

that in terms of NMP, Russia seems to lose substantially less than the other CIS-countries from bilateralism. This is seen by comparing columns 3 and 7 in panel a, for the realistic scenarios of 2b, 2c, 3b and 3c. This is due to the fact that Russia was the least dependent on CIS-trade of all former republics, which in itself is easily explained by Russia's scale and vast natural resources. Due caution is needed in the interpretation of the results, given the counterfactual nature of the methodology. Still, the results seem to indicate that the economic cost of bilateralism (be it through the correspondent accounts or inconvertibility of the new currencies) may have been considerable for all CIS, but still less serious for Russia than for others.

## 7. The 'Soviet Payments Union' revisited

Looking at the destructive effects of bilateralism indicated above, it seems that a payments union might have been a useful institution for the CIS as a transitory agreement between ruble zone and full convertibility. Indeed, in a cost-benefit framework, the benefit of a payments union as opposed to the correspondent accounts is the avoided loss of trade, while there is no net cost other than the costs of organizing the practical operations of the payments union. One cannot consider the provision of technical credits to be a cost of the payments union, since technical credits also featured in the benchmark of correspondent accounts. On the contrary, if anything the system of technical credits can be expected to be more efficient under a payments union because of the existence of explicit credit limits and settlement rules that provide clear incentives to member countries.

It comes not as a surprise therefore that many versions of payments unions were proposed. Already at the time of the demise of CMEA, [Bofinger \(1990\)](#) was one of the first of several authors who proposed an East European Payments Union. When the Soviet Union fell apart several authors followed this line of reasoning and argued in favor of a so-called SPU on the ground of economic arguments. See, for example, [van Brabant \(1991\)](#), [Gros \(1991\)](#), [Havrylyshyn and Williamson \(1991\)](#), [Aglietta \(1992\)](#) and [Bofinger and Gros \(1990\)](#). Other authors strongly argued in favor of the ruble zone. Also the IMF was a long time in this position (see [IMF, 1992b](#)). [Duchêne \(1994\)](#) finds no economic grounds for the maintenance of the ruble zone. [Åslund \(1993\)](#) and [Eichengreen \(1993\)](#) argue in favor of a clean break with the Soviet Union and favor free trade and current account convertibility.

Eichengreen rightly claims that other factors than simply economic rationale lie at the heart of the success of the EPU. The EPU played a special, historically unique role in post-WWII Europe and fitted in the framework of European integration. The FSU on the other hand was moving in the opposite direction. He argues that the actual choice for the NIS is between bilateralism and convertibility. History seemingly proved him to be right. However, his argument misses the point that a SPU could have been a useful transitory institution, as was the EPU. This transitory nature is in fact characteristic of any payments union. Only few would not agree that free trade and convertible currencies are indeed the best safeguards of economic efficiency. Discussing the choice between full convertibility and a payments union is therefore irrelevant. The real question is whether a payments

union could be a useful institution to smoothen the transition to full convertibility or not. This paper lends support to the proposition that the abrupt transition from the hybrid ruble zone over correspondent accounts to ultimate free trade and convertibility contributed to unnecessary and harmful disruptions and hence that a SPU could have played a useful though temporary role. Note for example that at the time of the splitting of Czechoslovakia in the Czech Republic and the Slovak Republic, the two new countries agreed on a payments arrangement (see [Baliño et al., 1994](#)). The agreement allowed payments between the two countries to be cleared and settled through their central banks. The unit of account and settlement was the ECU. The agreement avoided the disruption of payments and provided a transitory mechanism between the former Czechoslovak currency union and the final current account convertibility, without having to pass the phase of bilateralism.<sup>11</sup> This shows that one doesn't need the special historical context of integration for a payments union to work, as argued by Eichengreen.

It is still true, however, that the successful functioning of a payments union requires cooperation rather than competition. It is clear that the ruble zone could not be continued unchanged because of the inherent prisoners' dilemma described earlier on. The CIS was founded specifically to stimulate the cooperation between the CIS-countries, so as to avoid free rider behavior and its adverse equilibria. After the introduction of the correspondent accounts several attempts were therefore made to establish a kind of Post-Soviet Monetary Union (PMU). In October 1992, minds were changing in favor of a multilateral payments and settlement mechanism. I was happy to be involved in the work of EES-AGIR.<sup>12</sup> In this function, I was an unimportant but close witness of the rise and the demise of the so-called Interstate Bank (ISB). On 9 October 1992, there was an important summit of the CIS Heads of State in Bishkek, the capital of Kyrgyzstan. They concluded the Bishkek-agreement. This agreement called for a coordination of monetary, credit and exchange rate policies for all countries that retained the ruble as legal tender. At that moment only the Baltic countries had independent currencies. The other countries often had cash substitutes in the form of coupons, but retained the ruble as legal tender and remained in the ruble zone. On the same date, the heads of state decided to create a working party for the establishment of the ISB.<sup>13</sup> Initially, the ISB was perceived in the western press as a kind of central bank for the ruble zone. Also some CIS-countries feared that it would become a kind of central bank, dominated by Russia. However, the text of the decision explicitly calls for proposals for ISB-activities in the field of a CIS payment mechanism. With hindsight, it may not have been very wise to label a clearing institution as the ISB, but after all the same happened with the EPU, where the central clearing institution was named the 'Bank for International Settlements' (BIS). The banking functions of the BIS were initially also limited to the granting of technical credits, within the limits provided by the EPU.

The last quarter of 1992 was devoted to drafting an agreement on the establishment of the ISB and on a charter for the ISB. Specialists of EES-AGIR and the IMF were deeply

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<sup>11</sup> Only relatively recently full convertibility has been established in both countries and the payment system has been abolished.

<sup>12</sup> Advisory Group on Interstate Economic Relations of the European Expertise Service (EES-AGIR), financed by the TACIS-program of the EU.

<sup>13</sup> Decision of the heads of state of the CIS, 9 October 1992, issued at the summit of the heads of state of the CIS, Bishkek, October 1992.

involved in the drafting process. During this process it became clear that the ISB would indeed become an institution for multilateral interrepublican clearing and settlement rather than a central bank. The ISB would be only a bank in the sense that it provided technical credits. The system of technical credits was equivalent to the one applied in the EPU. Gros (1993) gives a good description of the system proposed. Every member country received a technical credit limit. The limit was proportional to gross interrepublican trade of the country concerned. The charter also provided a settlement schedule. The proposed schedule was exactly the same as the EPU one. For the first 20% of the credit limit, cumulated monthly balances were fully credited. Then gradually, in layers of 20%, settlement in hard currency was required. Cumulated balances exceeding the limit had to be fully settled in hard currency. Such a gradual system of technical credit provides strong incentives for deficit countries to solve structural deficits, but still allows temporary trade deficits.

On 22 January 1993, the heads of state signed a treaty in which they approved the proposed draft agreement and the ISB charter with two crucial amendments. The amendments concerned the accounting and settlement currency and the distribution of voting rights. The currency of account became the ruble instead of a hard currency as proposed by the Western experts and the distribution of voting rights was changed to the effect that Russia received 50% of the voting rights. The two amendments changed the heart of the agreement because they turned the ISB into a Russia-dominated institution.

On 14 May 1993, the Heads of State called for the ratification of the agreement and the charter by the member states and set the deadline for the start of operations of the ISB on October 1, 1993. During 1993, the agreements and the charter were indeed ratified by the majority of countries and the ISB was formally founded. Unfortunately, the agreement was never implemented. The ISB was founded but never showed any activity near to its mission. The idea of a payments union was not dropped, however. Russia did in fact sign an agreement on the creation of a payments union between CIS member states on 21 October 1994 (see Afanaseev, 1996). Nonetheless, this new agreement did not change anything to the reality of disintegration and the payments union never came about (van Selm and Wagener, 1995). Many years later, there continued to be serious problems to clear payments between CIS member states effectively (see Serov, 1997).

How to explain this implementation failure? First of all, implementation failures were fairly general for CIS agreements in 1992–1994, since the political elite of the new countries was preoccupied with nation building rather than cooperation with CIS neighbors. In addition, the cost of bilateralism in percentage of NMP seems to be lower for Russia than for the other CIS-countries, as shown in Table 4. I also calculated the average loss of export as percentage of NMP for the CIS-countries other than Russia. It is on average higher than 6%. Also the inefficient system of correspondent accounts rendered the CBR a lot of discretionary power it was less than willing to abandon. Therefore, Russia and the CBR doubted the usefulness of the ISB and of a payments union in general (see Serov, 1997) and they were able to hamper the implementation since Russia had 50% of the voting rights and the CBR was in practice staffing the ISB.<sup>14</sup> In post-WWII Europe on the

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<sup>14</sup> The first president of the ISB was Mr. Solovov, vice-president of the CBR. During the negotiations on the charter, it became clear that Mr. Solovov was not strongly convinced of the use of the ISB for Russia.

contrary the dominating partner was the US, an outsider in favor of the EPU and BIS. Maybe there should have been more vocal and financial support for the ISB from the EU and the US.

More importantly, the system of correspondent accounts had shown that the CBR did not hesitate to abuse technical credit facilities to grant huge subsidies to Russian exporters. In fact it seems that in 1992–1993, there were substantial increases in the CBR's net credit to former Soviet republics. Excluding cash deliveries, this credit amounted to an impressive 8% of Russian GDP in 1992 (Ferguson and Granville, 2000). The main problem inherent to the system of the ruble zone was surprisingly enough not the competitive behavior of the central banks of the other ruble zone countries but rather the non-cooperative behavior of the CBR itself. In this respect, the system of correspondent accounts was fairly unsuccessful, as it did not manage to exert any discipline on the CBR. It is impossible to enforce cooperation in a group if the dominant player does not want to play cooperatively. It is clear that the Russian political world in general and the battered Ministry of Finance in particular resented their lack of control over the CBR's credit policies during this period. It was feared that the provision of technical credits within the framework of the payments union would in practice only extend the CBR's ability to grant indirect subsidies to Russian exporters. Although the ISB charter provided a clear limitation of technical credits, the dominance of the CBR in terms of voting rights and settlement currency ensured that the CBR could easily abuse the ISB to pursue whatever policy it deemed appropriate. Neither the system of correspondent accounts nor a payments union could therefore be expected to be of much help in disciplining the credit policies of the CBR. In this respect, only a shift to full convertibility seems to be adequate. While this is true, it is not a genuine argument against the ISB as such. No one would want to cast doubt on the ultimate goal of convertibility, but even so it is clear that immediate convertibility is costly because of lack of appropriate settlement provisions. Therefore, a payments union could have facilitated a less costly transition from ruble zone to full convertibility. Abandoning the ISB for reasons of disciplining the CBR therefore seems perverse, as the net benefit of higher CBR discipline accrued largely to Russia in the form of lower inflation, while the brunt of the cost was, according to our results, borne by the other republics. The first best would have been to have a payments union and to discipline the CBR through adequate political supervision, for example by replacing the management of the CBR.

Still the second best was the real outcome. In July 1993, the CBR unexpectedly terminated the circulation of model 1961–1992 banknotes and introduced new cash rubles that were clearly Russian instead of Soviet. Solovov (1995), then the official president of the ISB, mentions that the Russian Federation was prepared to supply new Russian rubles to other CIS states, subject to “the transfer to the Bank of Russia of powers to regulate the volume of credit and money emission, the strict observance of common rules for carrying out banking operations and interbank transactions, and the coordination of currency and interest-rate policies with Russian Federation policy” (Solovov, 1995, p. 34). Since the common Soviet cash ruble was the last remainder of what used to be the ruble zone, this move forced all NIS to choose between leaving the ruble zone or de facto becoming a Russian province with respect to monetary policy. All CIS-countries, with the exception of Tajikistan that was in civil war, decided to establish their own currencies, which meant the end of the ruble zone altogether. All countries eventually established independent currencies with some form of

convertibility to the ruble. [Cazes and Le Cacheux \(1994\)](#) give an overview of this rush to independent currencies. This was the decisive step that settled the issue in favor of immediate convertibility without a transition phase of a payments union.

## 8. Conclusions

I have argued that the collapse of the ruble zone in 1992–1994 caused a payment system failure that imposed bilateralism and contributed to the decline of trade between the members of the CIS. In early 1992, the ruble zone was faced with a chaotic monetary constitution with a lot of inflationary potential. The CBR reacted by enforcing the correspondent account system. The system abruptly inflicted bilateralism on trade flows between CIS-countries, which induced unnecessary and inefficient trade disruptions. The estimates of the welfare cost of bilateralism in the FSU seem to indicate that the cost may have been relatively large when compared to the historical benchmark of post-WWII Europe. I argue that, though full convertibility is the ultimate goal, a SPU could have substantially reduced the economic cost of transition from a monetary union to full economic independence and convertibility. In fact, such a SPU could have avoided a dead weight loss of several percentage points of NMP. This leads to a reinterpretation of the fall of intra-CIS-trade in the aftermath of the collapse of the Soviet Union. Part of the fall in trade is not a reorientation of trade to achieve a more efficient equilibrium under new prices and comparative advantage, but rather a pure economic cost due to a blind and unnecessary payment failure. In order to avoid this cost, a form of SPU was concretely proposed and founded in the form of the ISB. The ISB was never operational mainly for internal Russian reasons. The CBR was a dominant partner in the whole construction and it was feared that the ISB would allow the CBR to continue its inflationary habit of financing Russian exporters indirectly through the unlimited provision of technical credits to former republics. In order to discipline the CBR, Russia opted for immediate and full convertibility. This in the short run prolonged the bilateralism of the correspondent accounts since settlement procedures between republics were generally not in place. This way of disciplining the CBR was relatively costly. However, the lion share of the cost was borne by the other former republics while Russia enjoyed the benefit of higher CBR discipline and lower inflation. It therefore made sense for Russia to do it.

## Acknowledgements

I wish to thank Daniel Gros for involving me in EES-AGIR, which gave me the inspiration for this article. Comments from participants at the VVE-day in Gent (1998) and anonymous referees were most welcome.

## Appendix A

Matrix 1 in detail is shown in [Tables A.1–A.3](#).

Table A.1  
Interrepublican trade matrix at world prices in millions of rubles

Importing republics	Exporting republics												Total
	Russia	Ukrain	Belgium	Uzbekistan	Kazakhstan	Georgia	Azerbaijan	Moldova	Kyrgyzstan	Tajikistan	Armenia	Turkmenistan	
Russia	0	25369.1	8974	3613	4681.2	1915.4	2834.7	1813	556.9	639.9	1424.4	1194	53015.6
Ukraine	36143.7	0	2474.8	606.6	752.5	414.3	558.1	563.5	164.4	141.8	347.9	179.2	42346.8
Belarus	12102	2717.2	0	139.1	291.2	138.4	181.7	156	76.5	38	87.5	49.9	15977.5
Uzbekistan	8019	1499.7	455.2	0	1085.6	157.9	141	40.9	269.8	177.5	103.4	672.5	12622.5
Kazakhstan	12152	1553.6	679.7	438.3	0	208.6	215.3	97	150.3	169.4	108.4	68.8	15841.4
Georgia	3661	894.2	236.8	45.6	101.6	0	240.7	54.5	17.1	10.3	83.7	10.4	5355.9
Azerbaijan	3063.6	885.7	249.2	46.5	239.6	86.7	0	34.5	23.8	30.3	58.7	5.6	4724.2
Moldova	3267.3	1464.5	338.8	75.2	49.1	25.9	31	0	15.3	4.7	29.1	11.7	5312.6
Kyrgyzstan	1835.3	291.3	124.9	229.4	261.6	49.3	33.9	27.1	0	45.4	40.8	46.9	2985.9
Tajikistan	1894.9	415.1	131.1	308.2	230.4	48	69.9	15.3	63.6	0	30	69.4	3275.9
Armenia	2233.4	528.3	240.8	56.3	37.9	61.9	251.8	52.8	20.2	8.7	0	12.8	3504.9
Turkmenistan	1604.5	437.9	87.7	123.7	108.1	52.2	124.3	16.1	50.9	48.7	66.8	0	2720.9
Total export	85976.7	36056.6	13993	5681.9	7838.8	3158.6	4682.4	2870.7	1408.8	1314.7	2380.7	2321.2	167684
Total import	53015.6	42346.8	15977.5	12622.5	15841.4	5355.9	4724.2	5312.6	2985.9	3275.9	3504.9	2720.9	167684
NMP	385.4	102.5	26.2	20.7	26.9	10.2	10.9	7.7	5.0	4.8	5.8	4.7	610.8
Share export/NMP (%)	22.3	35.2	53.4	27.4	29.1	31.0	43.0	37.3	28.2	27.4	41.0	49.4	27.5
Share import/NMP (%)	13.8	41.3	61.0	61.0	58.9	52.5	43.3	69.0	59.7	68.2	60.4	57.9	27.5
Multilateral balance	32961.1	6290.2	1984.5	6940.6	8002.6	2197.3	41.8	2441.9	1577.1	1961.2	1124.2	399.7	65922.2

Table A.2  
Bilaterally balanced trade matrix and export loss

Importing republics	Exporting republics												Total
	Russia	Ukrain	Belgium	Uzbekistan	Kazakhstan	Georgia	Azerbaijan	Moldova	Kyrgyzstan	Tajikistan	Armenia	Turkmenistan	
Russia	0.0	25369.1	8974.0	3613.0	4681.2	1915.4	2834.7	1813.0	556.9	639.9	1424.4	1194.0	53015.6
Ukraine	25369.1	0.0	2474.8	606.6	752.5	414.3	558.1	563.5	164.4	141.8	347.9	179.2	31572.2
Belarus	8974.0	2474.8	0.0	139.1	291.2	138.4	181.7	156.0	76.5	38.0	87.5	49.9	12607.1
Uzbekistan	3613.0	606.6	139.1	0.0	438.3	45.6	46.5	40.9	229.4	177.5	56.3	123.7	5516.9
Kazakhstan	4681.2	752.5	291.2	438.3	0.0	101.6	215.3	49.1	150.3	169.4	37.9	68.8	6955.6
Georgia	1915.4	414.3	138.4	45.6	101.6	0.0	86.7	25.9	17.1	10.3	61.9	10.4	2827.6
Azerbaijan	2834.7	558.1	181.7	46.5	215.3	86.7	0.0	31.0	23.8	30.3	58.7	5.6	4072.4
Moldova	1813.0	563.5	156.0	40.9	49.1	25.9	31.0	0.0	15.3	4.7	29.1	11.7	2740.2
Kyrgyzstan	556.9	164.4	76.5	229.4	150.3	17.1	23.8	15.3	0.0	45.4	20.2	46.9	1346.2
Tajikistan	639.9	141.8	38.0	177.5	169.4	10.3	30.3	4.7	45.4	0.0	8.7	48.7	1314.7
Armenia	1424.4	347.9	87.5	56.3	37.9	61.9	58.7	29.1	20.2	8.7	0.0	12.8	2145.4
Turkmenistan	1194.0	179.2	49.9	123.7	68.8	10.4	5.6	11.7	46.9	48.7	12.8	0.0	1751.7
Total	53015.6	31572.2	12607.1	5516.9	6955.6	2827.6	4072.4	2740.2	1346.2	1314.7	2145.4	1751.7	125865.6
Export loss (%)	38.3	12.4	9.9	2.9	11.3	10.5	13.0	4.5	4.4	0.0	9.9	24.5	24.9
Export loss/NMP (%)	8.6	4.4	5.3	0.8	3.3	3.2	5.6	1.7	1.3	0.0	4.1	12.1	6.8
Import loss (%)	0.0	25.4	21.1	56.3	56.1	47.2	13.8	48.4	54.9	59.9	38.8	35.6	24.9
Import loss/NMP (%)	0.0	10.5	12.9	34.3	33.0	24.8	6.0	33.4	32.8	40.9	23.4	20.6	6.8

Table A.3  
Absolute values of bilateral balances and Kaplan and Schleiminger estimates

Importing republics	Exporting republics												Total
	Russia	Ukrain	Belgium	Uzbekistan	Kazakhstan	Georgia	Azerbaijan	Moldova	Kyrgyzstan	Tajikistan	Armenia	Turkmenistan	
Russia	0.0	10774.6	3128.0	4406.0	7470.8	1745.6	228.9	1454.3	1278.4	1255.0	809.0	410.5	32961.1
Ukraine	10774.6	0.0	242.4	893.1	801.1	479.9	327.6	901.0	126.9	273.3	180.4	258.7	15259.0
Belarus	3128.0	242.4	0.0	316.1	388.5	98.4	67.5	182.8	48.4	93.1	153.3	37.8	4756.3
Uzbekistan	4406.0	893.1	316.1	0.0	647.3	112.3	94.5	34.3	40.4	130.7	47.1	548.8	7270.6
Kazakhstan	7470.8	801.1	388.5	647.3	0.0	107.0	24.3	47.9	111.3	61.0	70.5	39.3	9769.0
Georgia	1745.6	479.9	98.4	112.3	107.0	0.0	154.0	28.6	32.2	37.7	21.8	41.8	2859.3
Azerbaijan	228.9	327.6	67.5	94.5	24.3	154.0	0.0	3.5	10.1	39.6	193.1	118.7	1261.8
Moldova	1454.3	901.0	182.8	34.3	47.9	28.6	3.5	0.0	11.8	10.6	23.7	4.4	2702.9
Kyrgyzstan	1278.4	126.9	48.4	40.4	111.3	32.2	10.1	11.8	0.0	18.2	20.6	4.0	1702.3
Tajikistan	1255.0	273.3	93.1	130.7	61.0	37.7	39.6	10.6	18.2	0.0	21.3	20.7	1961.2
Armenia	809.0	180.4	153.3	47.1	70.5	21.8	193.1	23.7	20.6	21.3	0.0	54.0	1594.8
Turkmenistan	410.5	258.7	37.8	548.8	39.3	41.8	118.7	4.4	4.0	20.7	54.0	0.0	1538.7
Total bilateral balance	32961.1	15259.0	4756.3	7270.6	9769.0	2859.3	1261.8	2702.9	1702.3	1961.2	1594.8	1538.7	83637.0
Kaplan and Schleiminger	1.0	2.4	2.4	1.0	1.2	1.3	30.2	1.1	1.1	1.0	1.4	3.8	1.3
Kaplan and Schleiminger (%) of NMP	0.0	8.8	10.6	1.6	6.6	6.5	11.2	3.4	2.5	0.0	8.1	24.2	2.9

## Appendix B. A new data matrix adjusted for Russia's structural surplus (matrix 2)

Starting from the original trade matrix  $A$ , the bilateral trade flows with Russia  $X'_{jr}$  are adjusted by proportionally reducing Russia's bilateral surplus:

$$\forall X_{jr} \in A : X'_{jr} = X_{jr} \frac{\sum_{j=1}^n X_{rj}}{\sum_{j=1}^n X_{rj} + \left( \left( \sum_{i=1}^m X_{ir} - \sum_{j=1}^n X_{rj} \right) \alpha_j \right)} \quad (\text{B.1})$$

with  $\alpha_j$  is the percentage by which Russia reduces its surplus. Since Russia's structural surplus did not disappear right away, I define matrix 2a with  $\alpha_j = 100\%$ , matrix 2b with  $\alpha_j = 85\%$ , matrix 2c with  $\alpha_j = 70\%$ , and matrix 2d with  $\alpha_j = 50\%$ .

This yields a new series of matrices of the form:

$$A' = \begin{bmatrix} 0 & X_{1i} & X'_{1r} & X_{1n} \\ X_{i1} & 0 & X'_{ir} & X_{in} \\ X_{j1} & X_{ji} & 0 & X_{jn} \\ X_{m1} & X_{mi} & X'_{mr} & 0 \end{bmatrix} \quad (\text{B.2})$$

## Appendix C. A energy trade-adjusted data matrix (matrix 3)

The Russian structural surplus is corrected by reducing Russia's export to every republic  $j$  with a deficit in energy trade. The distribution of the reduction in Russian export to various republics is decided by the weights  $\beta_j$ , that are derived from recent energy trade data:

$$\forall X_{jr} \in A : X''_{jr} = X_{jr} - \alpha_j \beta_j \left( \sum_{i=1}^m X_{ir} - \sum_{j=1}^n X_{rj} \right) \quad (\text{C.1})$$

Since Russia's structural surplus did not disappear right away, I define, as in [Appendix B](#), matrix 3a with  $\alpha_j = 100\%$ , matrix 3b with  $\alpha_j = 85\%$ , matrix 3c with  $\alpha_j = 70\%$ , and matrix 3d with  $\alpha_j = 50\%$ . This yields a series of energy trade-adjusted data matrices of the form:

$$A'' = \begin{bmatrix} 0 & X_{1i} & X''_{1r} & X_{1n} \\ X_{i1} & 0 & X''_{ir} & X_{in} \\ X_{j1} & X_{ji} & 0 & X_{jn} \\ X_{m1} & X_{mi} & X''_{mr} & 0 \end{bmatrix} \quad (\text{C.2})$$

## Appendix D

The bilaterally balanced trade matrix is constructed. This amounts to selecting for every trade relation the lowest number of import and export:

$$\forall X_{ij} \in A : Y_{ij} = \text{Min}(X_{ij}, X_{ji}) \quad (\text{D.1})$$

This yields a bilaterally balanced matrix  $B$  of the following form:

$$B = \begin{bmatrix} 0 & Y_{1i} & Y_{1j} & Y_{1n} \\ Y_{i1} & 0 & Y_{ij} & Y_{in} \\ Y_{j1} & Y_{ji} & 0 & Y_{jn} \\ Y_{m1} & Y_{mi} & Y_{mj} & 0 \end{bmatrix} \quad (\text{D.2})$$

with  $B$  logically satisfying the following constraint:

$$\forall X_{ij} \in B : Y_{ij} = Y_{ji} = \text{Min}(X_{ij}, X_{ji})$$

i.e.  $B$  is a symmetric matrix. The bilaterally balanced matrices  $B$  are then compared to the original data matrices. This allows calculating the loss of export in percentage and the loss of export in percentage of NMP, due to the bilateral balancing constraint:

$$\begin{aligned} \text{export loss as percentage of total} &= \frac{\sum_{j=1}^n \sum_{i=1}^m (X_{ij} - Y_{ij})}{\sum_{j=1}^n \sum_{i=1}^m X_{ij}} \\ \text{export loss as percentage of NMP} &= \frac{\sum_{j=1}^n \sum_{i=1}^m (X_{ij} - Y_{ij})}{\text{NMP}} \end{aligned} \quad (\text{D.3})$$

## Appendix E

The absolute value of bilateral balances is calculated as follows:

$$\forall X_{ij} \in A : Z_{ij} = \text{Abs}(X_{ij} - X_{ji}) \quad (\text{E.1})$$

This yields a matrix of bilateral balances of the following form:

$$C = \begin{bmatrix} 0 & Z_{1i} & Z_{1j} & Z_{1n} \\ Z_{i1} & 0 & Z_{ij} & Z_{in} \\ Z_{j1} & Z_{ji} & 0 & Z_{jn} \\ Z_{m1} & Z_{mi} & Z_{mj} & 0 \end{bmatrix} \quad (\text{E.2})$$

with  $C$  logically satisfying the following constraint:

$$\forall X_{ij} \in C : Z_{ij} = Z_{ji} = \text{Abs}(X_{ij} - X_{ji})$$

i.e.  $C$  is a symmetric matrix. [Table A.3](#) in [Appendix A](#), I show the matrix  $C$  that follows from data matrix 1. The sum of the absolute value of bilateral balances (AVB) is easily determined:

$$\text{AVB} = \sum_{j=1}^n \sum_{i=1}^m (Z_{ij}) \quad (\text{E.3})$$

The absolute value of bilateral balances needs to be compared to the absolute value of multilateral balances (AVM). Calculating AVM amounts to summing for all CIS-countries

$k$  the absolute value of the multilateral balance of CIS-trade. This can be expressed as follows:

$$\text{AVM} = \sum_{k=1}^{m=n} \text{Abs} \left( \sum_{j=1}^m X_{ik} - \sum_{j=1}^n X_{kj} \right) \quad (\text{E.4})$$

with  $\sum_{j=1}^m X_{ik}$  = export from  $k$  to all other CIS-countries,  $\sum_{j=1}^n X_{kj}$  = export from all other CIS-countries to  $k$ .

Using the concepts of Eqs. (E.3) and (E.4), they calculate the ratio of bilateral to multilateral balances (KS1) and the difference between bilateral and multilateral balances, divided by NMP (KS2):

$$\text{KS1} = \frac{\text{AVB}}{\text{AVM}}, \quad \text{KS2} = \frac{\text{AVB} - \text{AVM}}{\text{NMP}} \quad (\text{E.5})$$

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