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**Central Bank Independence and
Inflation Performance in Transition Economies:
New Evidence from a Primary Data Approach**

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Biography:

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Abstract

In this paper we investigate the impact of Central Bank Independence (CBI) on average inflation and inflation variability for 22 transition economies over the time period of 1991-2003. We devise a new index to represent actual CBI rather then legislative independence. The empirical evidence suggests that Central Bank Independence lowers both average inflation and inflation variability.

Keywords: Transition economies, Central Bank Independence, Inflation, Panel Data

JEL Classifications: C23, E31, E58

1. Introduction

This paper addresses the impact of the central banks institutional reforms in the transition economies from Central and Eastern Europe and the Commonwealth of the Independent States on the inflation performance. This issue has been examined in details in the advanced economies however no firm relationship between central bank designs and inflation performance has been found in developing and transition economies.

The newly established central banks in transition economies followed the monetary design of the European Central Bank (ECB). This has become particularly evident in the middle and late 1990s when most of the legislative reforms resulted in increased independence of the central banks from the central governments.

The rationale behind this trend of increased CBI is multi-fold: for some transition economies it stems from their desire to join the European Union and the *acquis communautaire* that should be adopted by the applicant countries. Another incentive comes from the International financial institutions, e.g. the World Bank and the International Monetary Fund (IMF), where loans are conditional unless the necessary criteria are met. National governments, on the other hand, to better demonstrate the progress of the conducted reforms in the country are likely to use the CBI to signal foreign investors the nation's creditworthiness to potential investors. Following Maxfield (1997) the above stems from: (i) the larger their country's need for balance of payments support, (ii) the greater the expected effectiveness of signalling, (iii) the more secure the tenure of the politicians, and (iv) the fewer their country's restrictions on financial transactions.

This paper aims to provide a comprehensive measurement of CBI in transition economies which reflects the idiosyncrasy of the economies in question. Second, it aims to measure the impact of CBI on inflation performance (average inflation and inflation variance).

The rest of the paper is organised in the following way: Section 2 looks at the prerequisites for CBI in transition economies and compares the legislative design of the central banks with the Statute of the ECB. It shows that following the legislative approach towards the CBI, all the transition economies in this sample, with a few exceptions, have highly independent central banks. It provides a discussion of the institutional reforms in twenty-two transition economies. The sample covers all the Central and East European countries (CEE) except Yugoslavia and Montenegro and several countries from the Commonwealth of Independent States (CIS).

Section 3 outlines the need for new index to quantify CBI and it introduces the index proposed. Comparisons between different CBI indices used in transition economies are made. The results and the empirical part are presented in Section 4 where we investigate the hypothesis that the CBI can explain the behaviour of inflation and the variability of inflation in transition economies. Finally Section 5 concludes this paper.

2. Institutional Developments in Transition Economies

The constitution of the Bundesbank, which gave the design of the ECB, was widely used as a model for designing the new central banks in most of the transition economies. The Bundesbank provided the practical example of an independent central bank that maintained low average inflation during the post-war period[1]. Another rationale of having an independent central bank, as mentioned earlier, stems from the desire of the applicant country for an earlier accession to the EU. The section below compares the legislative framework of the central banks in transition economies with the Statute of the ECB aiming to capture the legislative similarities between them. It thus attempts to outline the causes behind the deficiency of the indices based on the legislative approach *per se* when applied to measure the CBI in transition economies.

2.1 Central bank independence as a legislative provision in transition economies

The literature on CBI is related to the work of Barro and Gordon (1983) and Rogoff (1985), arguing that central governments are tempted to 'sacrifice' long-term welfare for sake of short-run political gains. Therefore establishing a politically independent central bank is a prerequisite for lower average inflation. In line with these studies, Alesina and Grilli (1992) show, that following Rogoff's delegation (1985), the European median voter has an incentive to appoint central bankers who are more 'inflation-averse' than are the voters *per se*. In line with the above, the Maastricht Treaty granted the ECB with a degree of independence widely regarded as comparable to the Bundesbank. Article 108 of the Treaty declares that:

> *'… neither ECB, nor a national central bank, nor any member of their decision making bodies shall seek or take instructions from Community institutions or bodies, from government of a Member State or from any other body'.*

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[1] Broadly referenced is the Swiss Bank, which similarly to the Bundesbank is highly independent and has maintained very low average inflation.

In addition, the *acquis communautaire* of Stage 2 of the European Monetary Union, which must be adopted by new member states required:

> '... *Central Bank independence, co-ordination of economic policies, and adherence to the relevant provisions of the 'Stability and Growth Pact'. New member states will have to forego any direct central bank financing of public sector deficits as well as privileged access of public authorities to financial institutions.*'[2]

The independence of the central bank is therefore stated in the legislative provision in almost all the transition countries participating in this survey. Countries with sooner accession have greater incentives to grant their central banks with greater independence. Specific aspects of the legal independence are explored in the sections below.

2.2 Autonomy of the monetary policy formulation

Following Grilli *et al.* (1991), the political independence of the central bank relates to its ability to choose autonomously objectives and make decisions on monetary policy. The statute of the ECB only allows a member of the European Commission to participate, without having voting or veto rights, in meetings of the General Council[3]. Furthermore, the statute does not envisage a formal approval of monetary policy. Seventeen transition economies' banks (out of 22) in this study report that there has not been any interference from central government in formulation of monetary policy and only eleven banks state that there is not governmental or political control of the central bank's budget.

Attaining monetary policy autonomy depends on the term of office of central bankers, which must be sufficiently long to avoid the patronage involved in renewal of the term of office. The Executive Committee of ECB is appointed for as eight-year period of time. In our opinion the actual term of office is not important provided it is longer than the maximum term of office of the central government. The term of office of the central bank governor exceeds the longest of the central government in nineteen countries (except for Armenia, Azerbaijan, Bosnia and Herzegovina[4] and

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[2] European Commission, Agenda 2000, Supplement 13/97, p.44.
[3] General Council is constituted as a third decision-making body of the ECB, comprised by the President, Vice president and the Governors of the national central banks (Chapter IX, Art. 45 of the Protocol on the Statute of European System of Central Banks and the European Central Bank).
[4] The central Bank of Bosnia and Herzegovina provides a very unusual case. It operates as Currency Board Arrangement and according to the charter, the Governor for the first six years must be a foreigner. The appointment is by the Managing Director of the International Monetary Fund with the approval of the Presidency.

Kazakhstan). Regarding the term of office of the Bank's Board, this principle is kept in sixteen countries. The term of office in transition countries in our sample varies between five and eight years[5].

Another important feature is whether there are non-completions of the term of office of the central governor. Cukierman (1992) uses the turnover rate of central bank governors as a proxy for actual independence. His presumption is that a higher turnover of central bank governors indicates lower CBI. Thirteen transition countries in this sample report one or more non-completions of the term of office of their central bank governors.

However, this question allows different interpretations and the practices of different countries' banks provide interesting examples. Quite unique is the case of the Czech National Bank (CNB)[6]. Officially the Bank's governors have not completed their mandates as governors and as such no one ended the term of office in advance or being released by the government or Parliament. Drawing upon the CNB Act it is the president only empowered to dismiss governor and the CNB board members. However, the reality behind is rather different: in fact, there has been one governor only, Mr. Josef Tosovsky, since 1990. From January 1990 to December 1992 he headed the central bank of former Czechoslovakia, so he finished his office in advance (the term of office was 6 years) because of the split of Czechoslovakia at the end of 1992. He was then re-appointed for another six years by the president as a governor of the newly established CNB. In December 1997 he resigned due to the political turbulences in Czech Republic to take the post of a prime minister of the so-called "non-political" or "bureaucratic" government, replacing Vaclav Klaus in his office. The CNB was without governor from January 1998 until July 1998. Following the early elections in June 1998, when social democrats came to power, Tosovsky has been appointed as the governor again (since July 1998).

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[5] It used to be eight years term of office in Romania, but with the recent amendments it was reduced to 6 years.
[6] The author is indebted to Pavel Soukup for his interesting comments on the independence of the Czech National Bank.

2.3 Objectives

The rationale of a single policy objective instead a plurality of objectives is to eliminate the scope for central governments to interfere with demand for short-run objectives aiming at short-run output before election period**.** The primary objective of the European System of Central Banks (ESCB), as stated in Article 105 of the Treaty, is to maintain price stability. Article 14 of the Treaty obliges the member states to ensure that the statutes of its national bank are compatible with the provisions of the Treaty. This resulted in reforms that started in central banks' statutes across the European Union (EU) member-states as well as in the associate members from Central and Eastern Europe. This tendency is revealed by the legislative amendments to the central banks' charters in transition economies like Hungary (1996), Czech Republic (with the 1995 amendment), Poland (1997), Bulgaria (1997) and others. Nearly all CEE countries have closely modelled their legislation on the ECB and there are many legislative similarities. Regarding the primary objective, with a few exceptions (Armenia, Azerbaijan and Estonia), the transition economies in this sample chose the maintenance of price stability. Least is the bank's independence with regard to the autonomy of the Bank's budget, which is a subject of political or governmental control, which is the case for half of the banks in our sample.

2.4 Financing the Central Government

This section concerns the economic independence of the central bank (as formulated by Grilli *et al.* (1991), i.e. the ability of the central bank to choose the monetary instruments in pursuing its goals without government interference.

The most significant constraint is with regard to the use of monetary policy instruments related to financing the public deficit. Article 21.1 explicitly prohibits the ECB from participating in the primary market for public debt as well as any type of credit facility 'in favour of Community institutions or bodies, central governments, regional, local or other public authorities, other bodies governed by public law, or public undertakings of Member States'. However, eleven countries' banks only in this sample do not provide advances for financing the central government and thirteen central banks do not participate in the primary market for public debt.

2.5 Banking supervision

According to its Statutes the ECB is not envisaged to play an important supervisory role. Just two central banks in our sample (Hungary and Bosnia and Herzegovina) have separate agencies for prudential supervision of the financial institutions. However there is not a consensus in the economic literature whether the central bank should be involved in the commercial banks' supervision. Some economists believe that, as long as the central bank is acting as a lender of last resort, supervision should be entrusted to the central bank. Landau and Garber (1992) argue that if the central bank is lending to credit institutions, it should be responsible for the commercial banks' supervision. The rationale for this is that by delegating to the central bank a supervisory and regulatory role, it can accurately assess the solvency of eventual borrowers thereby defending its own interests.

Interference in the lender of last resort function of the central bank is an important aspect of CBI, especially in countries engaged in the privatisation of the banking sector or in countries where the banking sector is dominated by the state. In the face of a liquidity crisis, many transition governments are unwilling to allow state banks to go bankrupt, particularly if those banks are on the privatisation list. In countries retaining a major state banking sector, there is even less chance that a bankruptcy could take place. Most of the transition countries experienced such interference during the banking crises in the middle and late 1990s (early 1990s for Poland and the Baltic States, 1997 for Bulgaria, *etc.*)*.* The central bank then had to refinance the banks with liquidity problems at the cost of its anti-inflationary stance. More than one third of the countries in our sample indicated interference in the lender-of-last-resort function.

Summarising the sections above, the transition economies have fully embraced the current western approach and provided their central banks with considerable legislative independence from the central government. Many governments in transition economies are trying to fulfil the requirements imposed by the international institutions in order to obtain debt rescheduling, further loan facilities or/and sooner accession to the EU. Some governments in transition economies used to refer to decrees to oblige their central bank to absorb excess supply of government securities, although this may be in an explicit conflict with the central bank constitution. To demonstrate how successfully the economic transformation is progressing, the legislative system of the country is perfectly reflecting the recommendations given by international institutions, but in practice the parliament (or government) in the respective country used to issue 'other law' or decree which was applied when

the existing legislation was not appropriate for the goals of the government, examples of which are provided below.

In conclusion, the transition economies in this sample have central banks with very high legislative independence. On the other hand, the evidence from these countries suggests that their central banks often are pressed to follow instructions given by the government although they conflict the existing legislation. Therefore, in some countries, the legislative independence, taken on its own, does not reveal the true picture.

3. New CBI Index

The index introduced in this paper is broadly modelled on the one introduced by Grilli *et al.* (1991) but modified to capture the idiosyncrasy of transition economies. Most of the research on CBI in transition economies has been done during recent years. Dvorsky (2000) in her study on five CEE countries (Czech Republic, Hungary, Poland, Slovakia and Slovenia) updates the governors' turnover rate estimates of Radzyner and Riesinger (1997), aiming to measure the actual independence. Given the short period of observation (eleven years) the author warns that the estimates should be treated with caution. The countries in this sample show extremely low turnover rates (e.g. Slovenia is below the lower threshold, which is 0.25). The author concludes that the governors' turnover rate (introduced as a proxy for actual independence in developing countries by Cukierman 1992, p.383) does not reflect the actual CBI in transition economies. Earlier studies, such as Loungani and Sheets (1997), discovered an inverse relationship between their CBI index and the average inflation in 1993.

More light has been shed by the recent publications of Cukierman *et al.* (2000), Maliszewski (2000) and Hochreiter and Kowalski (2000). The latter authors examined the central banks' statutes in ten CEE countries (Bulgaria, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Romania, Slovenia and Slovak Republic) which except for Romania have adapted their legislation to resemble the one of the European Central Bank (ECB). Furthermore, the analysis of the CEE countries' central banks in question shows that the democratic accountability is comparable to the one of the ECB. In line with Hochreiter and Kowalski (2000), Cukierman *et al.* (2000, p. 10) extend the CBI study on 26 transition economies and conclude that "the levels of their legal independence are substantially higher, on average, than those of developed economies during the eighties".

Second, the indices used in the literature were designed for OECD countries and do not capture the picture in transition and developing economies. Referring to section two of this paper, transition economies have fully applied the legislation of the EU economies whereas the central bank practice there suggests that the rule of law is arguably observed. The section below introduces a new index of CBI, which aims to deal with limitations of previous indices when applied in non-OECD countries.

The assumption made when constructing the CBI index was that the legislative and actual independence might diverge when there are traditions in the country with the power of legislation, or existence of other legislation, which may conflict the central bank charter. These two aspects of CBI were taken into account when attempting to measure it. Furthermore, the understanding of the respondents is checked whenever possible and this is done by employing a triangulation technique.

3.1 Structure of the new index

The index provided in this section is structured into five categories: (i) objectives and policy formulation; (ii) appointments of the governor and board of the central bank; (iii) legislation and tradition; (iv) the banking sector; and (v) financing the government. The questions provided in each category approach the issues of independence from both a legislative and behavioural perspective. There is an attempt by the new indices to embrace the recommendation of Elgie and Thompson (1998) to allow comparisons to be made 'across time and across countries'.

The issues covered in the new CBI index are described below.

Objectives and policy formulation:

(i)   The objectives of each central bank are of key importance for its overall performance. Price stability as a sole objective of a bank is given priority by Grilli *et al*. (1991) and Cukierman *et al*. (1992) indices (respectively GMT and CWN) and is the major objective of the European Central Bank (ECB). This objective is also embedded in the legislative amendments of many central banks' charters in transition economies like Hungary, the Czech Republic (with the 1995 amendment), Poland (1997), Bulgaria (1997), Romania (1995) and others.

The reason for having one clearly identified objective instead of a plurality of objectives is to eliminate the possibility of governments intervening to exploit short-run trade-offs between

inflation and growth (or unemployment) before elections. Goodhart (1994) suggests that having price stability as a single objective may also reduce conflict between central banks' officials and monetarists over the most appropriate operational techniques.

(ii)   Autonomy of the policy formulation is another key feature of independent central banks. The five-year period chosen in this index is more or less the average term of office of governor or board. The rationale of selecting a certain period is that the maximum terms of office in different countries varies from country to country and it is usually from three to eight years. The last question in this cluster traces presence of governmental or political or other forms of control over the budget of the central bank. This issue has proved to be crucial for the Czech National Bank, where the independent budget of the Bank has been continuously debated in the Parliament. However, the suggested amendments in the Bank's charter, envisaging government's control over the Bank's budget, were finally overruled by the Supreme Court of the Czech Republic June 2001 as not being in line with the Constitution of the country. The second point traces for evidence of actual interference in the policy formulation coming from the government. Thus the score is based on what has actually happened rather than what is stated in the legislation.

Appointments:

(i)   Issues related to appointments have been well outlined in GMT and CWN indices. Provided the term of office is longer than five years (as required in the GMT index) or eight years (CWN index), it does not necessarily mean that it is longer than the maximum term of the government. The more important issue is not the actual term of office of the governor and central bank board, but whether it exceeds the maximum term of office of the government and therefore the new indices highlight this aspect of the terms of office.

(ii)   There is a possibility that some of the important issues related to the central bank are stated not in the central bank charter, but in the constitution of the country or elsewhere and this may constrain the freedom, initially granted to the central bank. This concern becomes relevant in cases when dismissal of the Bank's governor is in question (as in the described by Cukierman (1992) case with the Governor of Bank of Argentina).

(iii)   The bodies making the appointments for the positions of governor and board members must be clearly identified. Legally the appointments may come from the parliament/congress, but at the

same time it could be the government, as the only body entitled to nominate names that the parliament or the bank later approve. For instance, the governor of the Romanian central bank was legally elected by the parliament over the past few years even though it was the Prime Minister who nominated candidates to take this post. Independence is clearly maximised when the appointments of the governor and central bank board are made within the central bank, which on the other hand has been widely criticised as undemocratic act, allowing concentration of much power into a hand-full of non-elected bureaucrats.

(iv)   The governor should not hold an office outside the central bank (governmental or political) that might affect his/her decisions with regard to the management of the bank. The final issue covered in this cluster, looks whether there are government representatives present on the Bank's board, irrespectively whether they are with or without voting and/or veto rights.

Legislation and tradition

There are several ways to overrule the central bank law, the most common amongst them is the power of traditions, which conflict the existing legislation, alternatively the same can be achieved by a parallel law dealing with the same matters as the Bank's charter. Thirdly, by change in the legislation *per se*, when the existing charter is no longer convenient for the Chief Executive. And finally - not as common as the above - direct breaches of the Bank's legislation by the Chief Executive.

Elster (1979, p.93) argues that the "rule of law", following Max Weber and others, and a "stable institutional framework" are essential for a growing economy, mainly because of the ability to predict. There are two sources of uncertainties about future decisions stemming mainly from two sources: *ambiguous* law or constantly *changing* law. The latter outlines the need for constant law as far more essential than the need for just a law.

(i)   The *changeable nature of the legislation* or the "rule of law" in transition economies is an important issue, which has not been captured by the existing indices. The more changeable the legislation, the less the scope for the central bank to behave independently in monetary policy making (See Table 1 for details). The recent amendments in the legislation of the central banks in Bulgaria, Czech Republic, Poland and Romania are indicated in the table below, suggesting the constancy of law in the studies transition economies is far below the desired one.

Table 1: Recent Amendments of Central Bank Law in Bulgaria, Czech Republic, Poland and

Romania

Country	Amendments
Bulgaria	State Gazette 50/91 State Gazette 32/96 State Gazette 46/97
Czech Republic	Act No.130/1989 Act No. 22/1992 Act No. 6/1993 1995
Poland	Act No. 9, 30/06/95 Act No.47, 25/02/92 04/04/97
Romania	Law No.34, 1991 Rule No.3, 07/95 1999

Source: Bulgarian State Gazette 46, 1997; Cerna, S., Donath, L. and B. Dima (1999), 'Central Banking in Transition Economies: the Case of Romania'; Huterski, R., Nicholls, R. and Z. Wisniewski (1999), 'Central Bank Independence in Poland'; Soukup, P., Taci, A. and R. Matusek (1999), 'Central Bank Independence and Macroeconomic Performance in the Czech Republic' in 'Central Banking in Transition Economies' (Eds: Healey, N. and Z. Wisniewski), Torunska Szkola Zarzadzania, Torun.

(ii)   Traditions in some transition and developing economies may be as important as the legislation *per se*, however they are not part of the legislation and therefore are not captured by previous indices. Sometimes they may conflict with the existing legislation *ad hoc* affecting the legislatively based independence of the central bank. This appears to be amongst the main causes for the gaps between formal and actual independence. The well-known case of the Central Bank of Argentina, described by Cukierman (1992), provides a good illustration of how central bank charter can be overruled by the power of traditions.

(iii)   The existence of other laws in a country, interfering with the central bank charter, are broadly associated with the economic transition of Eastern Europe and the CIS. The Bulgarian central bank provides a unique case during the period preceding the introduction of a currency board arrangement (1990 - 1997). Although independence was guaranteed by the bank's charter, the government used to refer to the annual law for the budget, and supported by the parliament, it obliged the central bank to absorb the excess supply of long-run securities. This problem is present when the government wants to show to the public and international institutions lower inflation

commitment, and equally, it is not ready to give up the old 'habits', which assured easy money access. Alternatively parallel legislation may result from the pressure for change coming from international institutions for which the government is not prepared.

Many governments in transition economies are trying to fulfil the requirements imposed by the World Bank and IMF in order to obtain debt rescheduling or further loan facilities. Thus to demonstrate how successfully the economic transformation is progressing, the legislative system of the country is adjusted according to the recommendations of the international institutions. In reality, there used to be in power 'another' law, which was applied when the existing legislation was not suitable enough for the goals of the government.

The banking sector

(i)   The relationship between the central bank and the commercial banks is important in terms of the independence. The latter is higher when the central bank is not involved in supervision of the commercial banks. Historically, it is linked with the lender-of-last resort function of the central bank, which is a guarantee for the well being of the individual commercial banks acting as a lender-of-last-resort. This role was performed in various ways in the different countries. In some countries like Germany and Switzerland where the Bank was publicly found the banking supervision was entrusted to a separate body outside the CB and hence it was not entitled with being the lender-of-last resort. In other countries, like England, France, Italy and others, where the bank was found with private shareholders' capital, the bank was entitled with the role of lender-of-last-resort and respectively with the commercial banks' supervision.

(ii)   Government interference in the bank's lender-of-last-resort function is mostly associated with transition countries privatising the banking sector or state enterprises. In the face of a liquidity crisis, many transition governments are unwilling to allow the state bank to declare bankruptcy, particularly if the state bank is on the privatisation list. In countries retaining a major state-owned banking sector, there is even less probability that a bankruptcy would take place. Most of the CEE countries experienced such interference during the banking crisis in 1993 and 1996. The central bank then had to refinance the banks with liquidity problems, at the cost of its anti-inflationary stance.

Financing the Government

(i)   This section mainly looks at facilities that the central bank provides when financing the central government. Independence is best served when automatic advances to the government are not permitted, the terms of lending are under the control of the Bank and it does not participate in the primary market for public debt.

The new index detailed in this section is presented in the appendix. The coding technique employed in this study differs from the techniques used in previous CBI indices. Each question is equally weighted to reflect the critiques raised by Eijffinger and Schaling (1993) and Mangano (1998) regarding the weighting spread, i.e. the extent to which the final value of the index is affected by the weight attributed to each individual criterion. Furthermore, this index is based on the assumption that the more criteria that are met by the respective central bank, the more independent it is according to this index, whereas the criteria included in the weighted indices bring different scores.

The questions covered in the index are ticked in a manner to demonstrate absolute independence (see Appendix for further details).

Table 2 below compares three CBI indices for transition economies. Although the Cukierman (1992) and Cukierman *et al.* (1992) weighted index of legal independence (LVAW) and our index report the same average CBI, there are significant differences for some countries. A possible explanation could be the changeable nature of the legislation in transition economies (it is one of the criteria, included in the new index) and different authors have been referring to the legislation in different years. However, the most feasible explanations stems from the selection of different criteria, chosen by different authors, (i.e. the criteria spread) which were included in the index.

The highest is the average CBI reported by the GMT index 12.37, which is difficult to compare with the other indices because of the different metric system employed. However, this result is consistent with the results from our pilot study, showing that the legislative approach *per se* overstates the actual CBI in transition economies (valid for developing countries too in the eighties (Cukierman *et al.* (1992) and Cukierman (1992)).

Table 2: CBI in 22 Transition Economies (2000)

No.	Country	LVAW[a]	Grilli et al.[b]		CBI
1	Albania	0.51	12	(0.71)	0.48
2	Armenia	0.85	14	(0.82)	0.52
3	Azerbaijan	0.25	N/a	N/a	0.39
4	Belarus	0.73	11	(0.65)	0.43
5	Bulgaria	0.55	15	(0.88)	0.61
6	Croatia	0.44	11	(0.65)	0.52
7	Czech Republic	0.73	13	(0.76)	0.65
8	Estonia	0.78	13	(0.76)	0.65
9	Georgia	0.73	13	(0.76)	0.7
10	Hungary	0.67	10	(0.59)	0.7
11	Kazakhstan	0.44	N/a	N/a	0.48
12	Kyrgyzstan	0.52	15	(0.88)	0.7
13	Latvia	0.49	12	(0.71)	0.65
14	Lithuania	0.78	15	(0.88)	0.7
15	FYROM	0.41	14	(0.82)	0.74
16	Moldova	0.73	13	(0.76)	0.74
17	Mongolia	0.55	N/a	(N/a)	0.43
18	Poland	0.89	14	(0.82)	0.72
19	Romania	0.34	7	(0.41)	0.61
20	Russia	0.49	11	(0.65)	0.52
21	Slovak Republic	0.62	11	(0.65)	0.57
22	Slovenia	0.63	11	(0.65)	0.7
	Average CBI	**0.6**	**12.37**	**(0.73)**	**0.6**

Notes:

[a] Data obtained from Cukierman et al. (2001)

[b] Data obtained from Maliszewski (2000)

Using the index introduced in this study, the average CBI in transition economies is comparatively high (0.6). This is mainly evident in the CEE countries and stems from the *acquis communautaire*, which must be adopted by the new member states aiming membership to the EMU. However some patterns within the transition economies can be detected. Highly dependent are the banks in the CIS countries, (e.g. Azerbaijan, Belarus and Kazakhstan) participating in our survey. On the other hand, the CEE countries planning sooner accession to the European Union have highly independent central banks.

4. Central Bank Independence and Inflation in Transition Economies

The average annual inflation in transition economies has marked a significant decrease in the mid 1990s compared to the start of the reforms in the early 1990s. Meanwhile the CBI, arguably, has been the sole cause for the inflation developments. This section empirically tests the impact of CBI on average inflation and inflation variability of 22 transition economies over the time period of 1990-2003.

4.1 Inflation Developments in Transition Economies

As previously mentioned, the empirical evidence for OECD countries suggests a negative relationship between the CBI and the average inflation. The nature of inflation in transition economies is far more complex and many factors, besides CBI, can significantly influence it, which makes the investigation of the relationship a difficult task. Maliszewski (2000) outlines that a main cause for the high inflation in Eastern and Central Europe is the monetary expansion driven by political factors.

4.2 Central Bank Independence and Average Inflation in Transition Economies

4.2.1 Data Definitions

The Inflation Variable (I)

To reduce heteroscedasticity of the error term and improve the efficiency of the model, a transformation of the inflation variable was adopted. The new variable I, represents the annual real depreciation of a given amount of money, which is given by:

$$I = \frac{\pi}{(1+\pi)} \qquad (1)$$

Where π is the inflation rate and I is the transformed inflation rate (taking values from 0 to 1). Data on end-year inflation is obtained from the 2003 EBRD Transition Report. The data set comprises of 22 transition economies over the time period of 1991-2003.[7]

The transformed inflation variable I takes values between 0 and 1 and consequently is bounded by definition. In order to reinforce this point, we undertake the recently proposed unit root test by Ng and Perron (2001) for the variable I over a panel consisting of 22 countries and 13 years. The results of the unit root test can be seen in Table 2.

Table 2: Unit Root Test for The Transformed Inflation

Ng- Perron Test Statistic	Asymptotic Critical Value
-8.23	-8.1

Notes:

The Asymptotic Critical Value for the Ng-Perron Test Statistic is given at the 95% level of significance.

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[7] The 22 transition economies used in our sample can be seen in Table 2.

We are able to accept the hypothesis that the transformed inflation is stationary at the 95% level of significance.

Central Bank Independence Variable (CBI)

The CBI variable for the 22 countries between the time period of 1991-2003 was obtained with the use of the survey discussed previously.

Cumulative liberalization Index (CLI)

Cukierman et al (1998) find some evidence of a moderating effect on limitations on lending on inflation in their study. This result, however, is obtained without conditioning on the CLI. Maliszewski (2000) finds that the more advanced transition economies tend to have stricter limitations on lending. This leads to the conclusion that the coefficient of CBI may be biased if the CLI is not included in the model. Therefore we include CLI as an explanatory variable. The data for the CLI index is obtained from Cukierman et al (1998).

IMF Dummy (IMF)

We include a step dummy that is equal to 1 in the year of signing the IMF standby agreement and after and equal to 0 otherwise. This dummy accounts for the effect of the externally conditionality on policy performance and is constructed from the dates of IMF agreements in IMF (1998). [8]

Government Deficit Financing (DEF)

To test for the significance of government deficit financing, the general budget government deficit is also added to the regression model. The series is constructed using the data present in the 2003 EBRD Transition Report.

Rouble Zone (RZ)

A step dummy for countries participating in the rouble zone is added. The dummy is equal to 1 before the country adopts its own currency and equal to 0 afterwards. For non-FSU countries the dummy is always equal to 0. The dates of adopting national currencies are obtained from Lybek (1999).

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[8] For more details of the construction of the IMF dummy variable see Maliszewski (2000).

From the above discussions our adopted linear specification is of the form:

$$I_{it} = \beta_1 + \beta_2 CBI_{it} + \beta_3 CLT_{it} + \beta_4 IMF_{it} + \beta_5 DEF_{it} + \beta_6 BZ_{it} + \varepsilon_{it} \tag{2}$$

Where I_{it} is the transformed inflation for country i at time period t. CBI_{it} is the Central Bank Independence Index for country i at time period t. CLI_{it} is the Cumulative liberalization Index for country i at time period t. IMF_{it} is a dummy that is equal to 1 in the year of signing the IMF standby agreement and after and equal to 0 otherwise. DEF_{it} is the general budget government deficit for country i at time period t. BZ_{it} is a dummy that is equal to 1 before the country adopts its own currency and equal to 0 afterwards. β_1 is a constant and ε_{it} is a random error term which is distributed normally with a mean of 0 and a variance of σ^2. The results can be seen in Table 3.[9]

Table 3: Central Bank Independence and Average Inflation

$$I_{it} = \beta_1 + \beta_2 CBI_{it} + \beta_3 CLT_{it} + \beta_4 IMF_{it} + \beta_5 DEF_{it} + \beta_6 BZ_{it} + \varepsilon_{it}$$

Time Period	N	β_1	β_2	β_3	β_4	β_5	β_6	$\bar{R}^2$
1991-2003	286	0.83(0.13) 6.39*	-0.03(0.014) -2.15*	-0.09(0.015) -6.21*	-0.21(0.07) -3.03*	0.31(0.07) 4.44*	-0.22(0.08) -2.76*	0.74

Notes:

Standard errors are shown in brackets and t statistics are shown in bold. In order to account for possible serial correlation and heteroscedasticity problems in the error term we estimated serial correlation and heteroscedasticity consistent standard errors for panel data models as suggested by Driscoll and Kraay (1998).

* denotes significance at the 95% level of significance.

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[9] Since we are estimating a Panel regression we have to either estimate a fixed effects or random effects model. Our choice is based on the Hausmann (1978) test. When we apply this test we obtain a test statistic of 4.74 with a corresponding p value of 0.3149. This leads us to conclude that the random effects model is the optimal econometric model. We therefore proceed and estimate the random effects model.

The critical values at the 95% level of significance for the t statistics were obtained from an empirical distribution with the use of 1000 trials and were found to be equal to 1.89 and −1.82.

From Table 3 we can see that $\bar{R}^2$ is high indicating that 74% of the variation of the transformed inflation can be explained by the variation of the explanatory variables. We can also see that all the explanatory variables are statistically significant with the expected signs. As central banks become more independent inflation is lowered. This is apparent whether we use the CBI or the CLI indices to represent the CBI. Inflation decreases after introducing IMF programmes and after adopting 'own currency', and inflation increases with a greater government deficit. Our results agree with both Cukierman et al (1998) and Maliszewski (2000).[10]

4.3 Central Bank Independence and Inflation Variability in Transition Economies

Variability of inflation imposes economic costs. In fact many of the costs of high inflation arise because it is usually more variable and uncertain when the average inflation is high. Based on the previous discussion we would expect the transformed inflation to be less volatile as the central banks become more independent. It is therefore important to investigate whether our proxy for CBI actual affects the variability of inflation.

As a measure of inflation variability, we calculate the standard deviation of

$$SD_{it} = \sqrt{\left[d_{it} - \bar{d} \right]^2} \tag{3}$$

Where d_i is the transformed inflation of country i at time period t.

We investigate CBI and the variability of inflation by estimating the following econometric model:

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[10] Previous studies (see among others Cukierman et al (1998) and Maliszewski (2000)) have estimated dynamic panel data models to encounter possible endogeneity problems of the explanatory variables. Dynamic panel data models were estimated and the results remain the same. The results (not reported) are available upon request. The model presented in equation (2) was preferred because it had a higher $\bar{R}^2$.

$$SD_{it} = \beta_1 + \beta_2 CBI_{it} + \beta_3 CLT_{it} + \beta_4 IMF_{it} + \beta_5 DEF_{it} + \beta_6 BZ_{it} + \varepsilon_{it} \qquad (4)$$

Where the variables are defined as previously. The results can be seen in Table 4.[11]

Table 4: Central Bank Independence and Inflation Variability

$$SD_{it} = \beta_1 + \beta_2 CBI_{it} + \beta_3 CLT_{it} + \beta_4 IMF_{it} + \beta_5 DEF_{it} + \beta_6 BZ_{it} + \varepsilon_{it}$$

Time Period	N	β_1	β_2	β_3	β_4	β_5	β_6	$\bar{R}^2$
1991-2003	286	1.45(0.16) **9.05***	-0.04(0.011) **-3.62***	-0.06(0.019) **-3.16***	-0.17(0.02) **-8.49***	0.24(0.04) **6.00***	-0.18(0.09) **-2.01***	0.36

Notes:

Standard errors are shown in brackets and t statistics are shown in bold. In order to account for possible serial correlation and heteroscedasticity problems in the error term we estimated serial correlation and heteroscedasticity consistent standard errors for panel data models as suggested by Driscoll and Kraay (1998).

* denotes significance at the 95% level of significance.

The critical values at the 95% level of significance for the t statistics were obtained from an empirical distribution with the use of 1000 trials and were found to be equal to 1.92 and −1.87.

From Table 4 we can see that the $\bar{R}^2$ is quite low and indicates that the proposed model can explain only 36% of the variation of the standard deviation of the transformed inflation. However, the model appears to perform well when confronted with data since all the explanatory variables are statistically significant with the expected signs. As central banks become more independent inflation is lowered which in turn reduces the variability of inflation. This is evident whether we use the CBI or the CLI indices to represent the CBI. Inflation decreases after introducing IMF programmes and after adopting 'own currency', which reduces inflation variability. Finally inflation increases with a greater government deficit which consequently increases the variability of inflation.

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[11] The Hausmann (1978) test gives a test statistic of 4.82 with a corresponding p value of 0.3723. This leads us to conclude that the random effects model is the optimal econometric model. We therefore proceed and estimate the random effects model.

5. Conclusion

Recent empirical studies have used various indices to quantify CBI in transition economies (Loungani and Seets, 1995, Cukierman et al. 2000, Maliszewski 2000, *etc*). The indices used give a very good illustration of the legislative CBI, which as discussed in this paper, diverges from the actual independence. The authors provide comparison between the legislative design of the central banks in 22 transition economies and the design of ECB, which shows the transition economies have modelled their banks on the ECB charter. A close inspection of the practices of the studied central banks shows interference from central government in monetary policy formulation, appointments to the central bank board and terms of lending to central government. A new index of CBI is therefore introduced aiming to provide a more comprehensive measure the actual independence of central banks in transition economies.

The impact of the CBI (represented by the newly constructed index) on average inflation and inflation variability is tested empirically for 22 transition economies over the time period of 1991-2003, with the use of panel data estimation with robust standard errors. As previous studies we find that CBI lowers both average inflation and inflation variability. The high (r bar squared), the significance of the explanatory variables and the robust standard errors imply that this is an important empirical result.

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Appendix: Central Bank Independence Index and Coding Technique

<div style="border:1px solid black; padding:10px;">

<div align="center">A) OBJECTIVES AND POLICY FORMULATION</div>

1. Is the price stability the major and/or only objective of the Central Bank? ☒

2. Has there been any Government interference in formulation of the monetary policy within the last 5 years? ☐

3. Is there any Government or political control of the Central Bank's budget? ☐

<div align="center">B) APPOINTMENTS</div>

4. Is the Central Bank Governor appointed by the Government? ☐

5. Is there legislative provision for dismissal of the Governor? ☐

6. Can the Central Bank Governor hold governmental or political office? ☐

7. Does the Central Bank Governor's term of office exceed the maximum term of the Government? ☒

8. Does the Central Bank's Board office exceed the maximum term of the Government? ☒

9. Are there any appointments to the Central Bank Board made by the Government? ☐

10. Are there any Government representatives attending Central Bank Board meetings with/without voting/veto rights? ☐

11. Does the Government consult (e.g. nominates candidates) the bodies appointing the Governor and the Central Bank Board? ☐

12. Have there been any non-completions of the Central Bank Governor(s) term of office within the last ten years? ☐

C) Legislation and tradition

13. Has the Central Bank legislation been changed within the last 5 years? (if yes, which year) ☐

14. Has the Central Bank legislation been breached within the last 5 years? ☐

15. Are there any 'other laws' (in the country) that conflict with the Central Bank Constitution (evidence of breaching the Central Bank charter within the last 5 years)? ☐

16. Are there traditions that interfere with the Central Bank Charter (e.g. Central Bank Governor or/and Board Members resigning with change of the Government)? ☐

17. Are there provisions, which strengthen the Central Bank's position in case of conflict with the Government? ☒

<div align="center">*D) THE BANKING SECTOR*</div>

18. Is the banking supervision entrusted to the Central Bank? ☐

19. Is the banking supervision entrusted to the Central Bank alone? ☐

20. Has there been Government or political interference in fulfilling/not fulfilling the 'Lender-of-last-resort' function of the Central Bank for the last 5 years? ☐

<div align="center">*E) FINANCING THE GOVERNMENT*</div>

21. Are advances permitted when financing the Government? ☐

22. Are terms of lending controlled by the Central Bank or Bank charter when financing the Government? ☒

23. Does the Central Bank participate on the primary market for public debt? ☐

24. **Overall Central Bank Independence** (23) 1.00

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Central Bank Independence in Transition Economies

No.	Country	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q11	Q12	Q13	Q14	Q15	Q16	Q17	Q18	Q19	Q20	Q21	Q22	Q23	Total (%)
1	Albania	1	1	1	1	0	1	1	1	1	0	0	0	0	1	0	0	0	0	0	1	0	1	0	0.48
2	Armenia	0	0	0	1	0	1	0	0	1	0	1	1	1	1	1	1	1	0	1	1	0	0	0	0.52
3	Azerbaijan	0	0	0	0	0	1	0	0	0	0	1	1	0	1	1	0	1	0	1	1	0	1	0	0.39
4	Belarus	1	0	0	0	1	1	1	1	0	0	1	0	1	0	0	1	0	0	0	1	0	1	0	0.43
5	Bosnia and Herzegovina	1	1	1	0	1	1	0	1	0	1	0	1	1	1	1	1	0	1	0	1	1	0	1	0.7
6	Bulgaria	1	0	0	1	1	1	1	1	1	1	1	1	0	0	0	0	1	0	0	0	1	1	1	0.61
7	Croatia	1	1	1	1	1	1	1	0	1	0	0	0	0	0	1	1	0	0	0	1	0	1	0	0.52
8	Czech R.	1	1	1	1	0	1	1	1	1	1	1	0	1	1	1	1	0	0	0	0	0	1	0	0.65
9	Estonia	0	1	0	1	0	1	1	1	1	1	1	1	0	1	1	1	0	0	0	1	1	0	1	0.65
10	Georgia	1	1	1	1	0	1	1	1	1	1	1	0	0	1	1	1	0	0	0	1	1	0	1	0.7
11	Hungary	1	1	0	1	0	1	1	0	1	0	0	0	0	1	1	1	1	1	1	1	1	1	1	0.7
12	Kazakhstan	1	1	1	1	1	1	0	0	0	0	0	0	0	1	1	0	1	0	0	0	0	1	1	0.48
13	Kyrgyzstan	1	1	1	1	0	1	1	1	1	1	1	0	0	1	0	1	1	0	0	1	1	0	1	0.7
14	Latvia	1	1	1	0	0	1	1	1	0	0	1	1	0	1	1	1	1	0	0	1	0	1	1	0.65
15	Lithuania	0.5	0	0.5	1	0.5	1	1	1	1	1	1	0	0	1	1	1	1	0	0	0.5	1	1	1	0.7
16	FYROM	1	1	0	1	1	1	1	1	1	1	1	0	0	1	1	1	0	0	0	1	1	1	1	0.74
17	Moldova	1	1	1	1	0	1	1	1	1	0	1	1	0	1	1	1	0	0	0	1	1	1	1	0.74
18	Mongolia	1	1	0	1	0	1	1	1	0	1	0	0	0	0	0	0	0	0	0	0	1	1	1	0.43
19	Poland	1	1	0.5	1	0	1	1	0.5	1	0	1	0.5	0	1	1	1	1	0.5	0.5	1	1	0	1	0.72
20	Romania	1	1	1	1	1	1	1	1	1	1	1	0	0	1	1	1	0	0	0	0	0	0	0	0.61
21	Russia	1	0	0	1	1	1	1	1	1	1	1	1	0	0	1	0	0	0	1	0	0	0	0	0.52
22	Slovak R.	1	1	0	0	1	1	1	1	0	1	0	1	0	1	1	1	0	0	1	0	0	1	0	0.57
23	Slovenia	0.5	1	0	1	1	1	1	1	1	0.5	1	1	1	1	1	1	0	0	0	1	0	0.5	0.5	0.7

[1] Some central banks have given more than one response, and then the average weight of the given answers is shown. Respectively 1 and 0 indicate whether the CBI criterion is met or not.