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Jacek Cukrowski

Financing Budget Deficit by Central Bank Seigniorage in Selected Transitional Economies: A Comparative Study

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Graphic Design: Agnieszka Natalia Bury

DTP: CeDeWu Sp. z o.o.

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Jacek Cukrowski

Jacek Cukrowski (born 1960) received his M.Sc. degree in Systems Engineering in 1985, Ph.D. in Computer Science in 1990, Postgraduate Diploma in Sociology and Politics in 1993, Ph.D. in Economics in 1995. In 1997 he defended Habilitation Thesis in Economics. In 1992–1999 he worked as a researcher in the Economics Institute in the Academy of Science of the Czech Republic. Since 1998 he has been a docent of Charles University (Czech Republic), and Professor of University of Finance and Business (Poland), since 1997 with CASE Foundation.

Abstract

The paper presents a comparative study of the creation and distribution of central bank seigniorage in selected Central European countries (Poland, Czech Republic) and selected Commonwealth of Independent States countries (Georgia, Kyrgyzstan, Belarus) in the period of transition to market economy. A comprehensive framework for measurement of seigniorage revenues is presented and estimates of its sources and uses are computed and analyzed. It is shown that conventional concept of monetary seigniorage does not reflect government gains from money creation in transitional economies. The study also reveals sources of fiscal seigniorage in the period of macroeconomic stabilization accompanied by tight monetary policy. In particular, contrary to the common view, the analysis shows that typically revenues from the money creation has not been extensively used as a tool for financing government expenditures in non of the analyzed transitional economies. Nevertheless, the research shows that in CIS countries the flow of the resources from the central bank to the budget remains significant mainly due to the reduction of the portfolio of non-government debt and quasi-fiscal operations of central banks.

Key words: Seigniorage, central banks, economies in transition, National Bank of Poland, Czech National Bank, National Bank of Georgia, National Bank of the Kyrgyz Republic, National Bank of the Republic of Belarus.

1. Introduction

Over decades all centrally planned economies were ruled by means of the plan which set output goals for all sectors of the economy. Wages and prices were also set by central planner. Money supply was to adjust to ensure meeting the planned equilibrium. This system, maintained artificially for years, brought all related countries to serious economic crisis. Political and market reforms introduced in these countries in the early 1990s changed the situation drastically, however, they were accompanied by a sharp decline in economic activity, an increase in inflation rates [1] and significant fiscal problems.

In the first years of transition in most countries the huge jump of inflation came from a combination of price liberalization on the one hand, and large fiscal deficit on the other (largely due to the collapse of the tax base and the extended social duties of the state). The absence of other sources of financing led to the monetary financing of budget deficits, and hence rapid inflation. In the middle of nineties, however, inflation had came down significantly in all transition countries. Nevertheless, in subsequent years, due to a variety of factors, including the degree of industrialization, the geographical location and orientation of international trade, the extent of initial economic imbalances and the legacy of state institutions, three distinct clusters of countries emerged: Central and Eastern European (CEE) countries on one end, the western Commonwealth of Independent States (CIS) [2], and Baltic countries in the middle, and the Caucasus and Central Asian states at the other end.

In more advanced CEE countries rapid liberalization and sustained macroeconomic stabilization have laid the basis for the gradual development of market economy. In the less advanced countries (in Caucasus and Central Asia) progress in liberalization has been slow and uneven. Moreover, macroeconomic stabilization in these countries has been jeopardized by the persistence of large budget deficits.

It has to be stressed, however, that all transition countries, have faced and still meet the problem of significant fiscal imbalances. This is closely related both to the output collapse and to process of structural reform in the public sector (on the revenue side) and extended social duties of the state (on the expenditure side). Consequently, in most countries large public sector deficits determine most of macroeconomic indicators (monetary growth, inflation rates, interest rates, etc.). According to a common opinion seigniorage revenue and the inflation tax play an important role in financing large fiscal deficits in all transition countries.

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[1] Except Czechoslovakia.
[2] Except Belarus.

In advanced economies seigniorage is usually not a tool for financing a government's expenditures but rather a consequence of induced changes in the monetary policy (the range usually being between 0.5–1.5% of GDP). In other countries, however, seigniorage revenues are considered an important source of government financing [see, e.g., Drazen, 1989; Bruni, Penati and Porta, 1989, Grilli, 1989, and Gross, 1997]. Recent research shows that the size of the seigniorage in several Southern EU countries reported as a share of GDP or GNP varies between 2 and 4% [Horrendorf, 1997]. The importance of the seigniorage as a revenue instrument in Central and Eastern European countries has been also frequently analyzed [see, for example, Oblath and Valentinyi, 1994; Kotulan, 1995; Hochreiter, Rovelli and Winckler, 1996; and Budina, 1997]. The results indicate that, similar to Western Europe, the experience of collecting seigniorage revenues differs across countries. Hochreiter, Rovelli and Winckler (1996), for example, show the results of the computation of central bank seigniorage for five countries: Romania, Hungary, the Czech Republic, Austria and Germany. Their findings (base on opportunity cost and inflation tax definitions of seigniorage) [3] indicate that central bank seigniorage in 1993 was about 30% of GDP in Romania (due to the high inflation rate), and 4% of GDP in Hungary (due to the high ratio of central bank assets to GDP in Hungary). Seigniorage in the Czech Republic was around 1% of GDP (similar to that of Austria and Germany). Budina (1997) shows that the level of seigniorage in Poland in the period 1991–1995 oscillated between 1.55%–2.91% of GDP [4]. This could suggest that the revenues from the creation of money play very different budgetary roles across transition countries. However, as indicated by Klein and Neumann (1990) and Neumann (1996), to compare seigniorage revenues in various countries properly, one has to take into account a number of country-specific features, although this requires a more detailed analysis of the mechanism underlying the process of seigniorage formation.

This paper focuses exclusively on countries in transition to market economy. The sample analyzed includes two countries coming from the cluster of countries most advanced in market reforms (CEE countries): Czech Republic and Poland, two countries from group of the less successful countries (Caucasus and Central Asian countries): Georgia and Kyrgyzstan, and Belarus as an example of the country, in which real market reforms have not been started yet.

The aim of the study is to reveal sources and the magnitude of the total transfers from the central bank to the budget in different transition economies. Since the starting period of the transition in many countries (Poland, Georgia, Kyrgyzstan, Belarus) has been

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[3] See Section 2.

[4] These results are based on the estimation of monetary seigniorage only, and consequently are not precise (see Sections 2 and 3).

associated with hyperinflation we focus on the four years period following a moderate macroeconomic stabilization (when the inflation in all countries considered did not exceed 35%). More precisely, in each country we analyze the time period from the 5th until the 8th year since the beginning of economic transformation [5]. In particular, in CEE countries we study the period from 1994 until 1997 [6], in Caucasus and Central Asian countries we analyze the period from 1996 until 1999, and in Belarus, due to non availability of data we focus on the three years period from 1997 until 1999.

Following Neumann (1996), we define seigniorage in the broadest possible sense as the sum of all revenues resulting from the monopoly power to issue money. Unlike existing empirical studies we take into account the important fact that seigniorage depends also on legal, institutional and operational details that are relevant for the creation of base money in each particular country [see Klein and Neumann, 1990; and Neumann, 1996]. This approach not only allows proper estimation of the seigniorage revenues in subsequent years, but also shows how the size of seigniorage revenues should be computed for the purpose of inter-country comparisons.

The paper is organized as follows. In the next section we discuss issues related to the economic understanding of the term *seigniorage*, present alternative definitions, and describe the sources of total gross seigniorage. In the third section we consider possible uses of total gross seigniorage. In the fourth section, we show the measurement framework, describe the data sources and present empirical results for the countries analyzed. In the fifth section we make inter-country comparison and discuss the results. The last section contains the main conclusions.

2. The Concept of Seigniorage

The concept of seigniorage can be defined in a few different ways. In the classical theoretical literature [see e.g., Drazen, 1985] three basic definitions of seigniorage are used. The first defines seigniorage as inflation tax. The second defines seigniorage as *opportunity cost of holding money* – the private sector's loss of foregone interest revenue from holding non-interest bearing cash balances instead of earning assets. The third – and the most

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[5] Fisher, Sahay and Vegh (1996) stressed that due to the time differences in the starting point of market reforms it make sense to compare the countries in the same years since the start of transition rather then the same time periods.

[6] See Cukrowski and Janecki (2000) for the analysis of the National Bank of Poland seigniorage revenue and its components in the period 1990–1998.

general – defines seigniorage as *total revenues associated with money creation*. It has been shown [see Drazen, 1985] that the first two definitions are special cases of the last one.

As with most conceptual issues, there is no clear indication which definition of seigniorage is the best. In the analysis which follows we adopt the concept of gross seigniorage, proposed by Klein and Neumann, (1990) and Neumann (1996), which encompasses all other concepts [7]. In particular, we define *total gross seigniorage* as the real gross resource flow associated with base money creation [Neumann, 1996]. Formally, we specify total gross seigniorage s as

$$s = s^M + \frac{i^P A^P + i^F A^F}{p} + \frac{G}{p} \tag{1}$$

where
s^M is monetary seigniorage defined as a change in base money stock M deflated by the general price level p:

$$s^M = \frac{\Delta M}{p} = \frac{\Delta M}{M} m \tag{2}$$

A^P and A^F denote a private sector debt and foreign debt, respectively;
i^P and i^F stand for corresponding nominal interest rates;
G denotes revenue from central bank's operations.

Monetary seigniorage s^M measures the actual wealth transfer which the private sector has to make in order to receive base money in the amount of M from the central bank. The second term in expression (1) describes the flow of interest revenue on the stock of non-government debt that the central bank bought in the past in exchange for non-interest bearing base money (the debt service on the central bank's stock of government debt is not included here because it is merely an inside transaction between the government and the central bank). The third term in expression (1) describes seigniorage revenue from central bank's operations.

3. The Distribution of Total Seigniorage

Most empirical literature presents a proxy for actual seigniorage flow to the government based on two implicit assumptions: the government receives the seigniorage

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[7] See Neumann (1996) for a detailed explanation of how the concept of total gross seigniorage fits the definition (3) presented above.

revenues regardless of the legal and institutional regulations governing the relationship between the government and central bank; and the amount of seigniorage revenue transferred to the government does not depend on the specific ways and means in which the creation of seigniorage is induced by the central bank. This is a simplification which does not take into account the cost of money production and the existence of the central bank in general. Note that the cost of the central bank could be significant (e.g., Klein and Neumann (1990) show that in the period 1974–1987, about 16.9% of German monetary seigniorage was used to cover the Bundesbank´s operating costs).

A more precise analysis presented by Neumann (1996) shows that total seigniorage is used for covering the cost of money production and central bank operation s^C, for net investment in non-government debt by the central bank sNI, for replacement investment to make up for the exchange rate induced loss of assets (in terms of domestic currency) s^{RI}, for budget finance s^G [8], and for the increase of the central bank capital (and/or is transferred to the third parties) s^O. Thus,

$$s = s^C + s^{NI} + s^{RI} + s^G + s^O \qquad (3)$$

where

$$s^C = \frac{C^{Coin} + C^{CB}}{p} \qquad (4)$$

C^{Coin} denotes the cost of coinage, and C^{CB} stands for the central bank's cost of printing notes and maintaining operations;

$$s^{NI} = \frac{\Delta A^P + \Delta A^F}{p} \qquad (5)$$

A^P and A^F denote private sector debt and foreign debt, respectively;

$$s^{RI} = \frac{L}{p} = -\frac{\Delta e\, A^F}{ep} \qquad (6)$$

L denotes a book loss (defined as a positive number), and e is an exchange rate;

$$s^G = \frac{\Delta A^G + (R^G - i^G A^G)}{p} \qquad (7)$$

A^G denotes government debt and R^G appropriated profit;

$$s^O = \frac{R^O}{p}, \qquad (8)$$

[8] In the case of a fixed exchange rate regime, s^{RI} equals zero (see Neumann,1996; for details).

R^O denotes profit transferred to the third parties or used for capital accumulation.

Part of the seigniorage transferred to the central government budget s^G (specified by expression (7)) is called *fiscal seigniorage* [see Klein and Neumann, 1990; and Neumann, 1996]. In general, there should be two additional terms in the numerator of the expression (7): R^{Coin} – revenue from coinage (in the case where the government has rights to issue coins as in Germany, for example); and T^B – taxes on central bank's property and income (when the central bank has to pay taxes on property and income as, for instance, in Japan). In the case of the countries analyzed the government receives fiscal seigniorage through two channels: (1) net borrowing from the central bank (ΔA^G), and (2) appropriation of the central bank's profit, net of interest payments on the central bank's stock of government debt (R^G - $i^G A^G$). Thus, fiscal seigniorage is fully determined by expression (7).

4. Empirical Analysis

The empirical analysis of sources and uses of seigniorage revenues presented in this section is based on data from the central banks balance sheets and their statements of income and expenditures and profit distribution (the main data sources are the *central banks annual reports*). The sample period in the Czech Republic and Poland is 1994–1997, in Georgia and Kyrgyzstan it covers years 1996–1999, and in Belarus 1997–1999. All the data are reported annually and denoted in the analysis which follows by subscript t.

We begin with the distribution of the total gross seigniorage. The total seigniorage s_t is the sum of the following sources:

$$s_t = s_t^M + s_t^I + s_t^A \tag{9}$$

where the monetary seigniorage s_t^M is computed as

$$s_t^M = \frac{\Delta M_t}{p_t} \tag{10}$$

seigniorage revenue from the stock of interest-earning foreign and domestic private assets s_t^I is determined as

$$s_t^I = \frac{IR_t - IE_t}{p_t} \tag{11}$$

where IR_t and IE_t correspond to interest revenues and interest expenditures, respectively;

and seigniorage revenue from central bank's operations s_t^A is computed as

$$s_t^A = \frac{RE_t - IR_t}{p_t} \tag{12}$$

where RE_t denotes the total revenue of the central bank.

The total seigniorage s_t is allocated to the following uses:

$$s_t = s_t^C + s_t^{NI} + s_t^{RI} + s_t^G + s_t^O \tag{13}$$

where

$$s_t^C = \frac{C_t^{Co\&Bn} + C_t^{CB}}{p_t} \tag{14}$$

C^{CB} – costs of maintaining operations of central bank,
$C^{Co\&Bn}$ – costs of coinage and printing banknotes,

$$s_t^G = \frac{\Delta A_t^G + (R_t^G - i_t^G A_t^G)}{p_t} \tag{15}$$

$$s_t^{RI} = \frac{L_t}{p_t} = -\Delta e \frac{A_{t-1}^F}{e_{t-1} p_t} \tag{16}$$

$$s_t^O = \frac{\Pi_t - (R_t^G - i_t^G A_t^G)}{p_t}, \tag{17}$$

where Π_t denotes the total profit of the central bank in the period considered.

Investment seigniorage can be computed as a residual, i.e.,

$$s_t^{NI} = s_t - (s_t^C + s_t^{RI} + s_t^G + s_t^O) \tag{18}$$

In Table 1 and Table 2 present, respectively, the estimated values of sources and uses of seigniorage for the selected CEE (the Czech Republic and Poland) [9] and Caucasus and Central Asian (Georgia and Kyrgyzstan) [10] countries in the corresponding sample

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[9] See Cukrowski, Janecki (1998) for details of computations of the seigniorage revenues in Poland and Cukrowski, Stavrev (1999) in the Czech Republic.

[10] See Cukrowski, Bushman (2000) for details of computations of the seigniorage revenues in the Kyrgyz Republic and Cukrowski (2000) in Georgia.

		1994	1995	1996	1997
Czech Republic Billion of CZK					
Total	$s_{,}^{T}$	**89.18**	**63.78**	**57.74**	**36.46**
Sources					
Monetary	$s_{,}^{M}$	44.00	38.98	50.21	-4.75*
Interest Revenues	$s_{,}^{I}$	8.69	7.75	3.09	5.31
Revenues from CB operations	$s_{,}^{A}$	2.05	4.99	-4.10*	31.16
Uses					
Costs	$s_{,}^{C}$	2.14	1.82	2.39	6.28
Investment	$s_{,}^{NI}+s_{,}^{RI}$	87.04	61.96	51.26	18.49
Net Investment	$s_{,}^{NI}$	87.13	64.40	47.89	20.04
Replacement	$s_{,}^{RI}$	-0.09	-2.44	3.37	-1.55
Fiscal	$s_{,}^{F}$	-34.44**	-12.06**	4.45	6.95
Increase in CB capital	$s_{,}^{O}$	0.00	0.00	0.00	0.00
Per cent of total					
Sources					
Monetary	$s_{,}^{M}$	49.3	61.1	86.9	-13.0
Interest Revenues	$s_{,}^{I}$	9.7	12.1	5.4	14.6
Revenues from CB operations	$s_{,}^{A}$	2.3	7.8	-7.1	85.4
Uses					
Costs	$s_{,}^{C}$	2.4	2.9	4.1	17.2
Investment	$s_{,}^{NI}+s_{,}^{RI}$	97.6	97.1	88.8	50.7
Net Investment	$s_{,}^{NI}$	97.7	101.0	82.9	55.0
Replacement	$s_{,}^{RI}$	-0.1	-3.8	5.8	-4.3
Fiscal	$s_{,}^{F}$	-38.6	-18.9	-7.7	19.1
Increase in CB capital	$s_{,}^{O}$	0.0	0.0	0.0	0.0

*   Minus denotes that the item is a use of the total seigniorage

Table 1. Sources and distribution of seigniorage in selected CEE countries (in 1994 prices) – continued

		1994	1995	1996	1997
		Poland million of PLN			
Total	$s_{,}^{T}$	**7.10**	**16.93**	**4.16**	**7.40**
		Sources			
Monetary	$s_{,}^{M}$	3.96	9.34	3.07	4.42
Interest Revenues	$s_{,}^{I}$	0.24	-0.34*	0.12	0.15
Revenues from CB operations	$s_{,}^{A}$	2.58	2.70	0.32	0.56
		Uses			
Costs	$s_{,}^{C}$	0.69	1.18	2.69	3.06
Investment	$s_{,}^{NI}+s_{,}^{RI}$	-0.33**	15.12	1.35	-2.27**
Net Investment	$s_{,}^{NI}$	4.31	21.42	12.64	9.39
Replacement	$s_{,}^{RI}$	-4.63	-6.29	-11.29	-11.66
Fiscal	$s_{,}^{F}$	6.18	-4.89**	-0.64**	4.31
Increase in CB capital	$s_{,}^{O}$	0.23	0.28	0.12	0.03
		Per cent of total			
		Sources			
Monetary	$s_{,}^{M}$	55.7	55.2	73.8	59.8
Interest Revenues	$s_{,}^{I}$	3.3	-2.0	3.0	2.0
Revenues from CB operations	$s_{,}^{A}$	36.3	15.9	7.7	7.5
		Uses			
Costs	$s_{,}^{C}$	9.7	7.0	64.8	41.4
Investment	$s_{,}^{NI}+s_{,}^{RI}$	-4.6	89.4	32.4	-30.7
Net Investment	$s_{,}^{NI}$	60.6	126.5	304.1	126.8
Replacement	$s_{,}^{RI}$	-65.2	-37.2	-271.7	-157.5
Fiscal	$s_{,}^{F}$	87.0	-28.9	-15.5	58.2
Increase in CB capital	$s_{,}^{O}$	3.3	1.7	2.8	0.4

** Minus denotes that the item is a source of the total seigniorage

Table 2 . Sources and distribution of seigniorage in selected Caucasus and Central Asian countries (in 1996 prices)

		1994	1995	1996	1997
Georgia million of GEL					
Total	$s_,^T$	216.6	135.4	128.8	172.3
Sources					
Monetary	$s_,^M$	51.6	71.3	6.7	55.7
Interest Revenues	$s_,^I$	11.7	32.9	43.1	51.8
Revenues from CB operations	$s_,^A$	13.6	11.8	10.5	8.7
Uses					
Costs	$s_,^C$	19.7	6.1	16.7	20.1
Investment	$s_,^{NI}+s_,^{RI}$	-139.7**	-19.4**	49.9	-56.1**
Net Investment	$s_,^{NI}$	-138.3	-21.0	-49.2	-63.1
Replacement	$s_,^{RI}$	-1.4	1.6	99.1	7.0
Fiscal	$s_,^F$	195.8	125.8	62.1	118.8
Increase in CB capital	$s_,^O$	1.0	3.4	-68.5**	33.4
Per cent of total					
Sources					
Monetary	$s_,^M$	23.8	52.7	5.2	32.3
Interest Revenues	$s_,^I$	5.4	24.3	33.5	30.1
Revenues from CB operations	$s_,^A$	6.3	8.7	8.2	5.0
Uses					
Costs	$s_,^C$	9.1	4.5	13.0	11.7
Investment	$s_,^{NI}+s_,^{RI}$	-64.5	-14.3	38.7	-32.6
Net Investment	$s_,^{NI}$	-63.9	-15.5	-38.2	-36.6
Replacement	$s_,^{RI}$	-0.6	1.2	76.9	4.1
Fiscal	$s_,^F$	90.4	92.9	48.2	68.9
Increase in CB capital	$s_,^O$	0.5	2.5	-53.2	19.4

** Minus denotes that the item is a source of the total seigniorage

Table 2 . Sources and distribution of seigniorage in selected Caucasus and Central Asian countries (in 1996 prices) – continued

		1994	1995	1996	1997
Kyrgyzstan million of Som					
Total	s_t^T	1052.6	652.4	437.0	1115.1
Sources					
Monetary	s_t^M	489.1	448.9	160.3	431.3
Interest Revenues	s_t^I	-1.9[*]	89.7	80.1	114.0
Revenues from CB operations	s_t^A	44.4	113.8	-53.5[*]	-537.2[*]
Uses					
Costs	s_t^C	41.2	72.1	70.6	73.7
Investment	$s_t^{NI}+s_t^{RI}$	-519.1[**]	135.4	-196.6[**]	-569.8[**]
Net Investment	s_t^{NI}	-519.1	116.7	-62.8	110.2
Replacement	s_t^{RI}	0	18.7	-133.8	-680.0
Fiscal	s_t^F	1009.4	381.8	286.1	449.2
Increase in CB capital	s_t^O	0.2	63.1	27.6	54.9
Per cent of total					
Sources					
Monetary	s_t^M	46.5	68.8	36.7	38.7
Interest Revenues	s_t^I	-0.2[*]	13.7	18.3	10.2
Revenues from CB operations	s_t^A	4.2	17.4	-12.2[*]	-48.2[*]
Uses					
Costs	s_t^C	3.9	11.1	16.2	6.6
Investment	$s_t^{NI}+s_t^{RI}$	-49.3[**]	20.8	-45.0[**]	-51.1[**]
Net Investment	s_t^{NI}	-49.3	17.9	-14.4	9.9
Replacement	s_t^{RI}	0.0	2.9	-30.6	-61.0
Fiscal	s_t^F	95.9	58.5	65.5	40.3
Increase in CB capital	s_t^O	0.0	9.7	6.2	4.9

[*]   Minus denotes that the item is a use of the total seigniorage

[**] Minus denotes that the item is a source of the total seigniorage

Table 3 . Sources and distribution of seigniorage in Belarus (in 1997 prices)

		1995	1996	1997
Belarus million of Rubels				
Total	s_t^T	**20148947**	**40373649**	**16782559**
Sources				
Monetary	s_t^M	12574596	13475545	11899334
Interest Revenues	s_t^I	-76931**	87422	584771
Revenues from CB operations	s_t^A	4149180	1582463	3629082
Uses				
Costs	s_t^C	607209	481390	756760
Investment	$s_t^{NI}+s_t^{RI}$	11236201	6353473	4217074
Net Investment	s_t^{NI}	*14661372*	*28473944*	*4886445*
Replacement	s_t^{RI}	*-3425171***	*-2212047***	*-669371***
Fiscal	s_t^F	1650854	-3107748**	9870713
Increase in CB capital	s_t^O	3152581	11418314	1268641
Per cent of total				
Sources				
Monetary	s_t^M	62,4	33,4	70,9
Interest Revenues	s_t^I	-0,4**	0,2	3,5
Revenues from CB operations	s_t^A	20,6	3,9	21,6
Uses				
Costs	s_t^C	3,0	1,2	4,5
Investment	$s_t^{NI}+s_t^{RI}$	55,8	15,7	25,1
Net Investment	s_t^{NI}	*72,8*	*70,5*	*29,1*
Replacement	s_t^{RI}	*-17,0***	*-54,8***	*-4,0***
Fiscal	s_t^F	8,2	-7,7**	58,8
Increase in CB capital	s_t^O	15,6	28,3	7,6

*   Minus denotes that the item is a use of the total seigniorage

**   Minus denotes that the item is a source of the total seigniorage

periods. Similarly, estimated values of sources and uses of seigniorage for Belarus are presented in Table 3 [11]. All flows are represented in national currency in prices of the first year of the sample period.

Note that due to the policy of National Bank of Georgia and National Bank of the Kyrgyz Republic net investment is negative, so that it should be considered as a source of the seigniorage revenues rather than as the use, as in the case of CEE countries.

The year by year developments of the total gross seigniorage and its sources as a fraction of GDP in analyzed CEE countries are presented in Figure 1, in Caucasus and Central Asian countries in Figure 2, and in Belarus in Figure 3. The distribution of the total gross seigniorage in subsequent years as a fraction of GDP in the analyzed CEE countries, Caucasus and Central Asian countries and Belarus are presented in Figure 4, 5 and 6, respectively. The country results are shortly discussed below.

Czech Republic

In the beginning of the nineties, Czechoslovakia and later the Czech Republic implemented a successful macroeconomic program. The authorities managed to keep inflation relatively low (immediately after the transformation towards a market economy, in 1991, Czechoslovakia experienced around 57 per cent inflation, which was reduced to 20 per cent in 1993 and kept down below 10 per cent in the years thereafter). Budget deficits in the period 1994–1997 did not exceed 1 % (actually till 1995 the government budget was in surplus ¾ in 1994 the budget surplus was about 0,9 % and in 1995 about 0,5 %; for 1996 and 1997, the budget deficit was -0,1 % and -1 % per cent respectively). Therefore, there was no great pressure to use seigniorage revenues for fiscal purposes. Moreover, in the considered period the government had significant revenues from privatization. As the result, as shown in Figure 3 (a), in the years 1994–1996 seigniorage was not used for government purposes (resources flowed from the government to the central bank). In this period most of the central bank revenues were used for the investment in non-government debt.

In 1997, as the result of economic disturbances, a change in the previously observed pattern of fiscal seigniorage development occurred (this change is in line with the development of the budget deficit in the Czech Republic) [12]. We should note, however, that in 1997 fiscal seigniorage was still much below 1 % of GDP. Furthermore, it is worth mentioning that an increase in fiscal seigniorage has been accompanied by a significant decrease in the monetary base (strong monetary restrictions have been imposed in

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[11] See Cukrowski (2001) for details of computations.

[12] In 1997 the balanced observed in previous years budget was replaced by relatively high budget deficit.

Figure 1a. Sources of the central bank seigniorage in analyzed CEE countries in the period 1994-1997 (as % of GDP) - Czech Republic
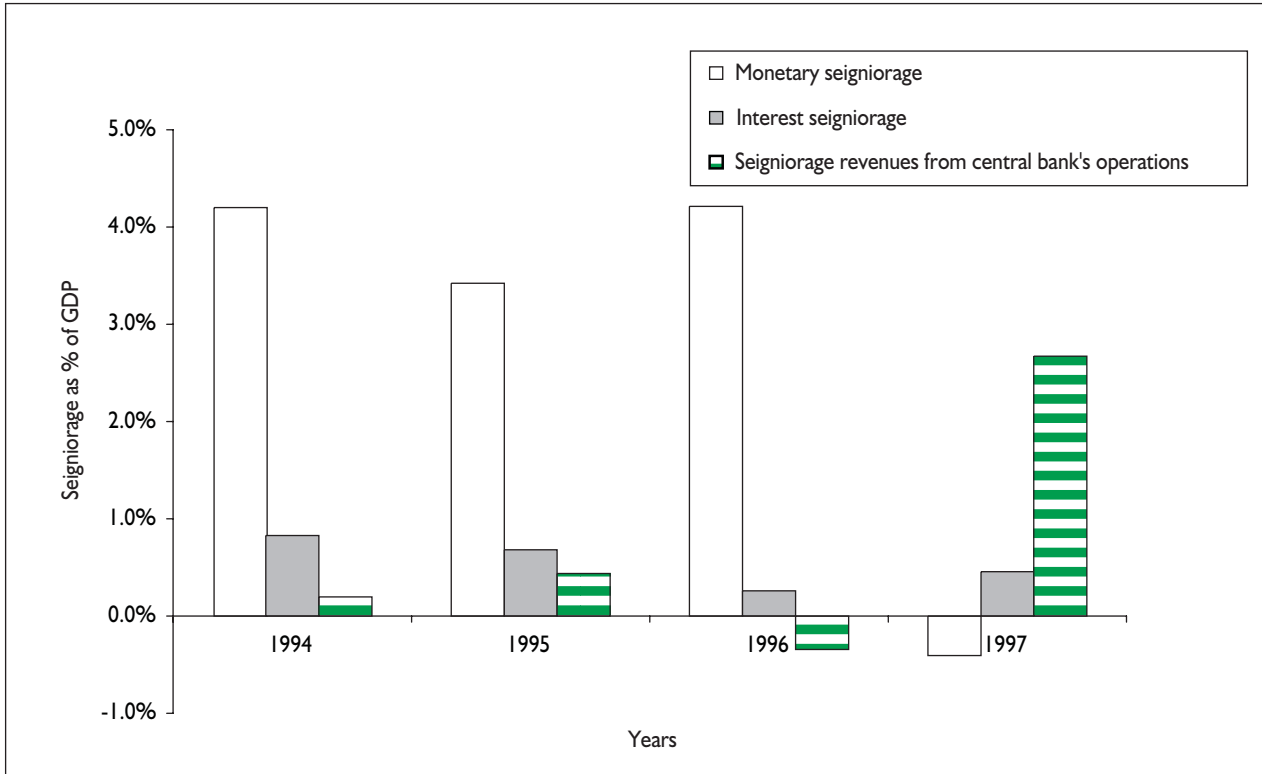
Figure 1b. Sources of the central bank seigniorage in analyzed CEE countries in the period 1994–1997 (as % of GDP) – Poland
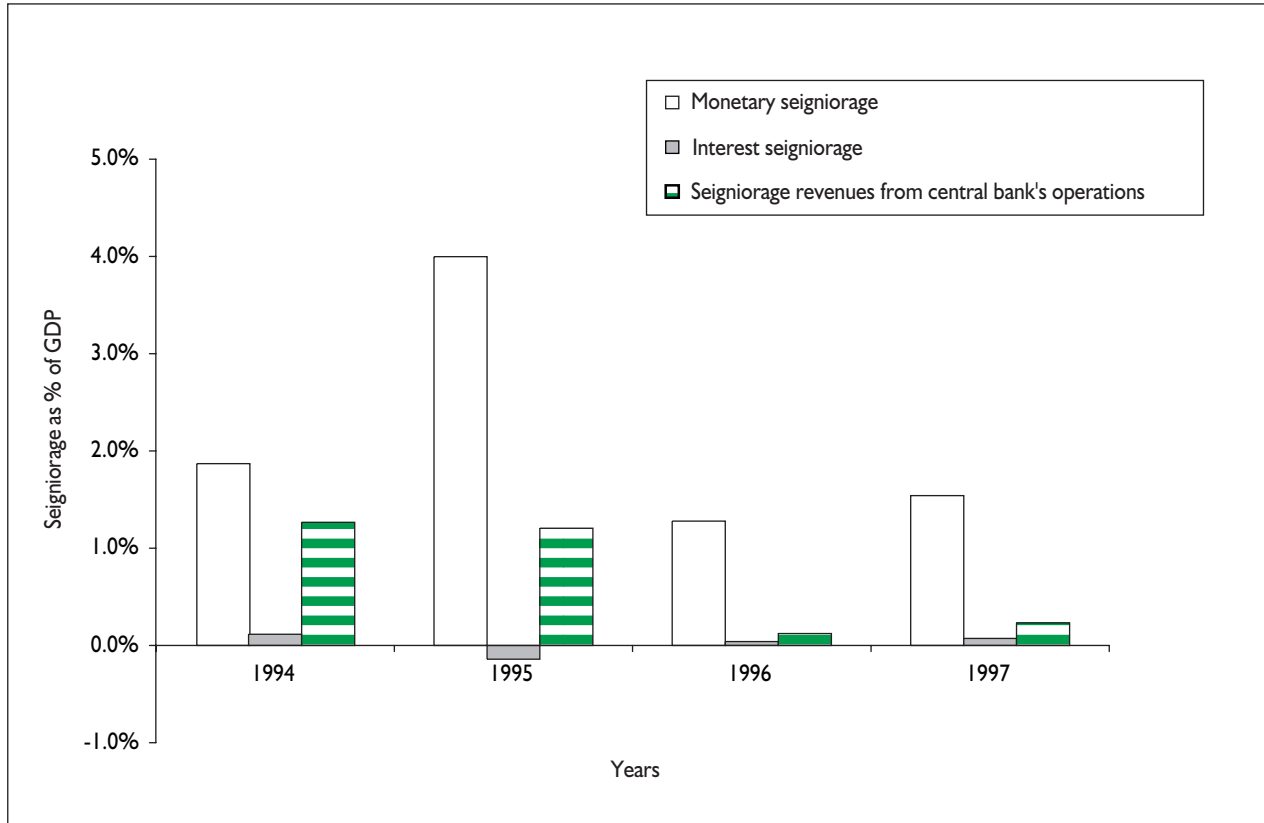
Figure 2a. Sources of the central bank seigniorage in analyzed Caucasus and Central Asian countries in the period 1996-1999 (as % of GDP) - Georgia
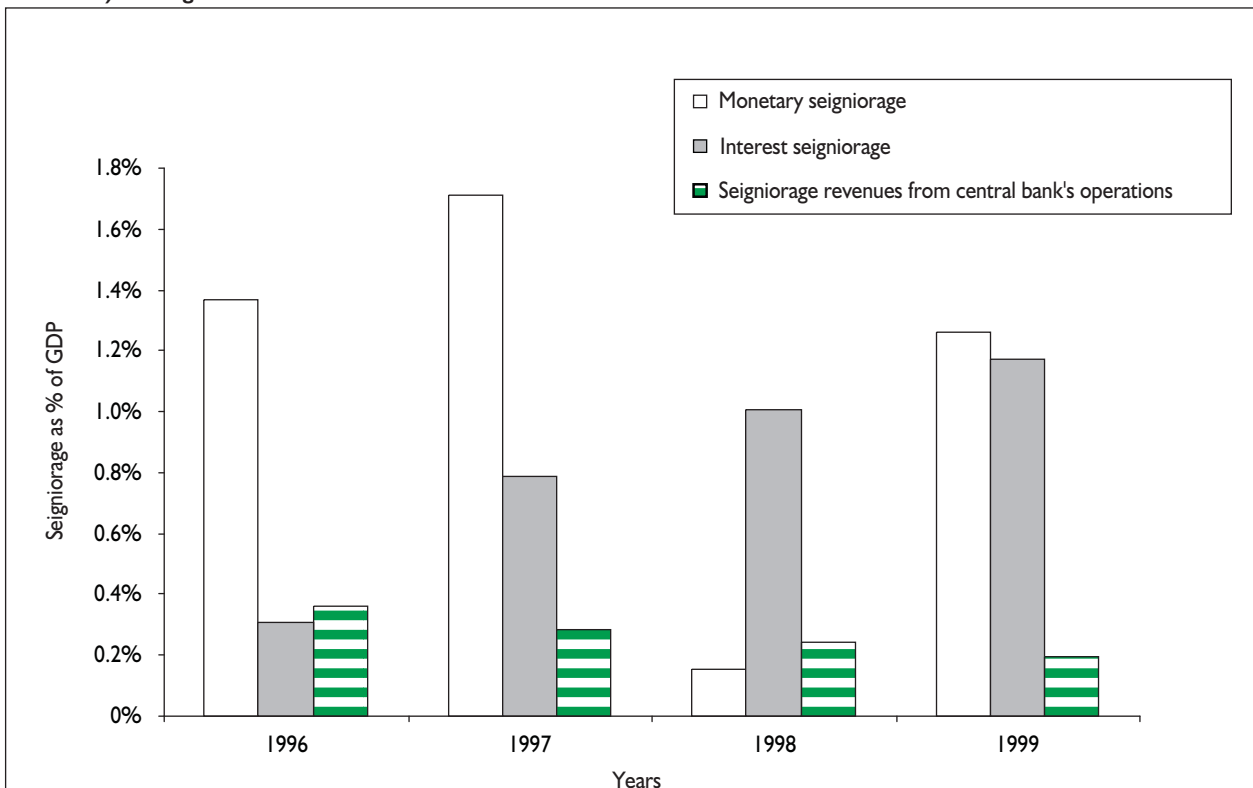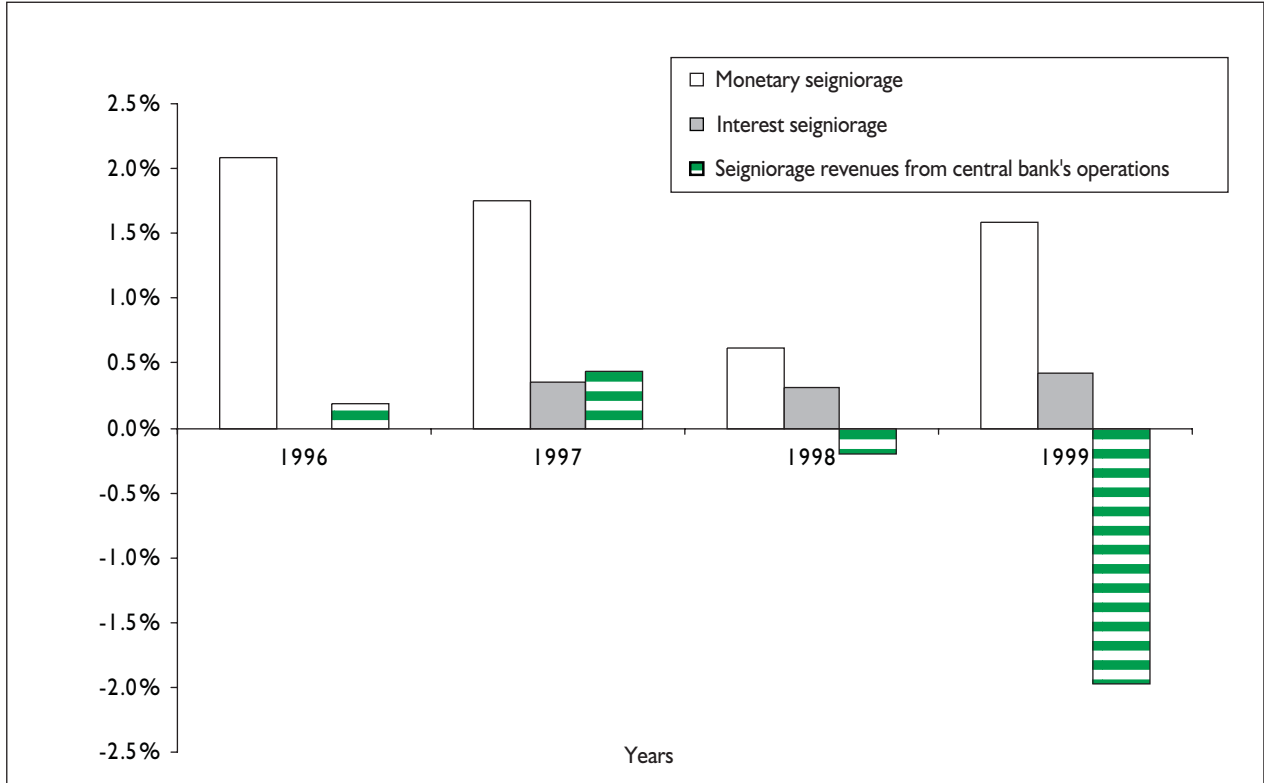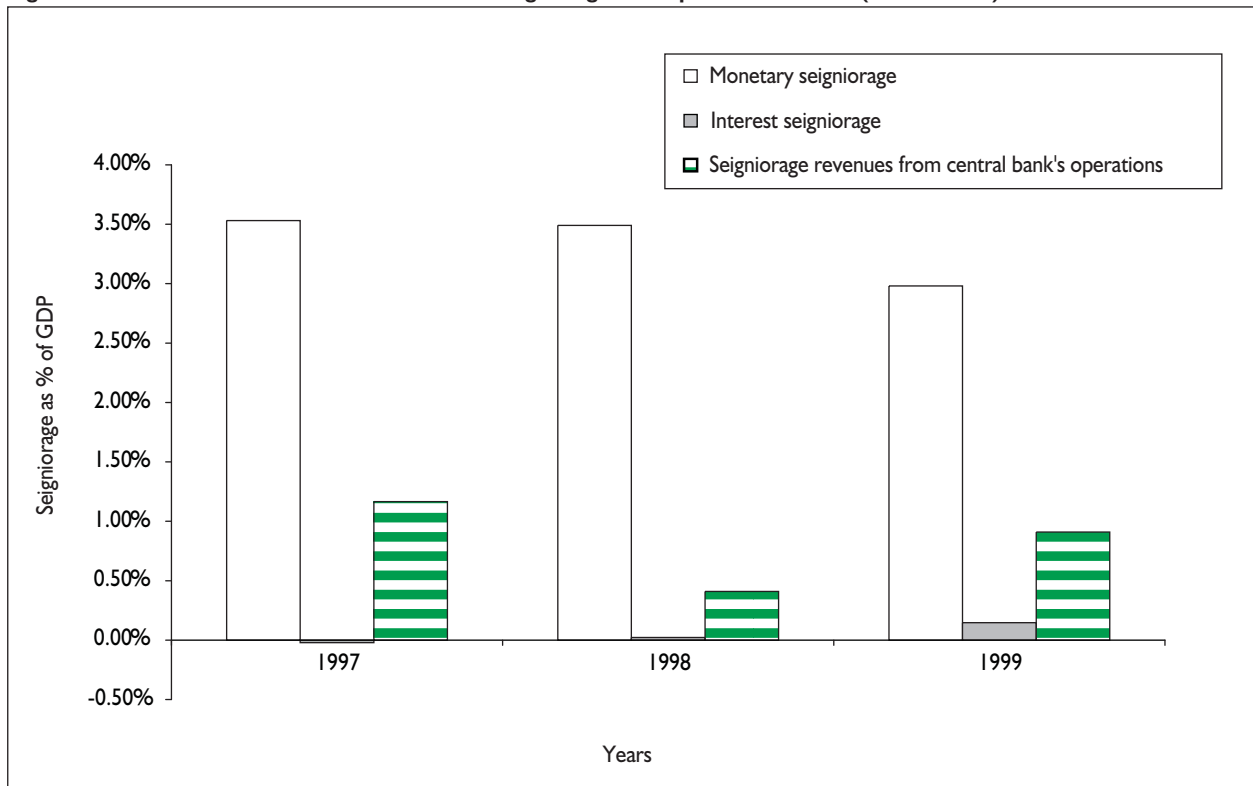
Figure 2b. Sources of the central bank seigniorage in analyzed Caucasus and Central Asian countries in the period 1996–1999 (as % of GDP) – Kyrgyzstan

Figure 3. Sources of the National Bank of Belarus seigniorage in the period 1996–1999 (as % of GDP)

response to the high current account deficit) [13] with a relatively small decline in the total gross seigniorage.

The increase in the scope of the budget deficit financing accompanied by a decrease in monetary base can be explained by the activities of the Czech National Bank (CNB) during the period of exchange market disturbances and the change of the exchange rate regime (the first part of 1997). For 1997, Figures 1 (a) and 4 (a) show huge revenues from central bank operations and more or less the same level of the central bank operation costs as in the preceding years. This suggests that in 1997 the CNB accumulated foreign assets before devaluation and sold them just after devaluation with a big profit (the net investment in non-government assets was still positive but rather modest). A large profit from financial operations allowed the CNB to reduce the monetary base and at the same time to increase the flow of resources to the budget, i.e., fiscal seigniorage (see Figure 4 (a)).

Poland

The process of the transformation to the market economy in Poland started in 1989. The main economic reforms initiated at that time included: market liberalization, privatization of the state properties, and macroeconomic stabilization. The first indicators of macroeconomic stabilization appears in 1992. In the period 1993–1996 positive trends accelerated (the rate of economic growth in 1995 amounted to 7%, export increased, and private sector has been developed). In 1997, the rate of economic growth was again close to 7% (6,9%), GDP per capita reached the level of 3500USD, private sector produced 65% of GDP, and annual average inflation decreased to 13,2%. Good economic results have been magnified by high domestic demand, and relatively good financial conditions of enterprises and households. Selected economic indicators from the period 1994–1997 are presented in Table 4.

Table 4. Selected economic indicators (1994–1997)

	1994	1995	1996	1997
Real GDP growth (year to year)	5.2%	7.0%	6.1%	6.9%
Inflation (CPI)	29.5%	21.6%	18.5%	13.2%
Trade balance (USD bn)	-0.8	-1.8	-8.2	-16.0
Current account balance (USD bn)	2.3	5.5	-1.4	-4.3
Budget deficit (% GDP)	-2.8%	-2.6%	-2.5%	-1.4%
International reserves (USD bn)	5.8	15.0	17.8	20.7

[13] Current account deficit in 1997 was about 7.9%

Figure 4a. Distribution of the total gross seigniorage in analyzed CEE countries in the period 1994–1997 (as % of GDP) – Czech Republik
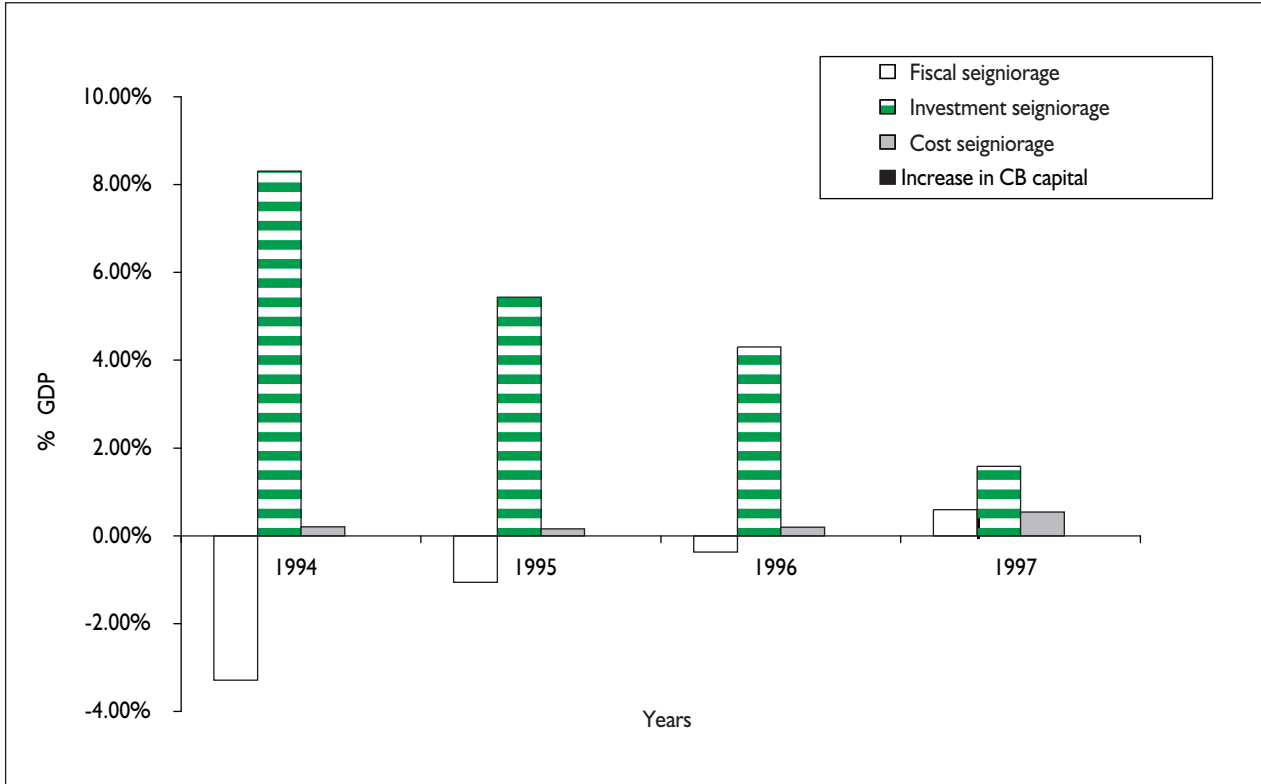
Figure 4b. Distribution of the total gross seigniorage in analyzed CEE countries in the period 1994–1997 (as % of GDP) – Poland
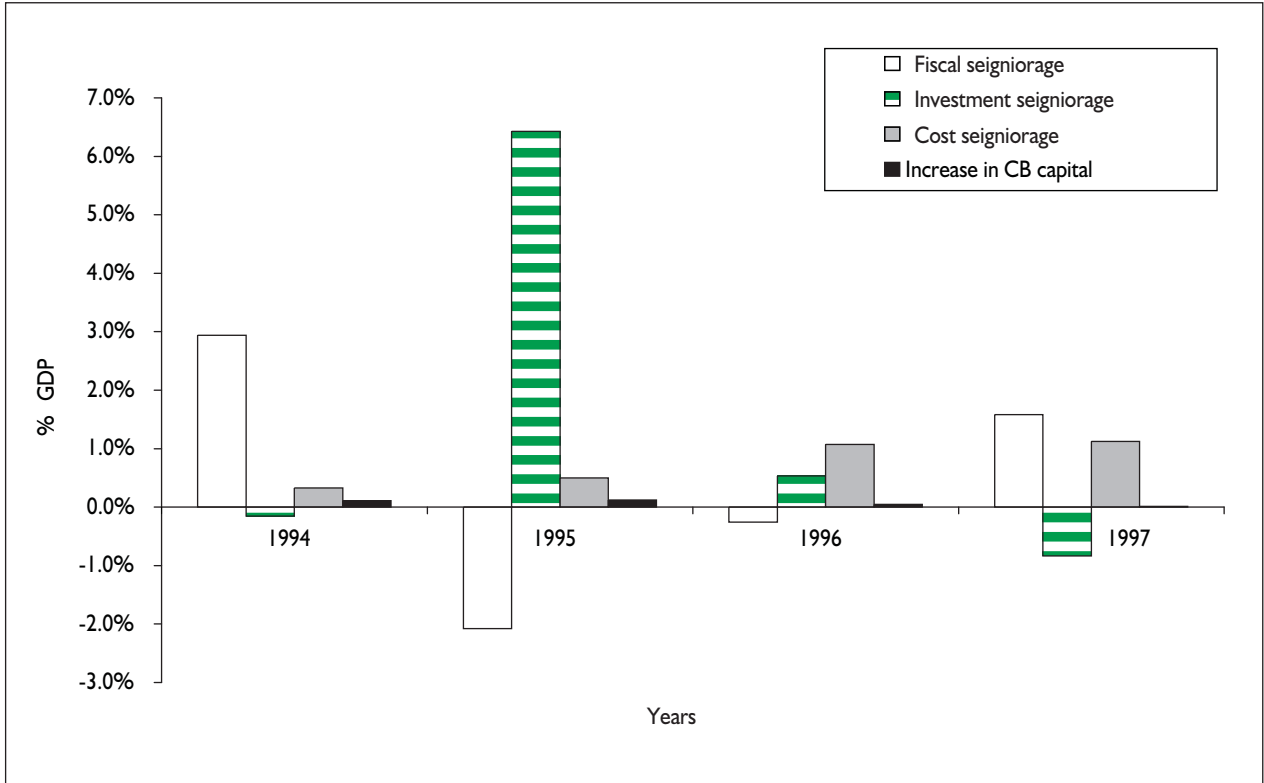
Figure 5a. Distribution of the total gross seigniorage in analyzed Caucasus and Central Asian countries in the period 1996-1999 (as % of GDP) – Georgia
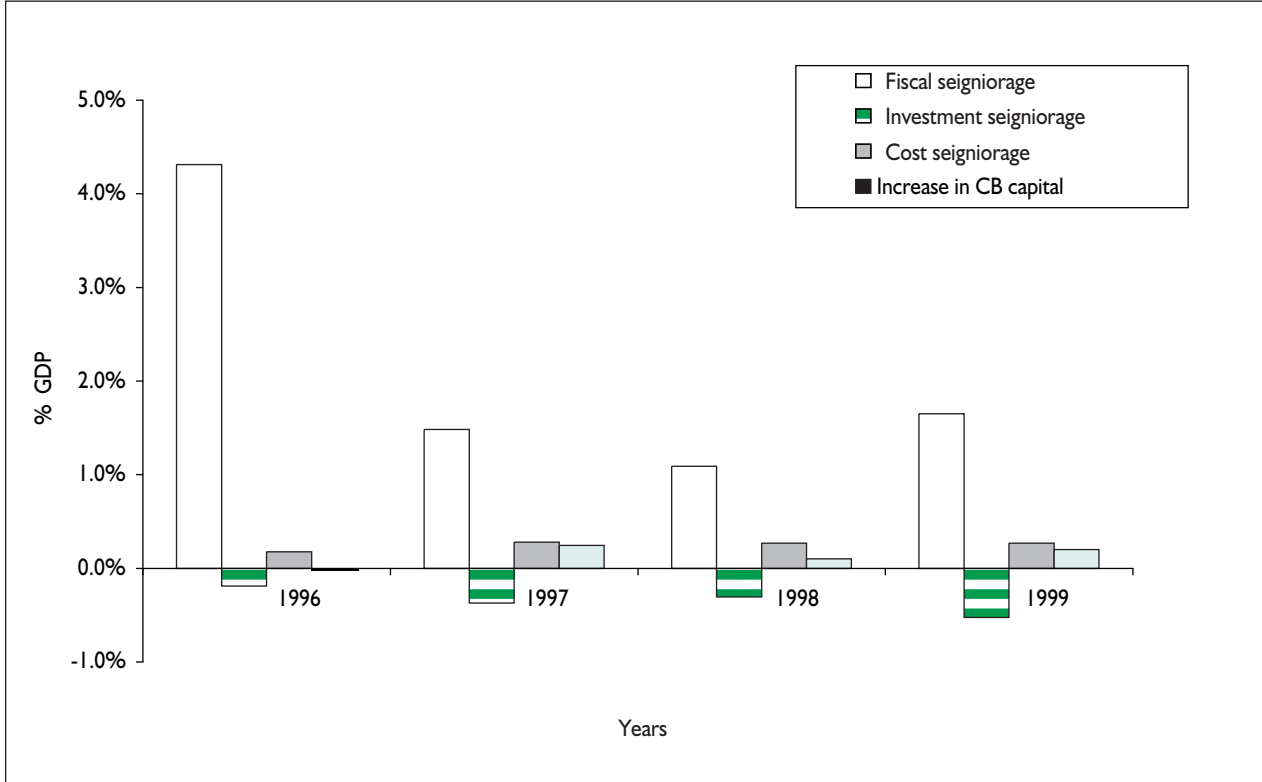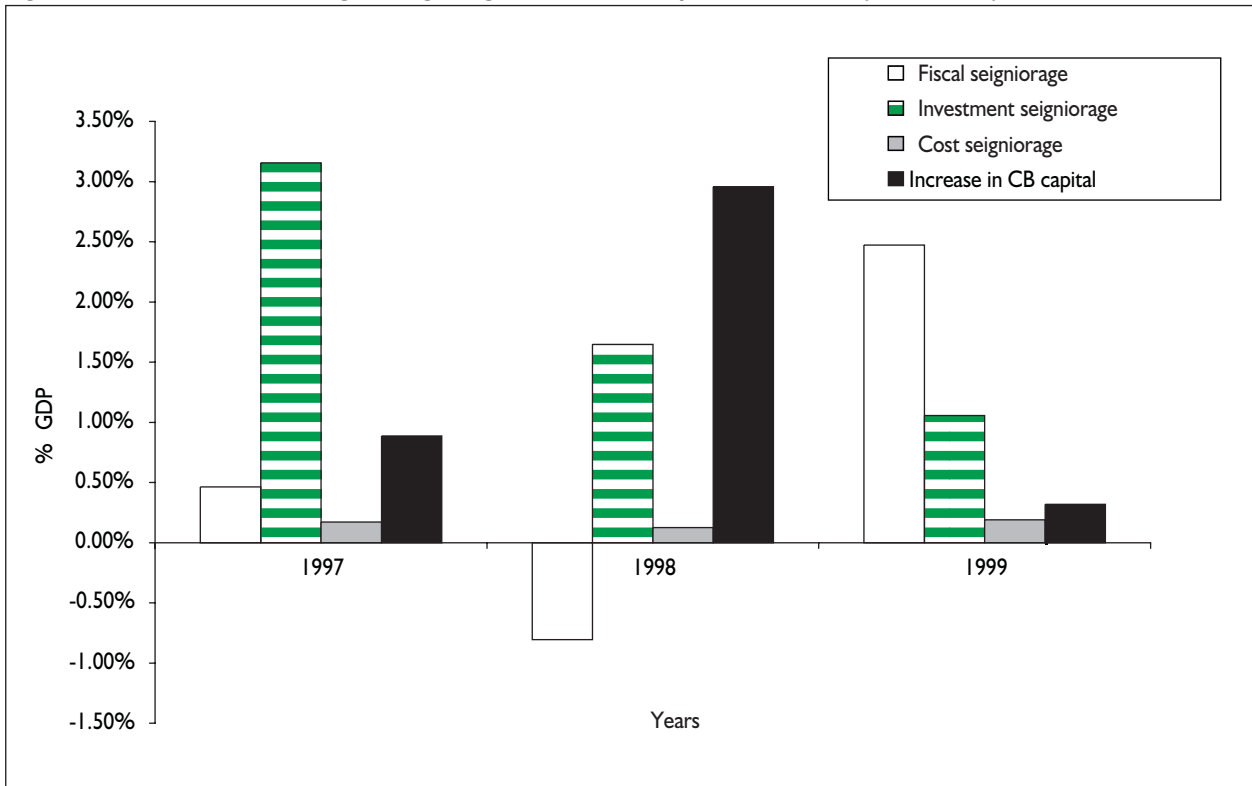
Figure 5b. Distribution of the total gross seigniorage in analyzed Caucasus and Central Asian countries in the period 1996–1999 (as % of GDP) – Kyrgyzstan

Figure 6. Distribution of the total gross seigniorage in Belarus in the period 1997–1999 (as % of GDP)

In spite of the fact that in the first half of nineties certain macroeconomic stabilization was achieved, the large deficit of the public sector still determined monetary growth and relatively high inflation rates. Moreover, although, at this time, the system in Poland has been already reformed [14] (in particular, National Bank of Poland changed administrative decisions to monetary policy instruments), in common opinion, seigniorage revenues and the inflation tax played an important role in financing large fiscal deficits.

Our estimations show (see Table 1, and Figures 1 and 4), that in contrast to the common belief that in most transitional economies revenues from money creation play a significant budgetary role [see, e.g., Budina 1997], in Poland seigniorage revenues have not been extensively used as a tool for financing government expenditures (in particular, in 1995 and 1996 values of fiscal seigniorage have been negative). It has to be noticed that even if in 1995 the value of monetary seigniorage increased, the value of the fiscal seigniorage decreased (due to significant increase of foreign assets). This is because monetary seigniorage corresponds to fiscal seigniorage only if investment seigniorage is close to zero (as in 1994). In all other years, positive values of investment seigniorage were accompanied by smaller values of fiscal seigniorage (years 1995 and 1996). Note, that in both cases monetary seigniorage does not reflect the flow of seigniorage revenues.

Georgia

In the aftermath of the breakdown of the Soviet Union, internal armed conflict and the war in Abkhazia, during the first years of independence Georgia experienced significant economic crisis. In 1992–1993 GDP reduced almost by 70%. The economy shifted to the shadow sector. The government unable to collect taxes had to get external debt resulting in significant foreign outstanding arrears. In the same time huge monetary emissions caused hyperinflation (percentage change in end-year consumer prices amounted about 7488% in 1993 and 6474% in 1994).

In 1994 government initiated the process of intensive system transformation based on, in general terms, a transition to a market economy and involved economic liberalization accompanied by the privatization of the state-owned sector. In 1995 national currency – lari (GEL) was introduced and a number of reforms were implemented to stabilize and liberalize the Georgian economy. Subsequent

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[14] Reform of the Polish banking system began in 1989, when the basis for two-tier system (the central bank and commercial banks) was introduced. In 1989 the Sejm adopted a new Banking Act and the National Bank of Poland Act. These two acts were replaced in 1997 with a new legislation which adopted banking regulations to the new environment in which banks now have to operate and prepared the banking sector to the future accession to the European Union. In particular, the National Bank of Poland Act of August 1997 specifies the organisation and responsibilities of the central bank and its agencies.

macroeconomic reforms aimed at strengthening the budget, enforcing national currency stability, reducing inflation rate and ensuring economic growth.

In the following years significant progress has been achieved in establishing macroeconomic stability. Inflation has sharply fallen and reached the level of 10.9% in 1999. After a massive output decline, real GDP started to increase, showed solid growth in 1996 and 1997 (11,2% and 10,8%, respectively) and stabilized at the level of about 3% in 1998 and 1999. Deficit of the state budget decreased from 6,8% of GDP in 1996 to 3,7% of GDP in 1999 (3,9% of GDP in 1998).

Reforms of tax legislation, and as a result, improvement of the tax base played a substantial role in realization of tax and fiscal program. However, notwithstanding the rate of improvement in budgetary revenue collection, there are still serious difficulties. The main reasons for budget revenues shortfall are: The shadow economy, tax evasion, low level of registration, as well as the poor financial conditions of enterprises and organizations. Deficit financing in Georgia is carried out mainly through loans from the National Bank of Georgia (by direct borrowing) and loans from abroad (mainly from international organizations). We have to note that the credits from NBG are critical for financing the deficit of the state budget. In particular, in 1996 about 73% of the budget deficit (5,2% of GDP) has been financed by NBG. In subsequent years budgetary revenues from NBG decreased but still remained significant (about 3,0%, 1,4% and 2,7% of GDP, respectively). On the other hand in the period considered the monetary policy of the National Bank of Georgia, aimed to achieve economic growth with minimal inflation, was rather strict.

As a result of very tight monetary policy, in last few years the National Bank of Georgia has mainly been supplying money through direct credits to the government and very rarely played a role of a lender of last resort. In 1998, out of the total credits of 294,1 million GEL 97,6% represented credits to the government and only 2,4% went to commercial banks. In 1999 the total credits to commercial banks were even lower (i.e., in 1999 of 147,2 million GEL total credit, 146,7 million lari (99,7%) was issued to the government, and only 0,5 million GEL (0,3%) to commercial banks). On the other hand the minimum reserve requirement increased in 1998 from 12% to 16%. In 1999 the stock of net claims on the government and its growth exceeded corresponding targets defined by IMF.

As mentioned above, although the main policy instrument used by the NBG was direct lending to the government this practice did not have much influence on the yearly inflation. This is because, only part of the transfers from the National Bank of Georgia to the government resulted from relatively restricted money supply. Taking into account that the NBG´s flow balance sheet can be written as

$$\Delta A_t^{F} + \Delta A_t^{P} + \Delta A_t^{G} + \Delta A_t^{fixed} = \Delta M_t + \Delta K_t \qquad (19)$$

where the left hand sums the changes in net foreign assets (ΔA_t^{F}), in loans to the private sector (ΔA_t^{P}), loans to the government (net of government deposits, ΔA_t^{G}) and fixed assets of NBG (ΔA_t^{fixed}); the right hand side sums changes in the monetary base (ΔM_t) and the NBG total capital accounts(ΔM_t);

and presented as in Table 5, it becomes clear that the other part of an extensive credits to government was financed by the reduction in of net assets of NBG (mainly net international assets).

The shares of these two sources in the financing of the budget deficit in the subsequent years of the period considered are presented in Table 6 (the monetary seigniorage and the revenues from the reduction of net assets are definitely the main sources of the financing of the budget deficit, moreover, in some years, e.g., 1998 and 1999, revenues from these sources have been used for the financing of other expenses of NBG).

Table 5. Flow balance sheet of National Bank of Georgia for the period 1996–1999 (in million GEL)

	1996	1997	1998	1999
Change in net foreign assets	-141.10	-12.82	-233.47	-45.69
+				
Change in loans to the private sector	-0.99	-27.39	39.73	40.97
+				
Change in loans to the government (net of government deposits)	194.87	131.22	172.14	65.70
+				
Change in fixed assets of NBG	3.77	0.99	4.73	9.41
=				
Change in monetary base	51.61	76.96	7.47	70.39
+				
Change in capital and reserves	4.93	15.05	-24.34	0.00

As shown in Table 5, in the whole period considered revenues from NBG were significantly used for government purposes. Fiscal seigniorage in the considered period amounted about 5,2% of GDP in 1996, 3% in 1997, 1,4% in 1998 and 2,7% of GDP in

Table 6. The shares of the monetary seigniorage and revenues from the reduction of net assets in the financing of the budget deficit

	1996	1997	1998	1999
Deficit of the state budget (% of GDP)	6.8%	6.1%	3.9%	3.7%
Fiscal seigniorage (in % of GDP)	5.2%	3.0%	1.4%	2.7%
Share of NBG in financing budget deficit	76%	49%	36%	72%
Monetary seigniorage as a percentage of fiscal seigniorage	26%	57%	11%	46%
Share of the revenues from the reduction of net assets as a percentage of fiscal seigniorage	70%	16%	104%	100%

1999. Reduction of the non government debt hold by NBG was the main source of the budgetary revenue from the central bank [15]. In 1996 about 70% of the budgetary revenues from central bank was financed by the decrease in non government debt hold by NBG. In 1998 NBG used resources from the reduction of the domestic private sector and foreign debt not only to increase credit to the government but also to cover other losses (in 1998 the decrease in non government debt hold by NBG amounted exceeded the budgetary revenues from central bank by 15%).

We have to stress that, the extended financing of the deficit of the state budget by the NBG is still costly. It does not result in higher inflation (because of restricted money supply), but it mainly reduces net assets of the National Bank of Georgia. Since the stock of international and private domestic assets hold by NBG is limited, in long run the only way how NBG can finance the deficit of the state budget to the similar extend is to use monetary seigniorage. This, however, will have to be accompanied by significant growth of monetary base and will cause a danger of large inflation.

Kyrgyzstan

Kyrgyzstan was considered as one of the poorest republics in the former Soviet Union. In that time it's economy to large extend was dependent from the subsidies from Moscow. Break down of the USSR and it's central planning system caused breaks of cooperative links between republics and enterprises, what resulted in significant fall of production, fiscal problems and inflation. In the first years of independence (until 1995)

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[15] It has to be mentioned that the reduction in the non government debt has been estimated as a residual, and consequently, it accommodates all possible errors in the data used. Nevertheless, we believe that the numbers presented are significant enough to represent an actual trend.

GDP of the Kyrgyz Republic decreased on about 50%. Budget deficit increased to 13,4% of GDP in 1992, 13,6% in 1993, and to 7,7% and 11,8% of GDP in subsequent years. As a result inflation reached the level of 178,9% in 1991, 1258,7% in 1992, 1491,7% in 1993, and 87,2% and 31,9% in two following years. Significant fall in inflation in 1995 resulted mainly from successful implementation of the program of market reforms (tight monetary and fiscal policy, economic liberalization, legal changes supporting the development of the private sector, etc.).

As mentioned in the introduction, in common opinion seigniorage revenues from National Bank of the Kyrgyz Republic (NBKR), play significant role in the financing of the budget deficit. However, out estimations presented in the Table 7 show that starting from 1997 budget revenues from NBKR have not exceed 1,7% of GDP (1,5% of GDP in 1997, 1,1% in 1998, 1,7% of GDP in 1999).

Table 7. Fiscal seigniorage, budget deficit and inflation in Kyrgyzstan in the period 1996–1999

	1996	1997	1998	1999
Fiscal seigniorage (% GDP)	4.3%	1.5%	1.1%	1.7%
Budget deficit (% GDP)	5.4%	5.2%	3.0%	2.5%
Inflation (% to previous year)	34.6%	13.0%	16.8%	39.9%

Moreover, the data presented in Table 7 do not show any link between the level of inflation and fiscal seigniorage (i.e., the amount of the resources transferred from NBKR to the budget). In the period 1997–1998, for example, relatively low inflation corresponds to higher amounts of the resources transferred to the budget. The opposite situation has been observed in 1996 and 1999 when higher inflation was associated with lower amounts of fiscal seigniorage. Consequently, one can conclude that fiscal seigniorage to large extend depends on the central bank policy and not always is linked to the inflationary increase in monetary base. In particular, as it follows from the figure 5(b), in the years 1996, 1997, 1999 the large part of the resources transferred from NBKR to the budget came from the reduction of the investment expenditures.

Belarus

After break down of the USSR, similar to other former soviet republics, economic situation in Belarus, was not good at all. One reason for this was an economic specialization of soviet republics, which resulted in the Belarussian industry structure dominated by enterprises producing low quality products or semi-products sold to other republics or to other communist countries (large part of all enterprises produced for

needs of the military sector). Slow reforms at the beginning of nineties did not change the situation inherited from soviet era. It has to be mentioned, that in the period 1994–1995 small progress in macroeconomic sphere was observed. However, real political and economic liberalization, similar to that in Central European countries, has never occurred in Belarus. Moreover, in the last few years under the leadership of the president Lukashenka significant regress in political and economic reforms was observed.

On the other hand, after serious fall in GDP during the period 1990–1995 (on about 40%), starting from 1996 official statistics show economic growth (the growth rate of real GDP in 1996 amounted to 2,8%, in 1997 – 11%, in 1998 – 84%, and 3,4% in 1999). It has to be mentioned that during this period state engagement into economics (state subsidies, credits, etc.) increased significantly. Budget revenues after significant fall in 1995–1994 (to 40% of GDP) increased in the period 1997–1998 to the level of 45% GDP (Antczak et al. 2000). At the same time government expenditures after initial fall to the level 42–43% of GDP increased to the level of 46– 47% GDP in the years 1997–1998. Budget deficit in the period 1997–1999 amounted about 3% of GDP [16].

As shown in Table 3, only in 1999 revenues from National Bank of Belarus were significantly used for government purposes (fiscal seigniorage in the considered period amounted about 0,5% of GDP in 1997, -0,8% in 1998 and about 2,5% of GDP in 1999). In the same time, however, the scale of the monetary seigniorage was quite significant, i.e., about 3,5% of GDP in year 1997 and 1998, and about 3% in 1999. Thus, only small part of the central bank revenues from money creation has been used for the financing of the budget deficit. On the other hand, we have to stress that in the period considered according to the official data there was no need for extended financing of the budget deficit (deficit of the state budget was about 0,7% in 1997, 0,3% in 1998, and 3,3% in the first quarter of 1999) [17]. It follows from Figure 6, that the biggest part of the central bank revenues in the period analyzed has been used for the increase of the central bank credit to the private (i.e., non governmental) sector of the economy. However, taking into he definition of private sector in Belarus is rather vague (it includes both state-owned enterprises and households), therefore, we may suppose that majority of financial resources is transferred to broadly defined public sector. Thus, one has to be very careful with making simple conclusion about limited financing of the public sector from the sources of the National Bank of Belarus. Since the central bank with limited autonomy is required to extend credit directly to the enterprises or to the commercial banking sector on the request of the government, real financing of the public sector (using so called quasi-fiscal operations) is much higher (see Markiewicz (2000) for details). We have to

[16] See"Republic of Belarus: Recent Economic Development" IMF Staff Country Report No. 99/143
[17] Quasi-fiscal deficit in Belarus amounted to 2,9% and 3,0% of GDP in 1997 and 1998, respectively.

mention that according to the official documents of the National Bank of Belarus in the period considered central bank has been expected to provide directed credits to "private sector" according to requests of the state organizations, for such purposes as, for example, housing, development of agricultural sector, support of agricultural production, seeds purchasing, payment of the salaries for workers of state enterprises, state emergency, trade, etc [18]. Obviously, revenues from money creation are not enough to cover fiscal and quasi-fiscal (investment) expenditures of the National Bank of Belarus. The remaining part is covered from the other sources of central bank revenues, i.e., financial operations and book gains from exchange rate changes. Comparison of the total seigniorage with the sum of the fiscal seigniorage and net investment of the central in non governmental debt (which results from quasi-fiscal operations of National Bank of Belarus) is presented in Figure 7.

5. Comparative Analysis

Total revenues of the central banks in the countries under study in the period considered (as a per cent of GDP) are presented in Figure 8. Figure 9 shows the scale of the budget financing from the central bank in each country analyzed (in per cent of GDP). The scale of monetary seigniorage in the countries under study as a per cent of GDP (i.e., central bank revenue from the increase of monetary base) is presented in Figure 10.

Data presented in Figure 8 confirm a common opinion, that in the most transition countries the scale of central bank revenues associated with the monopoly power for monetary policy and monetary emissions is significant. Estimated values suggest that these revenues are usually much higher than 2% of GDP, and in extreme cases (see e.g., Belarus) they reach the level of 10% of GDP. It has to be stressed however, that the central banks seigniorage revenues decrease from year to year in all countries considered (accompanying the development of the transition process).

Moreover, it has to be noticed (see Figure 9) that revenues from central banks have not been widely used as the source of financing of the deficits of the public sector (with the exception of Belarus, where market reforms have not been started yet). In the countries advanced in market reforms (Czech Republic, Poland) budgetary revenues from the central banks in the second and the third year of the transformation have been negative, and in the next year relatively low. It has to be mentioned that in the countries

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[18] Estimation of the scale of quasi-fiscal operations of the National Bank of Belarus is beyond the scope of the present analysis.

Figure 7. Total seigniorage of the National Bank of Belarus and the scale of public sector financing in the period 1997–1999
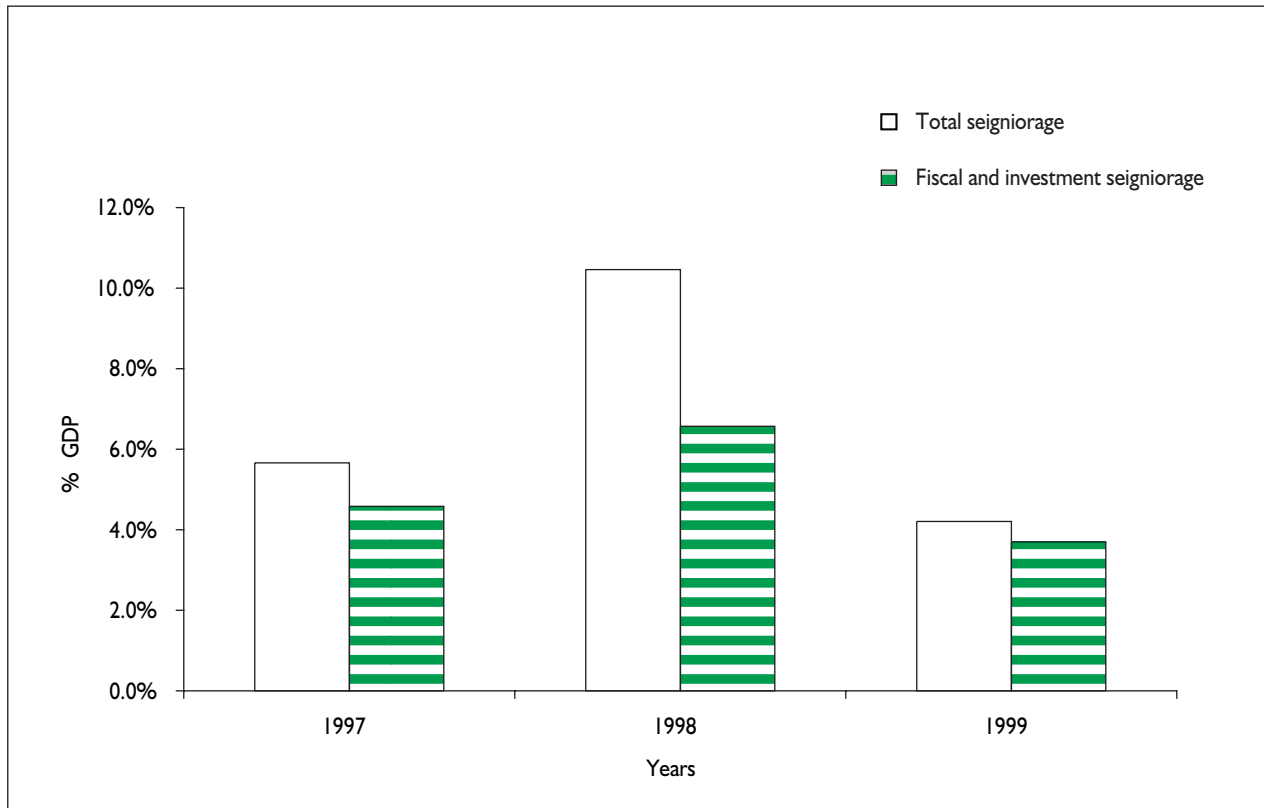
Figure 8. Revenues of the central banks (total gross seigniorage) in the countries under study (as % of GDP)
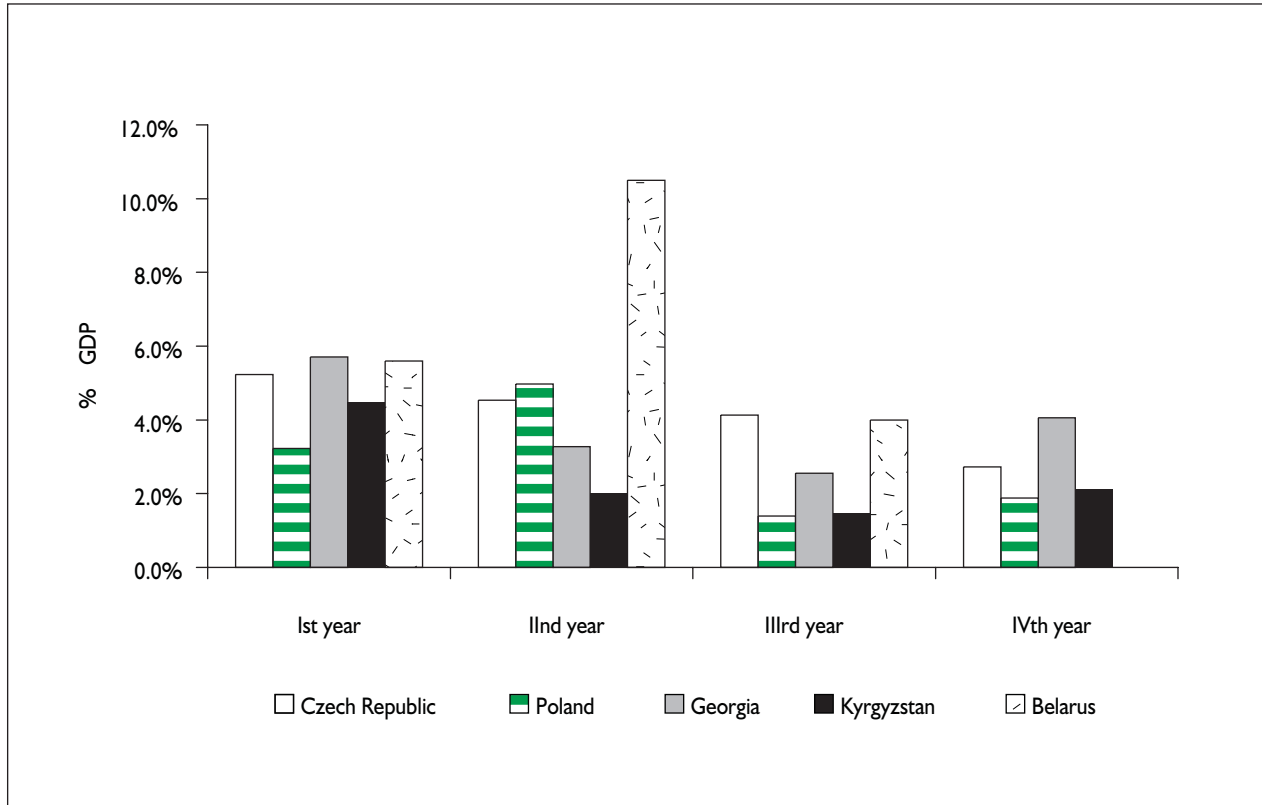
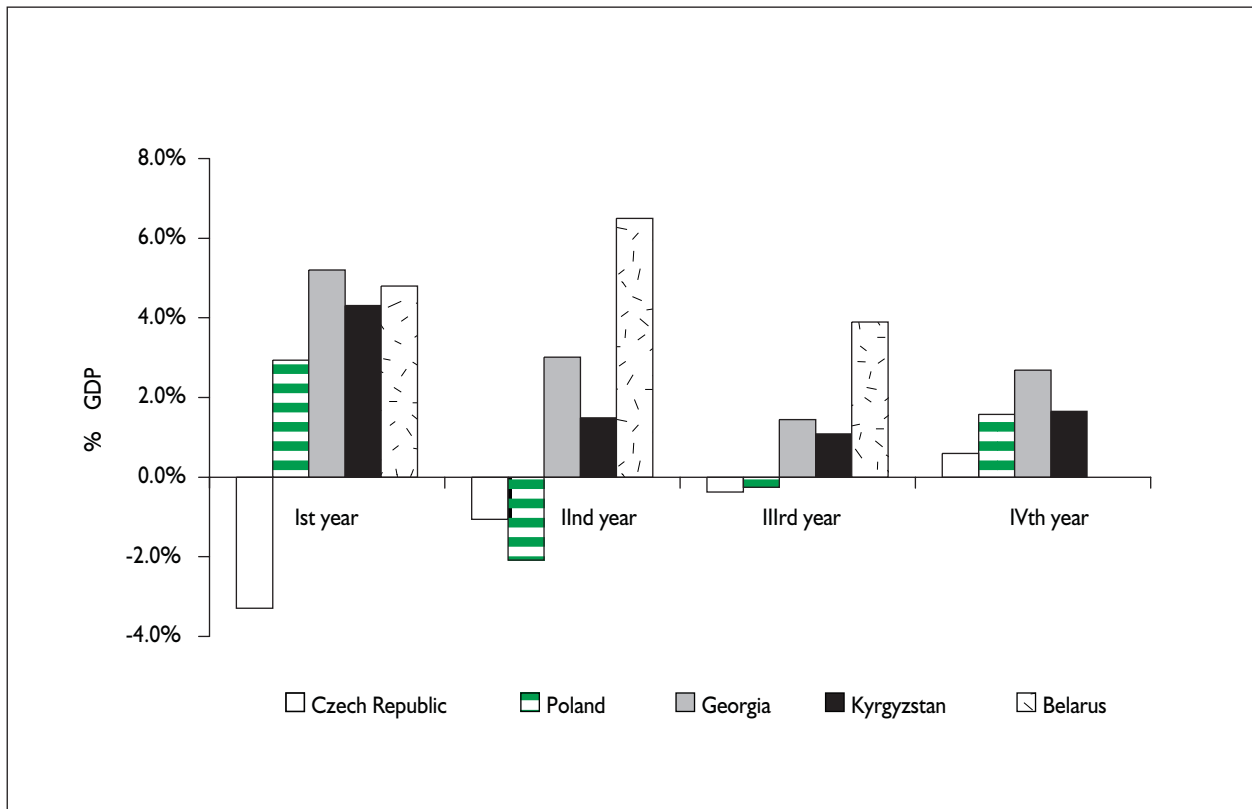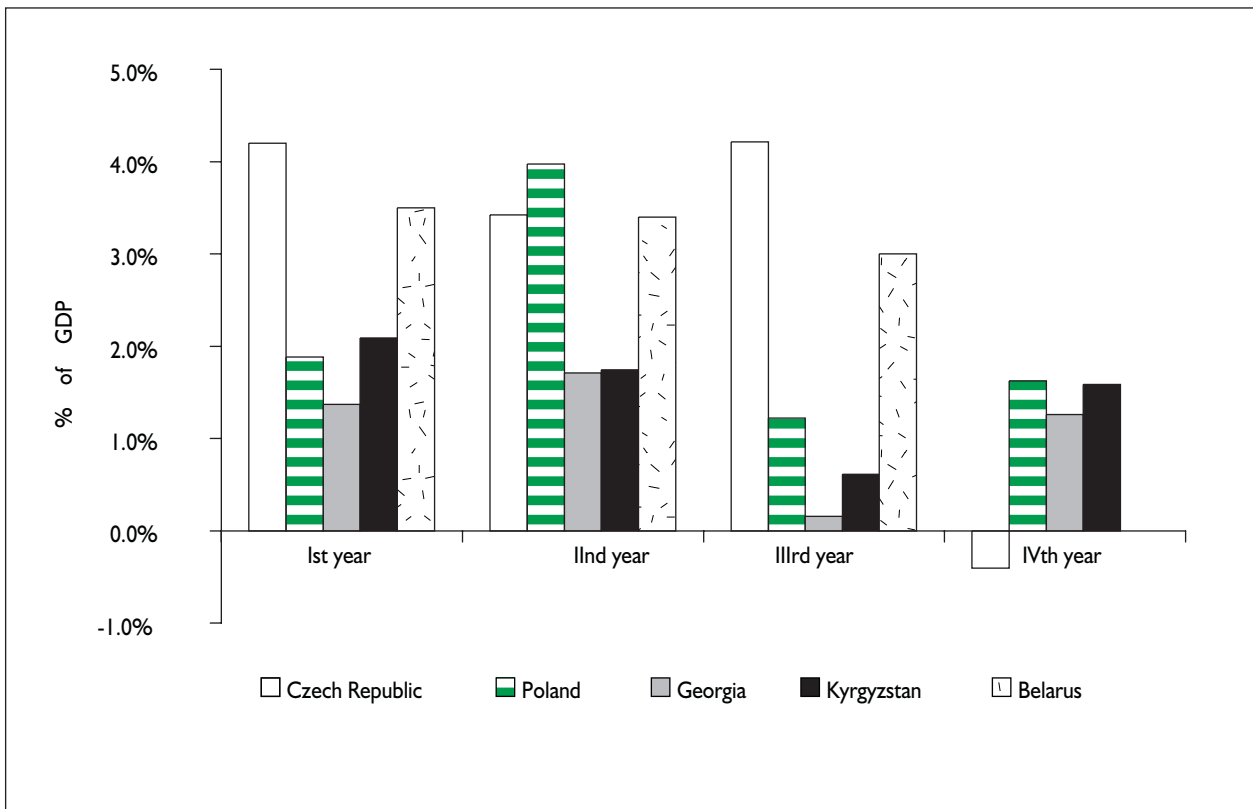**Figure 9. Scale of the budget financing from the central banks in the countries analyzed (% of GDP)**

Figure 10. The scale of monetary seigniorage in the countries under study as % of GDP

Legend: Czech Republic, Poland, Georgia, Kyrgyzstan, Belarus

less advanced in market reforms (Georgia, Kyrgyzstan) the scale of the resource transfer from central bank to the budget has been relatively higher, however, it also falls down from year to year.

Furthermore, it has to be stressed (see Figure 10) that in all countries considered the scale of the monetary seigniorage (resulting directly from the extension of the monetary base) was relatively large (up to 4% of GDP). The highest values of monetary seigniorage were observed in the first three years of transformation in the Czech Republic, where inflation was always relatively low. In the fourth year of the period analyzed, when some indicators of economic crisis started to be observed, monetary seigniorage in Czech Republic was negative. On the other hand, in Georgia and Kyrgyzstan, as a result of stabilization programs designed by international organizations (World Bank, and IMF) the amount of central bank revenues resulting directly from the creation of monetary base (monetary seigniorage) was relatively low (it did not exceed 2% of GDP).

We have to notice that monetary seigniorage corresponds to the revenues of the central bank from the extension of the monetary base only, and does not reflect the flow of resources transferred from the central bank to the budget (see Figure 9 and 10). The values of the monetary seigniorage and fiscal seigniorage are equal to each other only if net investment and other expenditures (e.g., net credits to private sector) are close to zero. Since such situation is not typical for countries in transition, in transitional economies monetary seigniorage definitely does not reflect the flow of the resources from the central bank to the budget (i.e., fiscal seigniorage).

6. Conclusions

The analysis above presents the new view on the formation of the central banks revenues and transfers from the central banks to the budget in the selected transition countries. In particular, in contrary to other empirical studies, in the present analysis we have not relied on the simple concept of monetary seigniorage which measures the flow of the additional monetary base the government can issue, but instead we have used (1) a new concept of total gross seigniorage which measures the total flow to the government sector and (2) fiscal seigniorage which measures the portion of seigniorage received for budget financing.

Empirical analysis of sources of seigniorage revenues in the Czech Republic, Poland, Georgia, Kyrgyzstan and Belarus, presented in the paper has revealed that the monetary authorities' interest earnings on non-government debt (interest revenues) and revenues

from the central bank's operations are important components of total central bank revenues, and therefore, the conventional concept of monetary seigniorage does not always adequately measure the total flow of seigniorage. In particular, the results show that an estimation of the total central bank earnings by monetary seigniorage usually understates the total flow of seigniorage revenues. At the same time, the results indicate that monetary seigniorage should not be used as a proxy for the total flow to the government sector since it reflects fiscal seigniorage only if investment seigniorage is close to zero, something that is usually not the case in transition economies.

Moreover, in contrast to the common belief that in most transition economies revenues from money creation play a significant budgetary role, we found that in the period of relative macroeconomic stabilization in most of the countries analyzed revenues from the creation of money have never been extensively used as a tool for financing government expenditures. Nevertheless, we have to stress that the average flow of seigniorage revenues into the budget has been of a higher scope than in developed Western European countries.

Finally, it is important to stress that the results presented in this paper imply a weakening of the link between inflation and seigniorage. In particular, much like Klein and Neumann (1990), we would like to emphasize that the increase in a monetary base (and a country's inflation rate) does not automatically imply higher fiscal seigniorage revenues. Nor does the inverse necessarily hold, i.e., a decrease in a monetary base (associated with a decrease in the rate of inflation) does not automatically imply smaller seigniorage revenues for budget deficit financing. An increase in the scope of budget deficit financing can be achieved by increasing the central bank's efficiency instead of by raising the rate of inflation.

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