

ISSUE OF CENTRAL BANK INDEPENDENCE. THE EVIDENCE FROM
TRANSITION ECONOMIES

by

Sologoub Dimitry

A thesis submitted in partial fulfillment of the requirements for the degree of

Master of Arts in Economics

National University of Kyiv-Mohyla Academy

2002

Approved by

Chairperson of Supervisory Committee

Program
to Offer Degree

Authorized

Date 27.05.2002

National University of “Kiev-Mohyla Academy”

Abstract

ISSUE OF CENTRAL BANK INDEPENDENCE.
THE EVIDENCE FROM TRANSITION
ECONOMIES

by Sologoub Dimitry

Chairperson of the Supervisory Committee: Professor Serhiy Korablin,
Institute for Economic Forecasting at the
National Academy of Science of Ukraine

It has been argued in the literature that the degree of Central Bank Independence (CBI) can have a strong positive effect on the overall economy's performance. This paper investigates the validity of this hypothesis by looking at evidence from cross-sectional data on transition economies. Specifically, it poses the following question: Is there a relationship between the degree of CBI and the rate of GDP growth, the size of budget deficit, and the level of Foreign Direct Investment (FDI)? The analysis is carried out within the Levine-Renelt (1992) framework. My study reveals no conclusive evidence in favor of the existence of the relationship between the degree of CBI and considered macroeconomic aggregates.

I argue, however, that my results can be contaminated by errors in measuring the degree of CBI: the indices existing in the literature are based on legal provisions, which often are not fulfilled in practice. I therefore propose an alternative measure of CBI, which reflects the actual independence of the Central Bank. The discrepancy between legal and actual CBI can perhaps be the best appreciated by looking at the example of Belarus. I find that actual independence of Belarussian CB in 1995-2000 years was much lower than legal (it falls from 5th to 17th place out of 25 in ranking of CBs in transition economies by their independence), which is mainly explained by the peculiarities of the political and legal environment in this country.

TABLE OF CONTENTS

Table of Contents.....	i
List of Figures and Tables.....	iii
Acknowledgments.....	iv
Glossary.....	v
1. Introduction.....	1
2. Theoretical Background.....	6
2.1. Literature Review.....	6
2.1.1 Issues of CBI in Economic Literature.....	6
2.1.2 Central Banking in Transition.....	12
2.2. Relationship between CBI and Real Economic Variables... ..	15
2.2.1 Dynamic Inconsistency Problem and Ways for its Resolving..	15
2.2.2 Does Degree of CBI Affects Inflation Rate?.....	20
2.2.3 Relationship between CBI and Economic Growth and Budget Deficit.....	21
3. Empirical Part.....	24
3.1 Data Description.....	24
3.2 Econometric Models Used.....	25
3.2.1 Sensitivity Analysis.....	26
3.2.2. Estimation of the Relationship between CBI and Size of Budget Deficit and Foreign Direct Investment.	29
3.3 Analysis of Results.....	31
4. The Practice of Central Banking in Belarus.....	39
4.1. History of Central Banking in Belarus.....	39
4.2. Legal Independence of Belarussian Central Bank.....	42
4.3. The Actual versus Legal Central Bank Independence in Belarus.	47
5. Conclusions and Suggestions for Future Research.....	58
Appendix A. Extractions from Banking Code of Belarus.....	61
Appendix B: Calculating the Degree of CBI in Belarus.....	63

Appendix C: Legal CBI in Transition Economies.....	66
Appendix D: The Relationship between CBI and Economic Variables on Diagram.....	68
Bibliography.....	71

LIST OF FIGURES AND TABLES

<i>Number</i>	<i>Page</i>
Figure 1. The Choice of Inflation Rate by Policymaker in the Absence of Binding Commitment	17
Figure 2. The Choice of Inflation by Conservative Policymaker	19
Figure 3. Relationship between GMT and LVAW Indices of CBI in Transition Economies	46
Table 1. Indices of Legal Central Bank Independence	8
Table 2. The Basic Determinants of Economic Growth in Transition Economies.	31
Table 3. CBI and Growth. Sensitivity Analysis.	32
Table 4. CBI and Budget Deficit. Econometric Estimation	34
Table 5. CBI and Foreign Direct Investment. Econometric Estimation	35
Table 6. CBI and Inflation. Econometric Estimation	37
Table 7. The Governors of Belarussian National Bank (1991-2002)	51
Table 8. Actual and Legal CBI in Belarus in 1995-2000 Period.	54

ACKNOWLEDGMENTS

First of all, I would like to thank my thesis advisors Professors Serguei Maliar and Jerzy Konieczny, without whom this research would never have been performed. Besides, I wish to express my sincere gratitude to Professor Alex Cukierman from Tel-Aviv University for his extremely helpful comments on measuring procedure of actual Central Bank independence. Also I am grateful to the EERC Faculty Professors Roy Gardner, John Willner and Irina Lukianenko for their valuable comments. My special thank is to Professor Hartmut Lehman for his extremely helpful advice on the empirical part. Finally, I want to thank Miss Anna Kovalyova from Belarussian Banking Association for her highly important insights into the practice of Central Banking in Belarus; and my fellow student Ilona Noskova for her help and support during the thesis development.

GLOSSARY

Actual Central Bank Independence: the degree of independence of CB, which is determined by looking at the Central Bank activity on practice

Conservative Central Banker: the type of Central Banker, who places greater relative weight on the inflation objective than does society in a whole

Discretionary Policy: the situation, when policymakers are free at any time to alter their instrument settings in absence of binding commitments

Dynamic Inconsistency Problem: the situation, when inability of policymakers to commit themselves can give rise to excessive inflation

Goal Independence of Central Bank: the ability of a Central Bank to set and pursue its own policy goals

Inflationary Bias: increase in inflation rate as a result of dynamic inconsistent policy

Instrument Independence of Central Bank: the ability to control over monetary policy and use monetary instruments

Legal Central Bank Independence: the degree of CB independence, which is determined by legal provisions of Central Bank legislation

Lucas Supply Curve: the type of the supply curve, which implies that the departure of output from its normal level is an increasing function of the surprise in the price level

LVAW Index of Legal CBI: the measure of legal CBI, which is composed from 16 variables and takes values in interval from 0 to 1

Transparency of Central Bank Policy: explaining and justifying by Central Bank authorities its policies or actions

Chapter 1

1. Introduction

It has been argued in the literature that the degree of Central Bank Independence (CBI) can have a strong positive effect on the overall economy's performance. In the paper I attempt to confront this hypothesis with the data. Specifically, I analyze the relationship between the degree of CBI and economic variables, focusing upon the following: Is there a significant relationship between the degree of Central Bank independence and the rate of GDP growth, the size of budget deficit, and the level of Foreign Direct Investment (FDI) in transition economies?

The issue of Central Bank independence (CBI) is associated in the literature with monetary economics, especially in dealing with inflation. Economists consider CBI to have a positive effect on reducing the inflation. According to the seminal paper by Kydland and Prescott (1977), dynamic inconsistency problem arises when governments, in their pursuit of low unemployment, set inflation rate higher than is expected by the public. However, if economic agents suspect government is cheating, they set their inflationary expectations in such a way that gives rise to excessive inflation. In this situation, granting the Central Bank a high degree of independence is argued to be an appropriate way for elimination of inflationary bias.

Since the time when the issue of CBI was recognized as an important point in economic policy, the link between CBI and inflation has been the subject of considerable empirical research. Alesina and Summers (1993), Cukierman, Miller and Neyapti (2001), and many others find a negative relationship between CBI and inflation.

First, I concentrate on the analysis of the relationship between the degree of CBI and economic growth. While direct link between CBI and the rate of growth does not exist in theory, it is possible that higher CBI has a positive effect on the rate of economic growth through inflation. Here, empirical findings tend to diverge. Barro (1995) and Bruno and Easterly (1996) find a negative correlation between high inflation and economic growth. However, Alesina and Summers (1993) and de Haan and Kooi (1998) do not find empirical evidence of relationship between degree of CBI and rate of economic growth.

All previous studies of the link between CBI and economic growth were done for developed and developing countries. So far, no one has examined such relationship in transition economies. Such analysis seems to be highly interesting, because, the practice of Central Banking in transition economies is different from that of the developed countries. Besides, according to Maliszewski (2000), the justification for granting CB a high degree of independence in transition countries does not lie in the resolution of the dynamic inconsistency problem (which hardly exists there), but in the willingness of policymakers to mitigate the difficulties of the transformation process to a market economy. Therefore, the issue of Central Bank independence in transition economies probably should be considered not as the way of eliminating inflationary bias, but as the one of the key elements in transformation package, along with privatization, liberalization etc, which adoption is necessary for successful transition.

Estimation of the relationship between CBI and the level of Foreign Direct Investment (FDI) addresses the question of the degree to which CBI provides the signal to foreign investors in making their investment decisions. If a significant positive relationship exists, we can say that granting the Central Bank a greater independence results in an increase in the level of FDI.

Large budget deficits are a common problem for governments in transition economies. They can be explained by excessive government expenditures on education, health care and pensions, which were provided by the state during socialist times and now impose a heavy burden on the government budget. High rent-seeking activity in these countries also causes government expenditures to be extremely high. The absence of appropriate tax systems leads to low government revenues. Because most of the countries in transition have underdeveloped financial markets and have little or no opportunities to borrow from abroad, the main way to resolve budgetary problems is seigniorage. The estimation of the relationship between the degree of CBI and size of budget deficit can answer the question: does a higher degree of CBI imply budgetary independence of the Central Bank from the government?

To carry out the analysis of the relationship between CBI and the rate of economic growth I use Levine and Renelt (1992) framework, who first apply the sensitivity analysis for studying the determinants of economic growth. The same method is used in all previous studies for estimating the relationship between CBI and growth. The reason for using this scheme is that we have identification problem – there is no clear theoretical link between CBI and growth, so we don't have standard specification for econometric analysis. The relationships between the degree of CBI and size of budget deficit and level of FDI are estimated using different specifications following previous findings in the literature.

The data set used includes the annual data on macroeconomic indicators for 25 transition economies for the period 1990-2000. The degree of CBI is proxied by indices of legal Central Bank independence - LVAW, proposed by Cukierman (1992), and GMT, constructed by Maliszewski (2000). Data on these indices of CBI is available from the authors.

Overall, my findings do not indicate the presence of clear link between Central Bank Independence and economic performance. In particular, the degree of CBI is not robustly correlated with rate of real GDP growth per capita in transition economies in 1990-s – the coefficient of CBI variable remains positive but insignificant in all regressions. Furthermore, using different specifications I find no significant relationship between degree of CBI and size of budget deficit and FDI. While in some specifications the coefficient of interest is of predicted sign and significant, altering the specification it becomes insignificant and even changes the sign.

However, results can be contaminated by errors in measuring the degree of CBI: the indices existing in the literature are based on legal provisions, which often are not fulfilled in practice. The discrepancy between the legal and actual measures of CBI can perhaps be the best appreciated by looking at the example of Belarus. Cukierman, Miller and Neyapti (2001) find that LVAW index of legal CBI for Belarus is very high – 0,73 out of one, which is one of the highest for transition economies (fifth place)¹. This may sound puzzling in the light of the widespread anecdotal evidence. First, the monetary policy of the National Bank is completely controlled by the state authorities. Second, de-facto president Lukashenko himself appoints and dismisses the head of the National Bank. Therefore, I compare the actual practice of Central Banking in Belarus with legal provisions of Central Bank legislation concerning the issues of personal, instrumental, financial and goal independence of Belarussian National Bank. Finally, employing the same procedure as Cukierman does for measuring legal CBI, I find that actual CBI in Belarus in 1995-2000 years was significantly lower than legal – the value of actual CBI by LVAW index is 0.48 – much lower than value of legal CBI (0.73). According to this score Belarus falls in ranking of Central Banks by their independence from fifth to seventeenth place out of 25

¹ The highest score corresponds to Polish Central Bank: LVAW = 0.89

countries in transition. Thus, Belarussian case is the example of situation where there is substantial discrepancy between actual and legal Central Bank independence. And findings here as for measurement of actual CBI can be applied in other cases, which is the subject for future research in this field.

The paper is organized as follows. Section 2 presents the theoretical background of Central Bank independence issues, starting with literature review, where the main concepts on CBI are examined. The next subsection is devoted to the analysis of the dynamic-inconsistency problem and ways it can be resolved using the models of reputation and delegation. And finally, the influence of CBI on output is examined. Section 3 deals with empirical testing of the relationships between CBI and output, budget deficit and FDI level. Here I describe the data, econometric models used and discuss the results. In last section the practice of Central Banking in Belarus is analyzed. It includes the calculation of the degree of independence of the National Bank of Belarus, employing already existing indices of CBI, and analysis of Central Bank legislation. Conclusions and suggestions for the future research are presented in the last section.

Section 2

2. Theoretical Background

2.1 Literature Review

2.1.1 Issues of CBI in Economic Literature

For over two decades the issue of CBI has been discussed in economic literature. This discussion has started with the models of delegation and reputation, while searching for the way of dynamic inconsistency problem resolution. And then it has continued with the construction of the various indices of CBI and the analysis of the relationship between the degree of CBI and the inflation rate. Later, this was extended to an examination of the influence of CBI on other economic variables, such as output, investment rate and unemployment. The breakdown of socialist systems in Eastern Europe and in USSR pushed the discussion of this issue in a new direction – the analysis of CBI in transition economies and explanation of differences in the practice of Central Banking there and in developed countries.

As mentioned above, discussion concerning CBI began in 1970-s. Kydland and Prescott (1977) in their classic paper show the inability of policymakers to commit themselves to follow low-inflation policy, which leads to inflationary bias. They pose a question: How can inflationary bias be eliminated? They provide only a rough answer, but the direction is right – attention should be focused on issues of Central Bank credibility and ability to precommit to policy. Similar analysis is implemented by Barro and Gordon (1983). They show that when the Central Bank has two objectives – low inflation and stable output, its policy would lead to excessive inflation, while having insignificant effect on output. A clear solution to the dynamic-inconsistency problem is proposed by Rogoff (1985). He suggests a model of

a conservative-central-banker, who is known to be especially inflation-averse. The idea is simple – expected inflation would be lower when monetary policy is controlled by a person who dislikes inflation very much. Rogoff analyzes this model by using social loss functions from Kydland and Prescott, but he places a greater relative weight on the inflation objective. Rogoff concludes that countries set up independent central bank, whose main objective should be low inflation.

A great deal of literature on CBI is devoted to the construction of different indices of CBI. The main point of this literature is finding such index of **legal** CBI, which will be the best proxy for **actual** independence of Central Bank. Pioneering work is done by Bade and Parkin (1982), who construct an index of political independence of Central Banks for twelve countries (BP index). They define political independence as the ability of the Central Bank to implement its policy without influence from government. Grilli, Masciandaro and Tabellini (1991) propose a new, more complex index of CBI (GMT), which is composed of two subindices measuring political and economic independence of the Central Bank. The political independence subindex is based on nine indicators covering appointment procedure of the head of the Central Bank, relationship between the body of CB and government, formal responsibilities assigned to the Central Bank etc. Economic independence is defined as the ability to use monetary instruments without any restrictions and consists of seven subitems – the role of CB in financing the budget deficit and lending to public, restrictions on using monetary instruments, such as discount rate and open market operations.

The most comprehensive index of CBI was created by Cukierman (1992). The index LVAW comprises 16 subitems, which are divided to four groups:² 1) variables of the status of executive officer, i.e. term of office,

² Cukierman, Alex. 1992. *Central Bank Strategies, Credibility and Independence*. Cambridge, Mass.: MIT Press, Table 19.1: 373-376

procedure of appointment and dismissal; 2) policy formulation variables – participation in budget process, regulation of potential conflicts between CB and government; 3) legislated Central Bank objectives and 4) limitations to lending variables. De Haan and Kooi (1998) present the indicator of CBI based on the turnover rate of Central Bank governors (TOR).³ Table 1 summarizes the information about various indices of legal CBI.

Table 1. Indices of legal Central Bank Independence

Index	Authors of index	Description of index
BP	Bade and Parkin (1982)	BP measures political independence of CB, which is defined as ability of CB to implement its policy without government influence. Index is calculated with (1-4) scale.
GMT	Grili, Masciandaro and Tabellini (1991)	GMT considers both political and economic independence, thus consisting of two sub-indices. There are nine indicators of political and seven of economic independence. Usually only two scores of 0 and 1 are allowed for each indicator. Overall score is found by summing all scores.
LVAW	Cukierman (1992)	Index covers 16 characteristics of CBI, including status of the governor, policy formulation, contacts with government etc. Each score is assigned a number from 0 to 1. Then two-round aggregation procedure is used for obtaining overall score, which also lies in interval from 0 to 1.
TOR	Cukierman (1992)	Index measures the actual turnover rate of CB governors and equals number of the CB governors for a given time period divided by number of years in given time period.
CBI-DF	Loungani and Sheets (1997)	CBI-DF slightly amends LVAW index. It is calculated on the basis of questionnaire, consisting of 14 questions about legal provisions of CB law.
Lybek	Lybek(1999)	Index covers the issues of CB autonomy and accountability and is based on 21 criteria.

³ The construction procedure of GMT, LVAW and TOR indices, as well as their comparative analysis, is presented in Section 4

Maliszewski	Maliszewski (2000)	This index is the amendment of GMT index, calculated by author for 26 transition economies. The difference between two indices is only due to subjective interpretation of CB legislation by authors.
--------------------	--------------------	---

In recent years a few authors estimate the degree of CBI in transition economies. Cukierman, Miller and Neyapti (2001) calculate LVAW index for 26 transition countries. Maliszewski (2000) measures the degree of CBI in these countries, using GMT index but changing it a little bit. Actually, the difference between his index and GMT is only in subjective interpretation of CB legislation by indices' authors. Lybek (1999) proposes his own index of CBI, which contains standard elements from previous studies, but also covers accountability of Central Bank and uses IMF guidelines provided to transition countries. The index consists of 21 graded characteristics and is calculated for 15 former Soviet Union countries.

Debelle and Fischer (1994) introduce a distinction between two forms of CBI: goal independence and instrument independence. The goal independence is the ability of a Central Bank to set and pursue its own policy goals. Instrument independence means CB is given control over monetary policy and is allowed to use monetary instruments. They present empirical evidence that instrument independence, as well as the presence of a clearly defined goal of price stability, are related to low rates of inflation. Therefore, Debelle and Fischer conclude that Central Banks should have instrument independence but not goal independence. Instead, CB should be given a clearly defined set of goals and the power to achieve them, and must also be accountable for its activity.

In last decade research in Central Banking has mainly concentrated on the analysis of relationships between degree of CBI and various economic variables, i.e. inflation, economic growth, budget deficit and investment rate. A great deal of literature is devoted to the examination the rela-

tionship between CBI and inflation, employing different techniques – econometric estimation, scatters diagrams. Almost all authors, Alesina and Summers (1993), Cukierman (1992), Cukierman, Miller and Neyapti (2001), de Haan and Kooi (1998), Loungani and Sheets (1997), find the negative relationship between CBI and inflation, using data from developed, developing and transition countries. However, these results are sensitive to the specification of equations and choice of the sample. There is just one outlier in this issue. Posen (1995) state that instead of causation, the link between CBI and inflation can exist because of third factor, for example culture and tradition of monetary stability in a country. It can be best explained by the evidence from transition economies. In particular, the negative relationship between CBI and inflation rate there not necessarily means that high degree of CBI contributes to lower inflation rate, but also that low inflation and high CBI are the part of requirements, faced by countries in transition. So, there is a situation when inflation is brought down by stabilization policy and CBI is set high according to standards of European Union. Therefore, inflation is low, CBI is high but clear link between these two variables does not exist.

Another strand of the literature is the examination of the relationship between CBI and growth. Alesina and Summers (1993) examine the impact of CBI on average real GNP growth. They use an average of BP and GMT indices and plot economic growth variable against measure of CBI. Their sample consists of 18 industrialized countries and covers the entire 1955-1988 period. The authors find that graphical analysis of the relationship between CBI and average real GNP growth does not imply any significant correlation between these variables. Although the analysis is very simple, it produces some interesting results. First, the observations represent at least a fragment of evidence in support of theories emphasizing the neutrality of money.⁴ Second, the authors conclude that the absence of correlation be-

⁴ Alesina, Alberto, Lawrence H. Summers. 1993. "Central Bank Independence and Macroeconomic Performance: Some Comparative Evidence", *Journal of Money, Credit and Banking*, Vol. 25(2): 159.

tween CBI and output confirms the resolution of the dynamic-inconsistency problem – taking the Central Bank out of political control creates the possibility of achieving low inflation without decrease in output.

De Haan and Kooi (1998) estimate the relationship between degree of CBI (they use TOR as a measure of CBI) and the average growth of per capita GDP, budget deficit and investment rate. Estimating the relationship between CBI and economic growth and level of investment, the authors use Levine and Renelt framework. However, they do not find significant relationship between CBI and those variables. This is also true for the relationship between budget surplus and CBI: the coefficient of TOR in that regression is positive, but insignificant.

The paper of Sikken and de Haan (1998) addresses the question, whether the degree of CBI affects the size of the budget deficit. The existence of such relationship is derived by authors from the fact that in case of highly independent Central Bank, the government has more incentive to balance its budget, because monetization of budget deficit in this situation is extremely difficult. The authors estimate such relationship econometrically, using the data from developing countries during the period 1950-94 and three subindices of CBI (TOR, legal index and limits to lending). They find no evidence of existence of relationship between CBI and budget deficit.

To conclude, it appears that CBI has negative effect on the average rate of inflation but little or no effect on real variables.

2.1.2 Central Banking in Transition

The research on Central Banking in transition economies started in the middle of 1990-s. And in last few years the number of papers on this issue is significant. Countries in transition have an economic environment different from that in developed countries. This is also true for the issue of Central Banking. First, under the socialist system the practice of Central Banking was completely different compared to developed countries, and thus transition countries don't have a history of independent Central Banks. In addition, the transformation processes in such countries requires that Central Banks act in a slightly different way than in other countries. Since the major part of literature on issue of CBI doesn't apply analysis of this issue for transition economies, it is difficult to use this literature in my research, which deals with countries in transition.

Literature on Central Banking in transition economies can be divided in two groups. The first group contains papers where authors mainly concentrate on finding the relationships between degree of CBI and economic variables, first of all inflation. The second group includes literature, which discusses various aspects of Central Bank Independence in transition countries, i.e. actual versus legal independence, institutional structure of Central Banks, CB accountability and transparency. The papers that belong to the latter group usually employ country studies, giving insights into Central Bank legislation in different countries and then making comparative analysis of them. Papers from former group analyze the whole sample of transition countries and estimate the above-mentioned relationships using econometric techniques.

The most important paper is Cukierman, Miller and Neyapti (2001). The authors estimate the degree of CBI by the LWAU index for a sample of 26 former Soviet economies (FSE) for the entire 1989-1998 period. They find that the LWAU index is significantly higher for almost all FSE than

for developed countries. Their explanation doesn't differ much from that of Riesenger and Radzyner (1997)(please see below), but they propose one new reason: the difference in legal independence between the two groups of countries exaggerates the difference in actual independence, since the average level of compliance with the law in FSE is lower than in Western democracies.⁵ The main purpose of the paper is estimation of the relationship between CBI and the inflation rate in transition economies. The authors find the negative and significant relationship between CBI and inflation, which is valid only for a high-sustained level of liberalization.

Loungani and Sheets (1997) examine the relationship between the index of legal CBI (constructed by themselves) and the rate of inflation for twelve transition countries in 1993. The authors find that increased Central Bank Independence is correlated with lower inflation in 1993. This result is persistent after controlling for other variables, which can affect inflation rate, i.e. effects of fiscal policy, liberalization index. Besides, they argue that higher CBI can, at least indirectly through lower inflation, contribute to higher economic growth, because it is found by authors for sample of 25 transition economies over the 1991-1994 periods that inflation is negatively correlated with subsequent real growth.

Maliszewski (2000) concentrates on finding the relationship between CBI and inflation in transition economies. Besides, he constructs his own index of CBI, which is actually an amendment of GMT index of political and economic independence of Central Bank. Using various specifications the author estimates the regression and finds the robust inverse relationship be-

⁵ Cukierman, Alex, Geoffrey Miller, Bilin Neyapti. 2001. "Central Bank Reform, Liberalization and Inflation in Transition Economies – an International Perspective", *Journal of Monetary Economics*, Vol. 49: 259.

tween inflation and CBI, emerging at the high level of economic liberalization, which is in line with conclusion of Cukierman, Miller and Neyapti (2001).

The paper by Lybek (1999) is devoted to the analysis of Central Banking in former Soviet Union (FSU) countries, where institutional environment was a little bit different from that in Eastern European countries (EEC), because Central Banks never existed here before. The author describes the main principles of sound Central Bank legislation in FSU countries, constructs his own index of CBI. Besides, using scatter diagrams, Lybek analyze the relationships between CBI and average inflation and economic growth. Of course, it is very approximate method, but nevertheless, the author finds evidence of negative correlation between CBI and inflation and positive correlation between CBI and economic growth.

Wagner (1999) analyzes issues of actual and legal CBI. His main conclusion is that establishing only formally independent Central Bank is counter-productive. When government wants for a while to control Central Bank policy, though it is formally independent, in order to achieve temporary goals, it will be punished later by suspicion of private agents, who are disappointed by government policy. In this case, as the author shows, activity of private agents eliminates the benefits from de-facto overriding Central Bank by government.

Radzyner and Riesenger (1997) deal with analysis of institutional framework of Central Banks in EEC. First, the authors present a history of Central Banking under socialist system and during transition process. Then they describe main reasons of establishing highly independent Central Banks in transition economies. The main reasons are application for European Union membership, aspiration to gain confidence on international financial markets and adoption of drastic stabilization programs, which require high credibility of Central Bank. Besides, the authors implement a detailed

analysis of Central Banking in five transition economies – Hungary, Poland, Czech Republic, Slovakia and Slovenia, treating all factors: the legislation in each country, the issues of financial, personal and independence in the formulation and implementation of monetary policy, political vulnerability and human factor. According to authors, actual CBI can be assessed by looking at personal independence of Central Bank governor, political vulnerability of CB, practice of overriding of CB by government and design of policy coordination mechanism between CB and government.

2.2 Relationship between CBI and Real Economic Variables

2.2.1 Dynamic inconsistency problem and ways for its resolving

For the first time, the issue of Central Bank Independence was raised in economic literature in discussing dynamic inconsistency problem. The seminal paper by Kydland and Prescott (1977) shows that any attempts by policymakers to solve the output-inflation trade-off lead to an inflationary bias, because such policy is time inconsistent. The dynamic inconsistency problem arises, because in the absence of binding commitments, government, which objective is low unemployment, pursues expansionary policy. This leads to the rate of inflation being higher than expected and economic agents, such as wage-setters, correct their expectations about future inflation and push output to its natural level. This general idea can be easily explained with the use of simple math. Aggregate supply curve is given by the Lucas supply curve:⁶

$$y = y' + b(\pi - \pi_{\text{exp}}), \quad b > 0 \quad (1)$$

⁶ Romer, David. 2001. *Advanced Macroeconomics*. New York: McGraw-Hill: 479.

where y is the log of output and y' is the log of its flexible price level, b is the discount rate and π and π_{exp} are inflation and expected inflation rates respectively. Kydland and Prescott also assume that flexible price output level is less than socially optimal because of positive marginal tax rate (individuals do not realize the full benefits of additional labor supply) or imperfect competition (firms do not capture all benefits of additional output). Assuming that $y^* > y'$, we see that when actual inflation rate equals expected, output is lower than socially optimal, because now it equals its flexible price level. Thus, policymakers have incentive to set inflation rate higher than it is expected by public. Loss function of policymaker is the sum of costs from output being lower than socially optimal level and inflation being higher than some threshold value. By assumption, loss function is quadratic in both output and inflation:

$$L = \frac{1}{2}(y - y^*)^2 + \frac{1}{2}a(\pi - \pi_{\text{exp}})^2, \quad y^* > y', \quad a > 0 \quad (2)$$

where a is the weight placed by society on inflation relative to output and y^* is the natural level of output.

First, I describe the situation when there is a binding commitment between policymaker and public. Here actual inflation rate simply equals expected, and so, according to (1), output equals its natural rate. The problem of policymaker is to choose π to minimize (2). This is done by setting $\pi = \pi^*$.

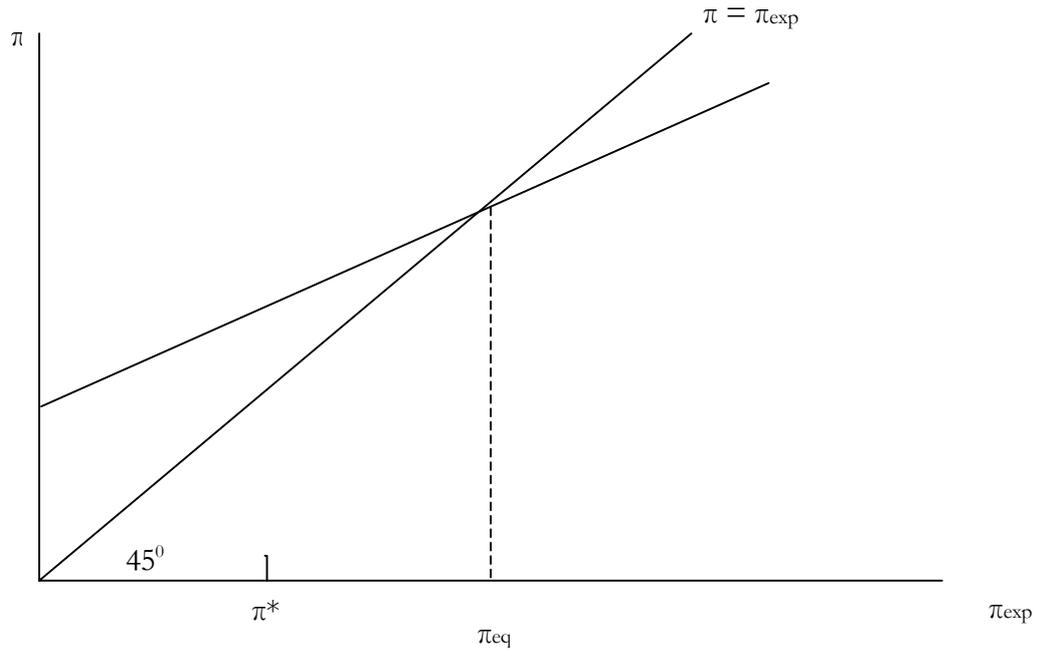
Suppose now that time inconsistency problem arises: the policymaker chooses inflation rate π , taking expectations of inflation as given. The objective of policymaker is to minimize (2) with respect to π , so substituting (1) into (2) and minimizing it with respect to π , we finally obtain the following expression for π :

$$\pi = \pi^* + \frac{b}{a + b^2}(y^* - y') + \frac{b^2}{a + b^2}(\pi_{\text{exp}} - \pi^*) \quad (3)$$

π^* is optimal inflation rate.

Figure 1 represents the relationship between π and π_{exp} . The policymaker's choice of π as a function of π_{exp} is upward sloping line with slope less than 1 ($0 < b^2/(a+b^2) < 1$).

Figure 1. The choice of inflation rate by policymaker in the absence of binding commitment



From this figure it is clear that in the absence of commitment policymaker has incentive to pursue expansionary policy by setting inflation rate higher than expected. So, both equation (3) and Figure 1 show that if public believes that policymaker will choose the optimal inflation rate π^* , policymaker is better off by choosing $\pi > \pi^*$, because in this case the marginal cost of higher inflation is zero, while marginal benefit of the resulting higher output is positive. However, this policy doesn't lead to output expansion, but only to the increase in inflation (emergence of inflationary bias). While economic agents are rational, they realize that government has incentive to cheat, choosing $\pi > \pi_{exp}$, and they respond by increase in their inflationary expectations. Thus in equilibrium $\pi = \pi_{exp}$ and we can rearrange equation (3) in the following way:

$$\pi_{exp} = \pi^* + (b/a)(y^* - y) = \pi_{eq} \quad (4)$$

So, public adjusts its inflationary expectations according to observed inflation rate, and the only equilibrium is for π and π_{exp} to equal π_{eq} and for y to equal y^* . Therefore, time inconsistent policy of government leads to increase in inflation without affecting output, while under binding commitment actual inflation rate equals its optimal level and output is at its natural level.

Rogoff (1985) and Barro (1986) propose two solutions to dynamic-inconsistency problem in the absence of binding commitments, involving issue of Central Bank Independence. Barro (1986) and Backus and Driffil (1985) describe the model of reputation, where reputation of Central Bank as a strong inflation fighter is a key element for maintaining low-inflation equilibrium. The authors assume that public is unsure about future policy and it forms its inflationary expectations, based on today's policy. Thus, the lower the inflation agents observe today, the lower their expectations of inflation in future periods. Policymakers have strong incentives to pursue tight monetary policy, because they know that if they deviate from the low-inflation solution, credibility is lost and public expects higher inflation in future. Or in other words, if we have repeated game, government can be punished by agents for cheating and this punishment is represented by the loss of reputation. Therefore, granting Central Bank high independence and making low inflation its main objective maintain his reputation as inflation fighter and reduce incentive of government to deviate from low-inflation policy.

Rogoff (1985) employs another approach in resolving dynamic inconsistency problem. He suggests that expected inflation is lower when monetary policy is controlled by Central Banker, who is known to be especially averse to inflation. This conservativeness of Central Banker means that

he places more weight on inflation in his objective function than society as a whole does. So, CB loss function is:⁷

$$L' = \frac{1}{2}(y - y^*) + \frac{1}{2}a'(\pi - \pi_{exp}), \quad y^* > y^* \quad a' > 0 \quad (5)$$

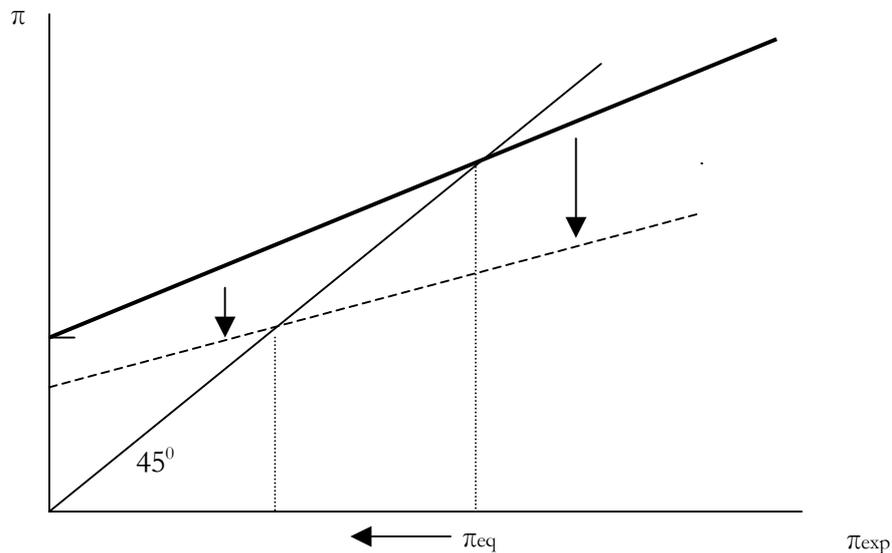
where $a' > a$ represents weight CB places on inflation objective.

Recalling expression (3) CB chooses inflation rate as following:

$$\pi = \pi^* + \frac{b}{(a' + b^2)}(y^* - y^*) + \frac{b^2}{(a' + b^2)}(\pi_{exp} - \pi^*) \quad (6)$$

Figure 2 represents the case when monetary policy is controlled by someone who is known to be especially inflation averse. Now his response function is flatter than in previous case ($b^2/(a' + b^2) < b^2/(a + b^2)$ because $a' > a$) and thus he chooses lower π_{eq} than before.

Figure 2. The choice of inflation by conservative policymaker



⁷ Romer, David. 2001. *Advanced Macroeconomics*. New York: McGraw-Hill: 487

From both equation (6) and Figure 2 we clearly see that because $a' > a$ a Central Banker chooses a lower value of inflation for a given level of expected inflation than before. Besides, social welfare under conservative Central Banker is higher than in previous case. To see why it is so, let's look at social loss function. In both cases output is equal y' , but now π is closer to π^* because a' is higher than a . This means that social loss is lower in the model of delegation, which implies higher social welfare in latter case. Thus, inflation bias problem can be resolved through model of delegation – government delegates responsibility for monetary policy to an independent Central Bank.

2.2.2 Does Degree of CBI Affects Inflation Rate?

These two models clearly show that granting Central Bank higher independence eliminates the inflation bias problem and results in a decrease of average inflation. Theoretical findings about relationship between degree of Central Bank independence and inflation rate were summarized by Cukierman (1992), who states that:⁸

- The mean rate of inflation in a country is higher, the lower the independence of its CB.
- The variance of inflation in country is higher, the lower the independence of its CB.
- The lower the degree of CBI in a country, the lower is the average credibility, and the higher is the level of inflation uncertainty.

However, Maliszewski (2000) puts into doubt the existence of inflationary bias and therefore negative relationship between degree of CBI and inflation rate. He states that employment motive for monetary expansion (standard theoretical determinant of inflationary bias) has little influence in the transition environment. Very high inflation rates during the first years of

⁸ Cukierman, Alex. 1992. *Central Bank Strategies, Credibility and Independence*. Cambridge, Mass.: MIT Press: 354

transition reduce the length of nominal contracts, promoting various indexation schemes, and thus lower potential gains from activist policy.⁹

2.2.3 Relationship between CBI and Economic Growth and Budget Deficit.

The model of delegation also implies that Central Banker whose main objective is low inflation may not respond optimally to output shocks, because he cares only about inflation rate and doesn't pay attention to output and employment levels. Thus, Rogoff model implies that higher degree of CBI results in lower average inflation, but in greater output variability. However, latter statement was not confirmed by empirical findings, and as stated by Alesina and Summers (1993), granting greater Central Bank Independence is a free lunch. In addition, Alesina and Gatti (1993) show that independent CB eliminates "politically induced" output variability, i.e. independent CB is free from political pressure and its policy doesn't depend on fluctuations in political cycles.¹⁰

Nevertheless, in the theory of Central Banking it is difficult to find the model, which can clearly describe the relationship between the degree of CBI and output performance. But, as mentioned above, there are few theories, which imply negative relationship between the degree of CBI and inflation rate; moreover, the existence of such relationship is confirmed by empirical studies. At the same time Barro (1995) and Bruno and Easterly (1996) find a negative correlation between high inflation and economic growth. Fisher, Sahay and Vegh (1996b), using data from transition economies, find that positive growth in post-communist economies resumes within two years of inflation falling below 50%. However, these empirical findings

⁹Maliszewski, Wojciech S. 2000. Central Bank Independence in Transition Economies, CASE:

give little evidence that such relationship is causal. For example Romer (2001) shows that in short-run negative supply shock is associated with both higher inflation and lower productivity growth, while in the long run, governments that follow policy, which can hurt the growth – protectionism, large budget deficits and so on, probably pursue the policy that results in higher inflation. Besides, rate of growth can go up not because of cutting inflation, but also due to implementing of budgetary and policy reforms. In short, as empirical findings confirm, high inflation hurts economic growth, therefore granting Central Bank a higher degree of independence can affect the rate of growth through reduction in inflation.

Sikken and De Haan (1998) describe possible theoretical link between degree of CBI and budget deficit. They state that high degree of CBI prevents government from creating large budget deficit, because government officials know that they cannot simply monetize this deficit in the presence of highly independent Central Bank. Let me note that it is especially clear for transition economies, where money creation often is the only way of financing budget deficit, assuming weak financial markets and heavy burden of foreign debt.

The authors cite four possible channels, through which excessive government expenditures can lead to money creation. First is political pressure to stabilize interest rates, which is the case in countries where stabilization of interest rates is the objective of the Central Bank. If increase in government debt pushes interest rates upward, the Central Bank will be forced to stabilize them by monetizing the budget deficit. A second example of such relationship comes from the already familiar dynamic inconsistency problem. In situation, when nominal interest rates are fixed and government debt is mainly long-term, government can set inflation rate (by pursuing active mone-

¹⁰ Alesina, Alberto, Roberta Gatti. 1995. "Independent Central Banks: Low Inflation at No Cost?", *American Economic Review*, Vol.85:200.

tary policy) higher than already determined expected inflation rate. This surprise inflation reduces the real value of the interest-bearing debt. Third channel is well-known seigniorage motive, when government finances its activities by simply printing money, which works as a mode of taxation. It is clear, when CB is dependent from government, it does not care much about balancing the budget, because it knows that excessive spending can be financed through seigniorage by printing money. And the last linkage between budget deficit and money growth is fiscal dominance hypothesis. According to it, monetary policy in a given country is dominated by fiscal policy, i.e. monetary authorities are forced to finance fiscal activities by money creation.

As I think, however, the causal link from CBI to size of budget deficit can work sometimes in opposite way. If government is inclined to have large deficit, it will try to reduce actual independence of Central Bank, even when legal CBI is high. It seems to be the case for Belarus, where government pursues active fiscal policy, thus creating large budget deficits, and actual CBI is significantly lower than legal. This question is examined thoroughly in section 4. Another possible link is that countries, where budget deficits are historically high (for example because of peculiarities of economic and political systems), try to stop this practice by granting CB high degree of legal independence. But finally, let me conclude with opinion that size of budget deficit is affected by legal CBI, while degree of actual CBI partially depends on fiscal practice in a given country.

Section 3

3. Empirical Part

3.1 Data Description

Most of the data used in this paper is from IMF working papers, EBRD Transition Report 2000 and World Bank World Development Indicators. The data on CBI indices is taken mainly from papers of authors of indices.

The problems with macro data from transition economies are well known and let me cite the most serious of them.¹¹ First of all, output data is likely to be seriously biased for both conceptual and measurement reasons. As for the first reason, before transition relative prices in socialist countries were different from the world prices and quality of goods was typically poor. Thus, combined effect of these factors tends to overstate the output decline in former socialist countries at the early stages of transition. The serious measurement problem arises because of the development of untaxed economy and weakness of statistical offices in these countries, which lead to the situation when new activities of non-state sector are not included in the statistical net. All this caused the understatement of rates of growth in official data. For example, Berg and Sachs (1992) estimate the growth rate of GDP in Poland in 1990 based on consumption, investment and net export. They find that decline in output in Poland in 1990 equals 4.9%, while official data reports the number of 12%. Some of the measurement problems can be surely related to inflation rates. Inflation at early stages of transition tends to be overestimated because of changing quality of goods, i.e. before transition goods were in general of poorer quality and it is difficult to compare prices on it with prices of new goods, which become available during transition.

¹¹ See for example Fischer, Stanley, Ratna Sahay and Carlos A. Vegh. 1996a. "Stabilization and Growth in Transition Economies: The Early Experience", *The Journal of Economic Perspectives*, Vol.10, № 2

Rate of growth of real GDP per capita is measured in percents relative to previous year. GDP per capita and FDI are measured in US dollars. Budget deficit, which is proxied by general government balance and measured as a share of GDP (when deficit enters with positive sign), is taken from EBRD Transition Report. Data on structural reform indices is taken from Fischer and Sahay (2000) and EBRD Transition Report 2000. And finally, war dummy and natural resource endowment variable are from de Melo et al. (1997).

All variables are taken as average over the specified period, which is taken in transition time, following the method of Fischer and Sahay (2000). The reason for this is that former socialist countries stepped into transition process in different time, so their pattern of transition is not the same in calendar time. But if we look at the dynamics of, for example rates of real GDP growth in each country, in transition time we see that pattern is almost identical for all countries. Thus, I take all variables as average over nine years – from year of transition (T) to T+8. Also, the usage of average values helps to lessen the influence of temporary exogenous shocks, because taking the average mitigates the influence of one extreme value.

3.2 Econometric Models Used

Let me note first of all that econometric analysis in this section is based only on cross-section study – I analyze the influence of Central Bank Independence on economic variables in cross-country perspective. The reason for this is that degree of CBI is set by CB law, which is not subject to change every year. Actually, 18 out of 25 countries in our sample have adopted only one CB law since start of transition, so the degree of CBI in these countries is constant over last decade. Therefore, we are interested in cross-country differences in economic performance of transition economies.

3.2.1 A Sensitivity Analysis

The examination of determinants of economic growth is widely discussed subject in economic literature. The basic framework was proposed by Barro (1991). Levine and Renelt (1992) examine the determinants of economic growth in cross-country perspective, using sensitivity analysis invented by Leamer (1985). The main idea of this method is following: The set of regressors consists of three groups, first is a vector I of variables, which in past were shown to affect rate of GDP growth (Levine and Renelt include in this vector investment share of GDP, secondary school enrolment as a proxy for human capital, log of initial GDP per capita and finally annual rate of population growth); second Z vector of variables, which are likely to affect economic growth (in this vector big number of variables can be included, such as share of government consumption in GDP, export and import share of GDP, inflation rate etc, up to three Z variables are included in each regression); and finally it is a variable of interest M (in my case degree of CBI). The left-hand side variable is rate of real GDP growth per capita. In cross-country regression all variables are taken as average of annual values during examined period. So, the equation for economic growth is:

$$Y = \beta_i * I + \beta_m * M + \beta_z * Z + \epsilon \quad (7)$$

Equation (1) represents the cross-country economic growth equation and is estimated by OLS. Usually, variables are chosen in that way, which allows to avoid the endogeneity and multicollinearity problems. The robustness of M variable is checked with extreme-bound analysis. In order to M variable to be robustly correlated with GDP growth coefficient β_m should have predicted sign and be significant, whenever we change the specification of regression, substituting the variables in Z vector. Besides, the interval between lower extreme bound (the lowest value of $\beta_m - 2 * \sigma_m$) and upper extreme bound (the largest value of $\beta_m + 2 * \sigma_m$) should not include zero, in opposite case the relationship between M variable and rate of GDP growth is fragile.

The Levine and Renelt scheme is used by Akhand (1998) and de Haan and Kooi (1998) for estimation of the relationship between CBI and rate of economic growth. Both studies find that relationship between degree of CBI and rate of real GDP growth per capita is fragile.

In last years the great number of studies is devoted to the analysis of growth performance in transition economies.¹² According to comprehensive study by Berg et al. (1999), various initial conditions, for example GDP per capita in pre-transition year, years under communism, repressed inflation and some others, do not explain growth differentials in transition economies in cross-section studies, while they are important when panel data is used. Structural reform variables, such as indices of internal and external liberalization, EBRD index of price liberalization and private sector share in GDP, have positive and significant coefficients in all studies. So, they seem to be a powerful explanation of growth differentials in transition economies. Macroeconomic variables included in growth regressions are usually budget deficit and inflation. Studies of growth performance in transition economies do not indicate the existence of clear relationship between these variables economic growth. While Fischer et al. (1996b) finds the clear negative relationship between inflation rate and rate of GDP growth, Berg et al. (1999) and Abed and Davoodi (2000) do not observe such relationship. Christoffersen and Doyle (2000) find that war dummy (assigned 1 if during 1990-s country was involved in military conflict, otherwise 0) is highly significant and has large adverse effect on growth performance. Finally, Campos and Coricelli (2002) show that natural resource endowment (NRE) variable (assigned 2 for rich NRE, 1 for moderate and 0 for poor) has negative effect on economic growth.

Here for estimation of the relationship between CBI and rate of economic growth I follow the analysis of Akhand (1998) and de Haan and

¹² Please for example de Melo et. al. (1997), Havrylyshyn et. al. (1998), Berg et. al. (1999), Fischer and Sahay (2000) etc.

Kooi (1998) and use the sensitivity analysis. However I slightly modify the variables in I and Z vectors, according to the specifics of growth performance in transition economies (based on the results from studies mentioned above). The problem with direct application of Levine and Renelt framework for analysis of growth determinants in transition economies is first mentioned by Fischer et al. (1996b), who says that traditional determinants of economic growth (population growth, investment rate etc) have little explanatory power of growth performance during the first stages of transition, but their importance rises with the extent of liberalization. So, here I combine in I vector variables from original set of Levine and Renelt and those variables, which were shown to be correlated with economic growth in transition economies. First I exclude from original I vector log of initial GDP per capita (it was mentioned above that it does not explain growth in transition economies in cross-country studies) and rate of population growth and then add cumulative liberalization index (CLI). So, now I vector is composed of three variables – CLI, secondary school enrolment (SEC) and investment rate of enterprises as a share of GDP (INV). Z vector contains both variables used originally by Levine and Renelt (rate of population growth, share of trade in GDP) and variables specific for transition – war dummy.

The maximum number of right-hand side variables in regressions is restricted to seven. It is important because the sample is small, so the results can be sensitive to the number of variables included. Following the suggestion of Levine and Renelt the variables which can measure the same phenomenon, i.e. various liberalization indices, are excluded from the regression in order to avoid collinearity problem.

So, in order to estimate the relationship between CBI and rate of real GDP growth per capita I run the total of eight regressions, where each regression contains I and M variables, and up to three Z variables are included in each regression. Strong restrictions imposed on the rule of inclusion of variables help to avoid collinearity and endogeneity problems. Thus the model

is estimated by OLS. If Cook-Weisberg test indicates the presence of heteroscedasticity, which is common problem in cross-section studies, robust standard errors are used in order to eliminate heteroscedasticity. The usage of robust standard errors is necessary here, because in this analysis we are interested first of all in significance of coefficient of M variable. But in the presence of heteroscedasticity the estimates are inefficient, so it can affect the value of t-statistic, and thus our conclusion about significance of coefficient.

The results of sensitivity analysis are presented and discussed in Section 3.3.

3.2.2. Estimation of the Relationship between CBI and Size of Budget Deficit and Foreign Direct Investment.

Unfortunately, there is no standard specification, which is used for analysis of determinants of budget deficit. For example, previous studies by Sikken and de Haan (1998) and de Haan and Kooi (1998), who estimate the relationship between degree of Central Bank Independence and size of budget deficit use the simplest specification, where there is only one right-hand side variable (CBI). Probably it is not exactly correct and it is indicated by the value of R-squared, which is close to zero in both studies.

So, in my study I try several specifications estimating the impact of CBI on budget deficit in transition economies. First, I run the regression with only CBI index (I use two indices – LVAW and GMT) as independent variable. Then I control for countries-outliers, adding to the right-hand side of the regression the dummy, which assigns a score of one to the countries where budget deficit is enormously high because of the reasons that are not captured by included variables. Also, based on studies of Piitila (2000) and Abed and Davoodi (2000), I include in my analysis as independent variables cumulative liberalization index and rate of growth of real GDP per capita. As for latter variable we can suspect its endogeneity with budget deficit. But previous studies for transition economies (see above) do not indicate the pres-

ence of influence of budget deficit on growth rate. Besides, the absence of endogeneity is also confirmed by the value of correlation coefficient between these two variables (it equals approximately -0.3). Inclusion of exactly these factors into regression seems reasonable, because advancement in structural reforms (privatization, price and trade liberalization) clearly promotes budgetary efficiency, lowering the size of budget deficit, while higher growth rates probably imply the strengthening of fiscal discipline.

In order to check the correctness of chosen specification I perform RESET test, which answers the questions about specification, i.e. does the model suffer from omitted variables problem or is the functional form of the relationship correct? Also, I perform Cook-Weisberg test for heteroscedasticity (again we have cross-section, so we expect heteroscedasticity here) and use robust standard errors when heteroscedasticity is detected. Chosen specifications allow me to avoid collinearity and endogeneity problems, so the model is estimated by OLS.

The results of estimation and its discussion are presented in the next section.

Finally, the impact of the degree of CBI on level of FDI is estimated also using different specifications. Again, I start with specification when only degree of CBI is independent variable. Then I control for other factors. Selowsky and Martin (1996) and Abed and Davoodi (2000) find that level of foreign direct investment in transition economies depends on advancement in structural reforms (measured again by cumulative liberalization index) and natural resource (oil and gas) endowment (measured by NRD dummy, which assigns a score of 1 to countries with rich natural resources endowment). I use in my model the level of Foreign Direct Investment per capita, which is measured in dollars. The same method is used by Abed and Davoodi in their study of determinants of FDI in transition economies.

The model is estimated by OLS, the tests for heteroscedasticity and specification error are performed. The results of estimation are presented and discussed in next section.

3.3 Analysis of Results

Let's first consider the results of Sensitivity Analysis. Table 2 shows the results when only I variables are included as regressors.

Table 2. The basic determinants of economic growth in transition economies.

Regression with robust standard errors						
Number of obs = 23						
F (3,19) = 17.86						
Prob > F = 0.0000						
R-squared = 0.5619						
Root MSE = 2.1731						

GDPpct		Coef.	Robust Std. Err.	t	P> t	-

+						
CLI		1.235473	.2888158	4.278	0.000	
SEC		.1507247	.0418604	3.601	0.002	
INV		.0088547	.0615898	0.144	0.887	
_cons		-21.42111	3.336174	-6.421	0.000	-

Cook-Weisberg test indicates the presence of heteroscedasticity, so robust standard errors are used. Results of the estimation show that usage of these variables in I vector is reasonable – coefficients of cumulative liberalization index and secondary school enrolment are of predicted sign and significant at 1% level. It means that in transition economies advancement in structural reforms and human capital endowment are important determinants of economic growth. However, the coefficient of investment rate is insignificant and very low in absolute value. Probably, such results are due to the lack of data. Fischer et al. (1996b) shows that investment rate has significant positive effect on rate of economic growth when panel data is used. They con-

clude that higher investment rate promotes higher growth when transition economies move further away in its transition. So, based on this statement, I include investment rate in I vector, even though my estimation does not detect the existence of clear link between investment rate and growth performance in transition economies.

Table 3 presents the results of sensitivity analysis. I use two indices of legal CBI as variable of interest, but this doesn't alter the results significantly.

Table 3. CBI and Growth. Sensitivity Analysis.

(Dependent variable is average growth of real GDP per capita from T to T+8 year)

M-variable	β		St. error	t-statistic	R-squared	Other variables	Robust/fragile
LVAW	high	3.22	3.69	0.87	0.61	POPgr, TRsh	Fragile
	base	1.53	4.24	0.36	0.57		
	low	1.33	4.38	0.3	0.57	POPgr	
GMT	high	0.64	0.42	1.52	0.68	POPgr, TRsh, WD	Fragile
	base	0.19	0.25	0.79	0.58		
	low	0.15	0.29	0.51	0.6	WD	

Notes: The base β is the estimated coefficient from the regression when only M and I variables are included. The high β is the estimated coefficient from the regression with the extreme upper bound ($\beta +$ two standard deviations), the low β is the coefficient from the regression with extreme lower bound.

The results in Table 3 show that the relationship between CBI and rate of growth of real GDP per capita is fragile: β coefficient is insignificant, though it has predicted sign, whenever we change the specification. This conclusion is the same for both indices of CBI. The difference in β coefficients of LVAW and GMT indices is explained by the fact that these two indices are constructed by different scale: LVAW varies from 0 to 1, while GMT can take values from 0 to 18.

So, applying sensitivity analysis I do not find the robust relationship between the degree of CBI and rate of growth of real GDP per capita. However, it can be explained by fact that Levine and Renelt scheme is rather strong as it is noticed by Sala-I-Martin (1997) – only few variables can pass this test. Therefore, the absence of robust relationship between CBI and GDP growth does not mean that these two variables are not related at all. Figure D1 in Appendix D partially confirms this suggestion: there is obvious positive link between CBI and GDP growth on the graph. Trend line is positively sloped, the value of correlation coefficient also points to positive correlation between CBI and growth.

In my opinion, such correlation does not mean that there is a causal link from CBI to economic growth (it is rejected by econometric estimation), but that these two indicators are moving together. I.e. probably high Central Bank Independence is only one element of the successful transformation package (where other elements are structural reform, macroeconomic stabilization etc) and adopting such package results in higher growth. So, co-existing of high growth rates and highly independent CB in transition economies is explained by some third factor, for example successful liberalization.

Now let's concentrate on econometric analysis of the relationship between degree of CBI and size of budget deficit. Table 4 shows a few specifications of this analysis – in regressions 1 and 4 the dummy for country outliers is included along with index of CBI (LVAW and GMT respectively) as independent variable. In regressions 2 and 5 I also control for real GDP per capita growth rate and in regressions 3 and 6 I include also cumulative liberalization index as RHS variable. I do not show here the results of basic regressions when only measure of CBI is included as RHS variable, because R-squared in these regressions is extremely low, which indicates that results of such estimations probably are meaningless.

Table 4. CBI and Budget Deficit. Econometric Estimation

(Dependent variable is average budget deficit as a share of GDP from T to T+8 year)

	1	2	3	4	5	6
constant	7.82*** (4.34)	4.48** (2.23)	5.06* (2.06)	5.8** (2.8)	2.62 (1.33)	3.64 (1.65)
LVAW	-6.39* (-1.9)	-2.13 (-0.64)	-1.6 (-0.44)			
GMT				-0.12 (-0.63)	0.05 (0.34)	0.18 (0.88)
BDoutl	9.16*** (5.96)	8.73*** (6.41)	8.51*** (5.76)	8.55*** (5.31)	8.39*** (6.29)	7.79*** (5.34)
GDPpc		-0.44** (2.73)	-0.39* (-2.07)		-0.5*** (-3.32)	-0.39** (-2.09)
CLI			-0.16 (-0.67)			-0.44 (-0.32)
R-squared	0.62	0.72	0.77	0.56	0.71	0.73
RESET test(p-value)	0.22	0.3	0.35	0.12	0.16	0.31
N (obs)	25	25	25	25	25	25

Notes: t-statistics are in parenthesis, *** - significant at 1% level

** - significant at 5% level

* - significant at 10 % level

Based on the results from Table 4 we can conclude that there is no clear relationship between CBI and size of budget deficit in transition economies: The coefficients of LVAW and GMT are insignificant in all regressions, except regression 1 where coefficient of LVAW is significant at 10% level. P-value of RESET test of specification error shows in all cases that specification of equation is correct.

The results of econometric estimation are in line with graphical representation of relationship between CBI and size of budget deficit. Figure D2 in Appendix D, as well as correlation coefficient, clearly show that there is no clear link between these two variables in transition economies. These findings confirm previous results of Sikken and de Haan (1998) and de Haan and Kooi (1998). So, let me conclude that in transition economies variations in Central Bank Independence across countries fail to explain the variations in size of budget deficit, which probably are explained by other factors – ad-

vancement in structural reforms, level of corruption, involvement in military conflicts, higher growth etc.

Finally let's examine the results of estimation of the relationship between CBI and level of FDI per capita in transition economies, which are presented in Table 5. Regressions 1 and 4 are base regressions, where only measure of CBI is included as independent variable. However, the explanatory power of these regressions is quite low, so we need to control for other factors, which can explain the variations in FDI across transition economies. Thus, I include in regressions 2 and 5 as independent variable cumulative liberalization index. And finally, in columns 3 and 6 of Table 5 I present the specification where in addition to variables from previous regressions dummy for natural resource endowment is included. This further increases the explanatory power of regressions.

Table 5. CBI and Foreign Direct Investment. Econometric Estimation

(Dependent variable is average FDI per capita in \$ from T to T+8 year)

Ind-t variables	1	2	3	4	5	6
constant	-33.4 (-0.96)	-51.0 (-1.4)	-89.4** (-2.16)	10.4 (0.26)	-7.72 (-0.31)	-2.36 (-0.92)
LVAW	154.5** (1.76)	67.5 (0.92)	115.1 (1.52)			
GMT				3.42 (0.94)	-3.74 (-1.28)	-2.97 (-0.99)
CLI		13.9** (2.47)	15.5*** (2.87)		20.9*** (3.1)	21.9*** (3.19)
NRD			41.3 (1.41)			19 (0.93)
R-squared	0.2	0.35	0.42	0.04	0.35	0.37
RESET test (p-value)	0.32	0.36	0.58	0.59	0.96	0.98
N (obs)	25	25	25	25	25	25

Notes: t-statistic is in parenthesis

***- significant at 1% level

** - significant at 5% level

* - significant at 10 % level

The results of the regression 1 in Table 5 show that higher degree of CBI results in large value of FDI per capita in transition economies and this relationship is significant at 10% level. However, as we see from regression 2, coefficient of LVAW became insignificant. Besides, coefficient of GMT index is insignificant in all specifications. Also, surprisingly in regressions 5 and 6 the coefficient of GMT became negative, which seems to be meaningless. So, based on results in Table 5 it is difficult to conclude that there is clear positive relationship between the degree of CBI and FDI per capita in transition economies.

Figure D3 in Appendix D shows the relationship between CBI and FDI on graph. On this figure this relationship is positive, but correlation coefficient is not high enough. Therefore, based on both econometric estimation and graphical representation, we can state that there is no clear link between Central Bank Independence and FDI per capita in transition economies. Probably, the major factor affecting the level of FDI in transition economies is advancement in structural reforms.

However, while I do not find through econometric estimation the clear relationship between the degree of Central Bank independence and rate of real GDP growth, size of budget deficit and level of Foreign Direct Investment, let me present here the piece of evidence, based on data from transition economies, that the degree of CBI is negatively correlated with inflation rate. In order to show this I run a few regressions with inflation as a dependent variable and CBI index LVAW as independent variable and also controlling for some other variables, which seems to be powerful in explanation of cross-country differences in inflation performance over last decade. Table 6 presents the results:

Table 6. CBI and Inflation. Econometric Estimation

Number of obs = 25
 F(3, 21) = 19.29
 Prob > F = 0.0000
 R-squared = 0.7337
 Adj R-squared = 0.6957
 Root MSE = .0815

dt	Coef.	Std. Err.	t	P> t
LVAW	-.2878853	.1309601	-2.198	0.039
lii	-.3996584	.1492572	-2.678	0.014
repi	.004471	.0018624	2.401	0.026
_cons	.7116025	.117106	6.077	0.000

The dependent variable in this regression is the rate of depreciation in the real value of money, which is measured as $F/(1+F)$ where F is annual inflation rate. This measure has two advantages over the rate of inflation according to Cukierman (1992). First it diminishes the influence of outliers, which is important consideration for the data from transition economies where inflation rates vary greatly from country to country. Second, the real losses on holding of money balances, i.e. the impact of inflation on individuals, are more accurately represented by depreciation rate than inflation rate. The right-hand side variables are the measure of CBI LVAW, the value of repressed inflation at the beginning of transition process (*repi*) and index of internal liberalization (*lii*) proposed de Melo et al. (1996). All variables in regression, except *repi*, again are taken as average from T to $T+8$ year.

It is clear from Table 6 that the coefficient of LVAW variable is negative and significant at 5 % level, while overall goodness of fit of regression is very high and all coefficients are significant and have predicted signs. Actually the coefficient of LVAW variable remains negative and significant in other regressions (not shown), where we change specification and control for other variables or include only LVAW as RHS variable.

As we see, both regression from Table 6 and Figure D4 in Appendix D, as well as correlation coefficient, indicate that in transition economies in last decade higher Central Bank Independence is associated with lower inflation.

So, our econometric estimations show that the degree of Central Bank Independence does not cause higher growth rate of real GDP per capita, lower size of budget deficit and higher level of Foreign Direct Investment per capita; but it is associated with lower inflation in transition economies. However, these results can be sensitive to the sample size and to the discrepancy between actual and legal CBI. As for the first factor, we can do nothing about it. Regarding the discrepancy between actual and legal CBI, it is stated in some studies, and actually it is shown in this study on the example of National Bank of Belarus, that de-facto CBI can be significantly lower than de-jure independence of CB (see next section). Such discrepancy can alter the results of estimations of relationship between CBI and various economic variables, making them meaningless. Because in this case index of legal CBI is not an appropriate proxy for actual independence. This is the issue of next section.

Section 4

4. Practice of Central Banking in Belarus

4.1 The History of Central Banking in Belarus

The practice of Central Banking in countries in transition, to which Belarus belongs, is different from that in developed countries. Until 1991 Belarus was never the independent state. It has been the part of Poland, Russia and the Soviet Union. So, the process of building of banking system here differs from that of not only in developed countries, but even in Eastern European former socialist economies. In these countries Central Banks exist for a long period of time, usually transforming from commercial banks. But the National Bank of Belarus as independent institution was created only in 1990. Thus, officials of newly created CB were faced the enormous task of institution building.

During Soviet times the main bank of Belarus was GosBank of Belarus, which was completely controlled by Soviet GosBank. GosBank was the main institution of one-tier Soviet Banking system, which also contains specialized banks – StroyBank (construction sector), VneshTorgBank (foreign trade operations), AgroPromBank (agriculture and industry sectors) and SberBank (accumulating personal savings). According to Tosunyan et al.(1999), GosBank, actually, was the ministry of banks, it regulated and controlled all banks and was responsible for their liabilities.¹³ GosBank was the only emission center, accumulated the deposits of enterprises, organizations and other banks, performed currency operations and financed the activity of state enterprises and organizations. Thus, the term Central Bank independence was meaningless at that time.

¹³ Tosunyan, G.A., A. Y. Vikulin, A. M. Ekmalyan. 1999. *The Banking Law of Russian Federation*, Moscow, Yurist: 313 (on Russian)

Announcing independence in 1991, the Belarusian government faced the task of building a two-tier banking system, with the National Bank of Belarus at the top of that system. Departments and branches of former the Belarussian GosBank were separated from the monobank and established as commercial banks. The new Banking Code endowed the Belarussian National Bank with monetary policy competences and a substantial degree of legal independence, thus making the National Bank one of the key players in economic policy.

The Central Bank law was introduced exactly before the time, when Belarus was stepped into hard and painful process of transition from planned to a market economy. In 1993 real GDP had fallen by almost 10% as a result of collapse of established production structure. At the same time, for two years, 1993 and 1994, Belarus experienced hyperinflation, when annual inflation rates were more than 1000%. Hyperinflation was the result of elimination of monetary overhang, which was substantial during Soviet times when money emission was uncontrollable. But inflation rates were low, because of price control, which led to high repressed inflation. So, liberalization of prices transformed repressed inflation into open, which made a great jump to hyperinflationary levels.

So, introduction of Central Bank law, which gives high independence to the Central Bank, could not bring immediate results in cutting inflation and stabilizing output. The very high degree of independence, which was granted by almost all transition countries to their Central Banks at the early stages of transition, was not considered as an important instrument in macroeconomic stabilization. Instead, according to some researchers¹⁴, high degree of legal CBI in transition economies has other

¹⁴ Please see for example: Cukierman, Alex, Geoffrey Miller, and Bilin Neyapti. 2001. *Central Bank Reform, Liberalization and Inflation in Transition Economies – an International Perspective*, Department of Economics, Tel-Aviv University, Working Paper: 10; or: Radzyner, Olga, Sandra Riesenger. 1997. “Central Bank Independence in Transition: Legislation

degree of legal CBI in transition economies has other roots. First, some of countries in transition have concluded Association Agreements with the European Union (EU) and have officially applied for EU membership. But standards of Maastricht Treaty, as for CBI, are rather strong because they are based on framework of Bundesbank, which considered being the most independent Central Bank in the world. Therefore, in order to fulfill these requirements transition countries ought to make their Central Bank highly independent. However, it is not the case for Belarus, which is not going to apply for EU membership in near future. Second, the successive example of Germany, where high degree of CBI contributes significantly to price stability, stimulates former socialist economies to adopt progressive Central Bank legislation. Even if higher CBI is useless during early stages of transition, it can be important later, when inflation would stabilize at some low level. Now issue of credibility of CB policy is very important, because public experienced high inflation in the past and it is really afraid of it in future, which means that inflationary expectations of agents are not stable and even small shift in CB policy can cause big rise in such expectations. And the last reason for high degree of CBI in transition economies is the importance of establishing and then maintaining the confidence of international financial markets in domestic market. In this case braking old traditions of monetary policy and protecting CB from political interference work as a signal for foreign investors about stability of national economy.

The first Central Bank law in Belarus was in line with analogous laws in other transition countries, granting the National Bank of Belarus high degree of legal independence. For example price stability was stated as the main and only one objective of CB. Besides basic points of legislation about policy formulation mechanisms and status of officials of the National Bank

and Reality in Central and Eastern Europe”, *Focus on Transition, Austrian National Bank*, , Vol.1 :61.

clearly conforms to standards of Bundesbank. But new Banking Code adopted in 2000 reduces the independence of Belarussian National Bank, which is very surprising, because in other transition countries the second CB law gives the Central Bank significantly higher degree of independence (the clear example is Poland, when LVAW index of CBI according to first CB law was 0,46 out of 1, while second CB law makes Polish CB the most independent in transition economies – LVAW = 0,89).

Thus, at the present time the activity of National Bank of Belarus is regulated by recently adopted Banking Code (2000) and Central Bank Statute. Central Bank Law, which is the part of Banking Code, contains the basic provisions concerning CB activity, while CB Statute concentrates mainly on some aspects of it, describing in details the functions of CB, its status and operations. The inclusion of Central Bank Law into Banking Code was heavily criticized by IMF experts¹⁵, who state that CB law and commercial banks legislation should be adopted separately for two reasons. First, these two laws are very different, because they deal with different issues, and second, they should be coordinated in order to eliminate contradictions, which is difficult to do, while these two laws are combined in one.

4.2 Legal Independence of Belarussian Central Bank

Legal independence of Central Bank usually is calculated based on legal provisions of CB law. Almost all indices of legal CBI (please see Table 1) cover the issues of statutory, financial and personal CB independence. Appendix A contains the extractions from Banking Code of Belarus, concerning these aspects of CBI. I use these provisions in order to calculate legal CBI in Belarus, based on new Banking Code, employing Cukierman (1992) procedure. But, first of all I present the calculation of Cukierman's index LVAW based on first CB law in Belarus

¹⁵ Comments on project of Banking Code of the Republic of Belarus, prepared by experts of IMF Law Department, 12.01.2000: 1

Cukierman's index gains high popularity because of his consistency – measuring of CBI is based on 16 characteristics, which involve almost all aspects relating to CBI, and scores are assigned according to clear criteria, that soften the problem of subjectivism. These 16 characteristics are divided into 4 subitems. First are variables on the status of Chief Executive officer, namely term of office, appointment and dismissal procedures and incompatibility clauses. Second group consists of policy formulation variables – who formulates monetary policy, final authority in conflicts between CB and government and CB role in formulating of government budget. Third element is legislated CB objectives. And the last group contains variables, which indicate limitations on lending by CB: lending in form of advances, securitized lending, control over terms and type of lending, circle of potential borrowers, maturity of loans, restrictions on interest rates and CB purchases on primary market. Table B1 in Appendix B presents the score of each variable applying to two Central Bank laws in Belarus.¹⁶

Based on this table I reestimate Cukierman's index LVAW for Belarus after adopting Banking Code in 2000 (the procedure of calculation is described in Appendix B). I find that LVAW equals 0.52 out of 1, while originally Cukierman himself find LVAW for Belarus equaling 0.73. Previous result for degree of CBI in Belarus has fifth rank among 26 transition economies. But now Belarus has only 14-th rank. So, here is rather surprising situation, when second CB law reduces, not increases, legal CBI.

Now let's turn to examining main determinants of legal CBI in Belarus. First I look at those variables included in Cukierman's analysis, then discuss a little bit GMT index of legal CBI, and finally present some legal provisions, which are not covered by these two indices. As we see from table B1 newly adopted Banking Code restricts personal independence of CB gover-

¹⁶ The scoring procedure is examined in great details in Cukierman (1992)

nor. Term of office was reduced from six to five years, but the most interesting point is the dismissal procedure of CB governor. Previous law contained no provisions for dismissal, which gives maximum score of 1. Recent law cites some reasons for dismissal (please see Table A1 in Appendix), which are similar to those in other countries and do not reduce the score much, but it also contains one more reason for dismissal – because of conducting illegal activities, which can lead to the loss of confidence in that person. Besides, according to CB law, CB governor can be dismissed when his qualifications do not fulfill the requirements of occupied position. Certainly, these two reasons reduce personal independence of CEO substantially, because such unclear statements can be interpreted in different ways, which creates the room for pressure on CB governor. Other two variables from first group keep the same score. Let's note that score 0.5 for appointment variable means that CB governor is appointed by president with approval of parliament (however in case of Belarus it means that president solely appoints CEO because parliament is completely dependent on president).

The second group of variables (policy formulation) examines the relationship between CB and government in process of formulation monetary policy, resolution of conflicts and preparation of government budget (legal provisions concerning these characteristics are presented in Table A2 in Appendix). The scores in this group are the same. However, let's note that previous CB law gave Central Bank an exclusive right for formulation and implementing monetary policy, while parliament could only give recommendations to CB and none of state officials could interfere in activity of CB. This point should give maximum score of 1 for *monopol* variable (please see table B1), but Cukierman assigns to it a lower score.

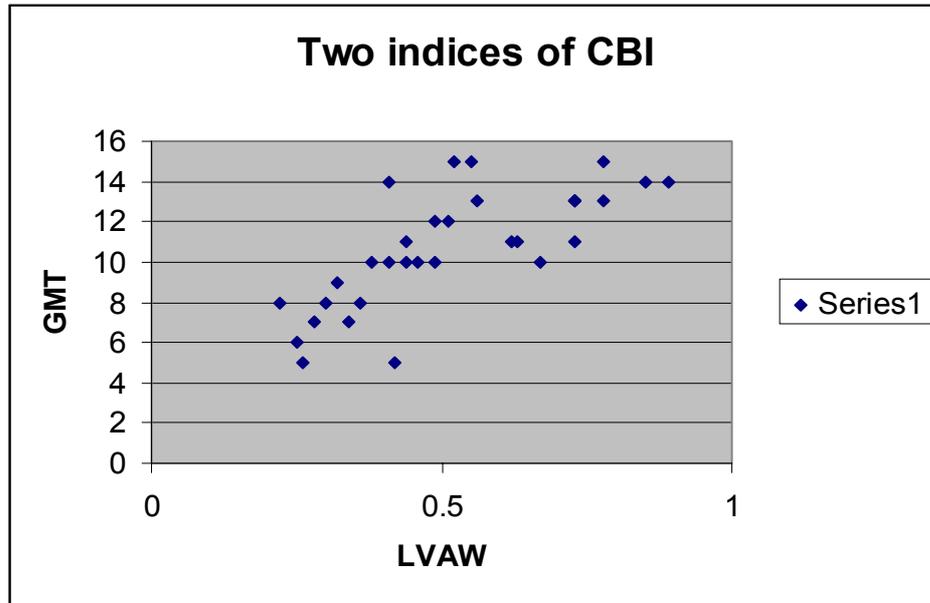
The last group contains variables, which indicate the possibility of fiscal financing by Central Bank in form of advances, primary market operations and securitized lending (Table A3 in Appendix). This question is

painful for Belarus, where CB is often used as a source of financing government activities. It is mainly explained by soft budget constraints, which still exist in Belarussian economy – the large-scale enterprises are not privatized, the effective procedure of bankruptcy is not created, thus government support state enterprises. However, first CB law was rather progressive in this issue. It prohibited financing of government in form of advances, as well as operations of CB in primary market. Besides, maturity of loans was limited to a maximum of 6 month, which gives a maximum score to *lmat* variable. But, at the same time, previous law contained a few potentially dangerous points. First, limit on lending was specified as a percentage of government expenditures, which hardly reduces government incentive to inflate budget deficit. Moreover, there were no explicit legal provisions regarding the interest rate on CB loans, which creates the room for rent-seeking. But despite in general the high de-jure independence of CB in this issue, stipulated by law, in practice Central Bank was often overridden by president and government, especially after 1995, when strengthening of power of president was contingent with increase in fiscal expenditures of government. This issue will be examined in details in next subsection.

Another index of legal CBI - GMT is constructed by Grili, Masciandaro and Tabellini (1991) and updated for transition economies by Maliszewski (2000). GMT index is composed from 16 variables, which are almost the same as in LVAW index (the scoring procedure of GMT index and its calculation for Belarus are presented in details in Appendix B). Difference is that GMT index, in contrast to Cukierman index, covers the appointment and dismissal procedures of CB board members. Also, scoring procedure of GMT index differs from that of LVAW index and involves higher degree of subjectivity. Authors of GMT index allow only two scores of 0 and 1 for each variable (actually for two variables they allow three values – from 0 to 2), while Cukierman's procedure is more flexible – it allows distinguishing between rather close states. However, despite the differences, values of GMT and

and LVAW indices in transition countries are highly correlated, which is clear from Figure 3.

Figure 3. Relationship between GMT and LVAW Indices of CBI in Transition Economies



Correlation coefficient is 0.742

So, the calculation of GMT index for Belarus is based on almost the same legal provisions, which were used in calculating LVAW index. But also we should look at the procedure of appointment of CB board members in Belarus. They are appointed by president with the approval of parliament. However, as I have stated above, de-facto it means that president himself chooses CB board. The term of office of CB board member is five years and there is no mandatory government representative in CB board. However, the provisions for dismissal of members of CB board are also unclear as for CEO dismissal (please see above), which again reduces de-facto their independence from president.

But there are some aspects of legal CBI, which are not covered by LVAW and GMT indices. First of all, it is financial independence of CB. Because CB does not belong to the system of state institutions, it is not fi-

nanced from government budget and makes profit from his commercial activity. New CB law contains some points, which reduce substantially financial independence of CB: 1) Expenditures and investment of CB is determined according to plan, which is created by CB board and approved by president; 2) All amendments to this plan should be approved by president; 3) The distribution of profits of CB is determined by budget law.

And finally there are issues of audit and control of CB activity. President himself appoints auditors, while ideally it should be independent auditors. Besides, CB officials should give to the president any information upon request, concerning activity of CB and other financial institutions.

Analysis of current CB legislation in Belarus clearly shows that previous paradox, when legal CBI was significantly higher than actual, disappears. However, in next subsection I examine the main factors, which contributes to existence of such paradox a few years ago.

4.3 The Actual versus Legal Central Bank Independence in Belarus.

Unfortunately, existing indices of legal CBI inadequately measure in some cases the actual independence of Central Bank. There is a plenty of reasons for this. Nice summary of this issue is provided by Cukierman (1992), so let me mention only the most important reasons. First, it is almost impossible to include all relevant factors concerning CBI in legislation. Second, the political, legal, economic and cultural evidence differs from country to country and each of them affects the degree of CBI on practice. One famous example cited by Cukierman is Argentina, where while legal term of office is four years, there is informal tradition of resignation of CB governor whenever there is a change in government. This makes position of CEO extremely vulnerable. Also Cukierman states that actual and legal independence is almost the same in developed countries, where political and economic environment are stable and there is no urgent need to override the Central Bank.

The situation is opposite in developing countries where government operates under high budget deficit and political system is fragile, all this creates an enormous pressure on CB, and even if legally CB is granted high independence (for example in order to follow the requirements of IMF), on practice it can be highly dependent from state officials. Cukierman et al.(2001) also cite some reasons, why actual and legal degree of CBI can differ in transition economies. The main reason is that general compliance with law in former socialist economies, especially in those, which were before the part of other country (Belarus is example), is low, because it was low under authoritarian socialist system. However, this compliance increases with advancing in transition process.

The problem with actual CBI is that it is extremely difficult to measure. Up to now there are only two indices, which may be the reasonable proxies for actual independence of Central Bank. First is turnover rate of the governors (TOR), which is constructed by Cukierman (1992). It is calculated by dividing the number of CB governors by the length of the reference period. So, probably TOR index adequately measures personal independence of CB governor, and thus gives a sign about actual CBI, but only if observation period is rather long., which is so for developed and developing countries (Cukierman (1992) calculates TOR for such countries for period 1950-1989). However, for transition economies observation period is only 11-12 years, which is not enough in order to state unambiguously that TOR clearly reflects the actual independence of CB. For such short period even slight changes in length of reference period or in number of governors alter the result substantially. But the reasons for premature termination of governor's term can be sometimes non-political, for example health status of CB governor. So, with such short reference period dismissal because of health status has significant influence on value of TOR, and therefore not adequately reflects the degree of actual CBI.

Nevertheless, let's calculate TOR index for Belarussian CB. Reference period is January 1991-February 2002 (eleven years).

$$\text{TOR (Belarus)} = 4/11=0.36$$

Table C1 in Appendix C shows the TOR indices for selected countries, based on Cukierman (1992) and Dvorsky (2000) calculations. Comparing TOR index for Belarus with that of in other transition economies, Belarus is on fourth place out of six. However, Cukierman (1992) defines the upper threshold value for TOR as 0.25, while higher numbers show that actual CBI is low. So, despite the TOR index estimated for such short period is not the best proxy for actual independence, it gives a sign that actual CBI in Belarus is lower than legal.

One more index which is often cited in literature as a proxy for actual CBI is an index of political vulnerability of CB governors. It is defined as an average number of politically induced turnovers of CB governors per political transition. However, it has the same problem in transition economies as TOR index – reference period is short. For example in Belarus during last 12 years there was only one political transition, so it is impossible to draw some conclusions about actual CBI in Belarus based on the value of this index.

Since neither turnover rate of the governors nor index of political vulnerability reflects the actual CBI in Belarus, I propose another method for measuring actual independence of Central Bank. It is based on examination of the deviations from legal CBI on practice. I.e. I compare provisions of Belarussian CB law, which are used in calculation of LVAW index of legal CBI, with actual practice. This method is in line with that of Radzyner and Riesenger (1997), who analyze actual CBI in four main dimensions: personal independence, political vulnerability of CB, gaps in CB legislation and financial independence on practice. But while these authors make this analysis just

verbally, step by step comparing actual and legal practice, I propose here a formal measure of actual Central Bank independence.

Certainly, the possible problem with this measure is its subjectivity - as deviations from legal provisions are not explicitly stated, their assessment is, necessarily, subjective. For example the evaluation of actual practice concerning the relationship between CB and the government in the process of formulation of monetary policy and resolution of conflicts heavily depends on the personality of the observer. On the other hand, some factors, for example the term in office of the Central Bank governor, can be easily captured and interpreted. It is the case for term of office of CB governor and limits on lending by CB to the government.

I undertake the evaluation of the actual level of Central Bank Independence in Belarus, using the Cukierman's (1992) methodology. The measuring procedure is based on the LVAW index, which is the most comprehensive measure used by Cukierman (1992). The advantage of this index is in its detailed scoring procedure. There are 16 sixteen characteristics, which are aggregated into a single index. Almost all variables can take four or five values, which significantly reduces the subjectivity while assigning the scores. Such detailed procedure minimizes the effect of subjectivity in the estimation of de-facto independence of CB.

The way I proceed is as follows. For each of the 16 variables I assess the actual practice in Belarus and assign the score on the basis of Cukierman's procedure. In case when the information is insufficient I assume the actual practice is the same as the legal practice. I apply this procedure to the National Bank of Belarus for the period 1995-2000. The reason for selecting this period of time is that nearly in 1995 the political regime in Belarus was changed fundamentally after president Lukashenko came into the power in

1994; and, in 2000 a new Banking Code was adopted. Let me now turn to the detailed calculations.

1. Personal Independence of CB Governor

Assessing personal independences of governors of Belarussian National Bank let me start with presenting Table 7, which summarizes all relevant information about CB Governors in Belarus over last decade.

Table 7. The Governors of Belarussian National Bank (1991-2002)

CB Govern- ors	Appoint- ment/Dismissal Date	Profession	Previous Posi- tion	Reason for Dismissal
Stanislav Bogdanke- vich	January 1991 /August 1995	Economist	The Dean of Banking and Credit Depart- ment of Belarus- sian State Eco- nomic University	Resignation be- cause of disap- proval with pol- icy of president
Tamara Vin- nikova	February 1996 / January 1997	Economist	The Head of Board of Direc- tors of “Belarus- Bank”	Accusation of misappropriation of state property
Gennadiy Aleynikov	January 1997 /March 1998	Economist	The Head of Board of Direc- tors of “BelVne- shEconombank”	Inability to hold the position be- cause of low qualification
Pyotr Pro- kopovich	March 1998	Builder	First Vice – Pre- mier of Govern- ment	

1.1 Term of office (*too*)

While, de-jure, the term in office of the governor of the National Bank of Belarus is 6 years, the actual term over the period 1991-2002 (see Table 7) is 3 years (4 governors in 12 years). In the 1995-2000 period it was even lower – less than 2 years. Using Cukierman’s (1992) criteria, this corresponds to the score of 0, rather than 0.75 (see Table 8).

1.2 Appointment procedure (*app*)

While the CB law stipulates that the governor is appointed by the president with the approval of parliament (score of 0.5), in practice he has been appointed by the president alone. This means that the governor is appointed solely by members of executive branch which, according to Cukierman's (1992) scoring procedure gives a score of zero.

1.3 Dismissal procedure (*dis*)

Over the period in question two out of three CB governors were dismissed for reasons not mentioned in the CB law (in order to see this you can compare last column in Table 7 with third column in Table A1 in Appendix A¹⁷). Clearly, the dismissal procedure is arbitrary and so the appropriate score is zero.

1.4 Incompatibility clauses (*off*)

There is no difference between legal and actual practice for this variable.

2. Independence in the Formulation of Monetary Policy

2.1 Formulation of policy (*monpol*)

While, according to CB law, the CB together with government participates in formulation of monetary policy, in practice the government alone is responsible for monetary policy, which is justified by the decree of president from 21.03.1998. This gives zero score for this variable. Actually, while the responsibility of government over monetary policy was justified by the decree only in 1998, indeed in 1995-97 years government also had a great influence on formulation of monetary policy. Probably for this period the most appropriate score is 0.33. So, the final score for this variable is found by calculating the average of two scores. And it is 0.17.

¹⁷ Tamara Vinnikova was dismissed for accusation of crime activity, but not **conviction of crime**, which gives us right to state that it was unconditional dismissal.

2.2 Resolution of conflicts between CB and government (*conf*)

While CB law stipulates that CB is powerful in this respect, in practice the government has a final authority in the case of a conflict with CB (it is justified not only by actual but also by legal practice – according to the law “About Standard Legal Acts of the Republic of Belarus” the legal status of standard acts of CB is lower than that of governmental decrees, so in case of any conflict government has the last word). This implies the score of 0.2.

2.3 Participation of CB in formulation of government budget (*adv*)

There does not appear to be a discrepancy between the actual and legal practice.

3. CB objective (*obj*)

It remains the same in practice as formally – the main objective of CB is the price stability.

4. Limitations to lending

In this group almost all variables are assigned the same score as for legal CBI. The only difference concerns the decision on the terms of lending by the CB (*ldec*). The CB law states that CB is given a legal authority to set the terms of lending. But, in practice, the amount, structure and interest rate on CB loans is specified by the budget law. This corresponds to the score of zero.

Table 8 summarizes these calculations and compares the legal and actual CBI in Belarus in 1995-2000 years.

Table 8. Actual and Legal CBI in Belarus in 1995-2000 period.

	Chief Executive Officer				Policy Formulation			Objec tives	Limitations on Lending							
	<i>too</i>	<i>app</i>	<i>dis</i>	<i>off</i>	<i>monpol</i>	<i>conf</i>	<i>adv</i>		<i>obj</i>	<i>lla</i>	<i>lls</i>	<i>ldec</i>	<i>lwidth</i>	<i>ltype</i>	<i>lmat</i>	<i>lint</i>
CB law 1991	0.75	0.5	1	1	0.67	0.8	1	0.8	1	0.33	0.67	0.33	0	1	0,25	1
Actual Prac- tice	0	0	0	1	0.17	0.2	1	0.8	1	0.33	0	0.33	0	1	0.25	1

It is clear from table 1 that, during 1995-2000, the actual independence of CB in Belarus was significantly lower than legal independence. While the calculation procedure is not ideal my findings show that for six out of sixteen characteristics the scores for actual independence are much lower than for legal independence; in no case the score is higher.

Using the two-round aggregation procedure of Cukierman, the actual level of independence of Belarussian National Bank in 1995-2000 years equals 0.48, which is significantly lower than the value of legal independence, calculated by Cukierman (0.73). The difference is significant: the value of 0.48 would place Belarus in the 17th place out of 25 countries in transition, while ranking by legal CBI gives Belarus 5th place (note, however, that in other countries actual independence may also be lower than formal independence).

Unfortunately, the scarcity of data and information on actual practice regarding Central Bank activity in other transition economies makes impossible at this stage the calculation of such index of actual independence for countries other than Belarus. But, the scoring procedure, which I use here for measuring actual independence in Belarus, is applicable elsewhere. So, fur-

ther development of the literature requires that similar comparisons between actual and formal indices of central bank independence are done for other transition economies. This would allow to answer the question whether monetary policy in transition countries is, in fact, more independent than in developed market economies, as indicated by Cukierman et al (2001) findings, or whether the difference is only the result of regulations and laws which are not observed in practice.

There is also another piece of evidence from Belarus, concerning personality of CB Governor, which while it is not captured by index of actual CBI definitely argues for existence of huge discrepancy between actual and legal CBI in Belarus. For example, the current governor of the National Bank Prokopovich was before the vice-premier of the government, which indicates his close informal relations with executive power. Besides, he is not professional economist, which gives us right to say that probably he is not independent in his activity, but depends on president and government. In favor of such version there is a fact that during the discussion of recent CB law in Parliament, the head of CB argues for decreasing, not increasing, the degree of independence of the National Bank of Belarus.

So, calculations presented here clearly show that during 1995-2000 actual independence of the National Bank of Belarus was much lower than legal. And the case of Belarus is the clear illustration of situation noticed by previous studies where there is discrepancy between actual and legal CBI. Let also note that such discrepancy was eliminated with adopting of new Banking Code in 2000, which reduced the legal independence of Belarussian National Bank thus transferring actual practice to legal.

All previous studies consider that main reason for discrepancy between actual and legal independence in transition economies is that general compliance with law in these countries is lower than in developed countries.

In Belarus the main reason for such discrepancy also comes from legal environment but it is little bit different. In order to see it let's shortly examine the history of legal system in Belarus.

Before 1995 National Bank of Belarus was highly independent not only legally, but also actually. It can be explained by two facts; first, the main objective of Belarus was quick transformation of economic and political systems, and integration to the international community. Second, the CB Governor Stanislav Bogdankevich had a great authority because of his high professionalism. However, when in 1994 president Lukashenko came to the scene, political and then economic system in Belarus began to change, which was reflected by change in actual status of CB Under the new constitution of 1996 presidential decrees have the dominant legal status. In practice it means that CB is absolutely dependent on president, who can issue any decree, which CB must obey without fail. The notional precedent was created by presidential decree from 20.03.1998, which shifts the responsibility over monetary policy from Central Bank to the government, thus giving the government an absolute power over Central Bank. This decree was response to abrupt depreciation of Belarussian ruble, when for three days it depreciated for 20%. This sudden fall is mainly explained by speculative operations of agents, who having high inflationary expectations were uncertain about future of Belarussian currency in situation where official exchange rate was almost two times lower than market exchange rate. Moreover, the law "About Standard Legal Acts of the Republic of Belarus" lowers the status on standard acts of CB, making it even lower than the status of decree of government.

Therefore, the main reason for the discrepancy between actual and legal Central Bank independence in Belarus is the low legal status of CB legal acts, which means that whatever is written in CB law, on practice any legal provision concerning CBI can be overridden by state authorities using the legal acts which have higher legal power. Also, probably one more reason

for existence of such discrepancy in Belarus is the authoritarian political regime where everything depends on president Lukashenko. On practice it means that all institutions, in particular Central Bank, follow the policy of president, even if such activity contradicts to the legal provisions, prescribed in legislation.

5. Conclusions and Suggestions for Future Research

The issue of Central Bank independence attracts a great number of researches in last two decades. The economists are mainly concentrating on two subjects in this area - examining the determinants of CBI, issues of actual and legal Central Bank independence in particular, and finding the empirical evidence on existence of relationship between degree of CBI and other economic variables, first of all inflation.

This paper pays attention to both subjects. Theory of monetary policy gives unambiguous answer to the question: are CBI and inflation rate negatively correlated? Considering granting the Central Bank with high independence is a way to resolve dynamic-inconsistency problem, economists state that highly independent CB eliminates inflationary bias, making both inflation rate and variance of inflation lower. However, the existence in theory of direct link between the degree of CBI and output performance seems to be dubious. The one reason for this relationship to exist is negative correlation between CBI and inflation, while latter probably can be negatively correlated with growth. However, checking such relationship based on the data from transition economies and employing sensitivity analysis I find that there is no robust relationship between the degree of Central Bank Independence and rate of real GDP growth per capita. But, the problem with sensitivity analysis is that it is very strong scheme and actually only few variables can pass it. So, it is possible that employing different model the relationship between CBI and growth in transition economies can be found. So, here is the suggestion for future research in this field – to check the relationship between these two variables using another specification.

At the same time the positive correlation between CBI and rate of economic growth is found by looking at scatter diagram and correlation

coefficient. Therefore, all these graphical and econometric findings drive us to the conclusion that while higher degree of CBI is associated with higher rate of economic growth, there is no causal link here – highly independent CB does not cause higher growth rate.

The estimation of impact of CBI on size of budget deficit and level of FDI again shows that no significant correlation between these variables exists. So, it is possible to conclude that the degree of Central Bank independence is not the major factor, which determines the size of budget deficit in transition economies, as well as the level of FDI in these countries. As for the latter, probably, foreign investors making their investment decisions do not pay a lot of attention to the degree of CBI in country of interest.

Of course, the problem with above-made estimations is that sample is small. One escape from this situation is to use panel data, however which will be possible to do only when time-varying information about Central Bank independence will become available. In that case we will be able to analyze the influence on economic growth of variations in Central Bank independence not only across countries but also over time period.

Another suggestion for future research comes from observation that in transition economies very often actual CBI is much lower than legal. So, using various indices of legal CBI in econometric estimation can produce inconsistent results. The way to correct this situation is to use more reliable proxy for actual independence, for example Turnover Rate of the Governors. However, it will be possible to do only when reference period will be long enough (at least 20-25 years).

However, the estimation of CBI impact on performance of various economic indicators is not only the point of researches in this area. Another interesting question is what determines the degree of CBI. Two main measures of CBI are legal and actual CBI. While, legal CBI is measured by simply looking at CB law, actual CBI is hard to measure. In this paper I ana-

lyze this issue with respect to Belarussian case. This case is especially interesting, because by the recent time there was the big gap between actual and legal independence of National Bank of Belarus. The reason for this gap was that first CB law in Belarus, adopted in 1991, granted CB with high legal independence, while authoritarian regime of president Lukashenko (he became the president in 1994) makes CB actually highly dependent from president and government, while de-jure it remains independent. I prove this by calculating the value of actual independence of Belarussian National Bank in 1995-2000 years, using procedure proposed by Cukierman for calculating legal CBI. I.e. I assign the appropriate scores to such characteristics as term of office, appointment and dismissal procedures of CB governor, issues of monetary policy formulation and limitations on CB lending to government according to actual, not legal, practice. Finally, I obtain the score of 0.48 out of 1 for Belarussian CB, while the value of legal CBI is much higher – 0.73. The value of actual CBI corresponds to 17th place out of 25 in ranking of Central Banks in transition economies by their independence, while legal CBI gives National Bank of Belarus 5th place. The main reasons for huge discrepancy between actual and legal CBI in Belarus are peculiarities of legal and political environment.

Even though, actual CBI is an ambiguous term, which difficult to estimate properly, I think the measure of actual CBI proposed in this paper can be used for measuring actual CBI in other transition economies, if the sufficient amount of information on actual CBI is available. Thus, the examination of actual CBI in other countries employing technique used here is the major point for future research in this field.

Appendix A. Extractions from Banking Code of Belarus

Table A1. Personal Independence of Belarussian National Bank

Governor			Central Bank Board (CBB)			Incompatibility clauses
Term of Office	Appointment	Dismissal	Term of office of CB Board members	Appointment	Dismissal	
5 years (art. 61)	Appointed by president with approval of parliament (art.61)	<ul style="list-style-type: none"> - own resignation and retirement - conviction of crime - conduction of legal activities, which can lead to the lost of confidence in that person - disclosure of state secret (art. 62) 	5 years (art.61)	The same as for CB governor (art. 61-62)		CBB membership incompatible with: <ul style="list-style-type: none"> - position in government and political parties (art.60) - ownership or employment in banks and enterprises (art.68)

Table A2. Statutory Objectives of Belarussian National Bank and Formulation of Monetary Policy.

Statutory objective	Formulation and implementation of monetary policy	Coordination with the government
<ul style="list-style-type: none"> - To ensure the stability of the national currency, its domestic and external purchasing power - Development and strengthening the banking system of Belarus - To ensure safeguard functioning of system of payments (art. 25) 	<ul style="list-style-type: none"> - National Bank formulates and along with the government implements monetary policy (art.26) - National Bank sets official exchange rate of Belarussian ruble. (art.33) 	<ul style="list-style-type: none"> - CB governor is the member of the government - National Bank and government interact in process of formulation and implementation of economic policy (art.36)

Table A3. Financial Independence of Belarussian National Bank

Limits to government lending		Budgetary independence			Accountability of Central Bank
Direct credit	Indirect credit	Management of CB budget	Allocation of profit	Coverage of potential losses	
Bank provides credit to the government in amount specified by Budget law (art.52)	Bank may purchase and sell securities for the purpose of regulating the money market (art.51)	Bank budget is approved by Bank Board (art. 65)	-Yearly transfers of profit to the state budget in amount specified by Budget law - The remaining profit is used to replenish reserves (art.43)	The government provides the National Bank with securities for the coverage of CB losses (art.44)	The National Bank provides the annual report to the President. Annual report is composed of: - Annual balance sheet - Report of implementation of “Main Directions of Monetary Policy of the Republic of Belarus” (art.45) - The president defines the institution, which implement audit of financial activity of the National Bank (art.46)

Appendix B. Calculating the Degree of CBI in Belarus

1. Calculation of GMT Index for Belarussian CB, based on recent CB law.

GMT Index composed from two indices – political and economic independence indices. Each variable is assigned * (for some variables **) for the highest score and absence of * means lowest score. Here I apply this procedure to Belarussian CB, based on recent CB law.

Political Independence Index:

G1: governor not appointed by the parliament - **

G2: governor appointed for five years – 0

B3: no board member appointed by government - *

B4: board appointed for five years – 0

B5: provisions for governor's dismissal are not only non-political – 0

R6: no mandatory government representative on the board - *

R7: government approval of monetary policy is required – 0

C8: statutory responsibility to pursue monetary policy - *

C9: there is no legal provision, which supports CB in conflict with government – 0

Economic Independence:

D1: direct credit facility is automatic – 0

D2: interest rate on CB loans is not specified - 0

D3: there is no provision in law concerning the maturity of loan – 0

D4: there is no provision in law setting the limit on lending – 0

D5: there is no provision mentioning CB operations in primary market – 0

M6: the discount rate is set by CB – *

M7: CB is not only one institution supervising commercial banks - *

Now let's summarize

GMT (Belarus) = PI + EI = 5 + 2 = 7

The maximal possible result is 10 + 8 = 18

2. Calculation of LVAW Index for Belarussian CB, based on recent CB law.

LVAW index is calculated based on 16 characteristics, which are aggregated in four groups:

1. Status of Chief Executive Officer (CEO) variables
 - term of office (*too*)
 - appointment procedure (*app*)
 - dismissal procedure (*dis*)
 - incompatibility clauses (*off*)
2. Policy formulation variables
 - who formulates monetary policy (*monpol*)
 - final authority in conflicts between CB and government (*conf*)
 - CB role in formulating of government budget (*adv*)
3. Legislated CB objectives (*obj*)
4. Limitations on lending by CB variables
 - lending in form of advances (*lla*)
 - securitized lending (*lls*)
 - control over terms of lending (*ldec*)
 - circle of potential borrowers (*lwidth*)
 - control over type of lending (*ltype*)
 - maturity of loans (*lmat*)
 - restrictions on interest rates (*lint*)
 - CB purchases on primary market (*lprm*).

Table B1. presents the score for each variable for second Central Bank law in Belarus.

Table B1. Legal Independence in Belarus

	Chief Executive Officer				Policy Formulation			Objectives	Limitations on Lending							
	<i>too</i>	<i>app</i>	<i>dis</i>	<i>off</i>	<i>mon pol</i>	<i>conf</i>	<i>adv</i>		<i>obj</i>	<i>lla</i>	<i>lls</i>	<i>ldec</i>	<i>lwidi b</i>	<i>ltype</i>	<i>lmat</i>	<i>lint</i>
CB law 1991	0.75	0.5	1	1	0.67	0.8	1	0.8	1	0.33	0.67	0.33	0	1	0,25	1
CB law 2000	0.5	0.5	0	1	0.67	0.8	1	0.6	1	0.33	0	0.33	0	0	0.25	0

The procedure of aggregation, described by Cukierman (1992) involves two rounds and finally gives the score of 0.73 for first CB law and 0.52 for second CB law. Table C2 in Appendix C provides the information on LVAW scores for 20 countries in transition.

Appendix C Legal CBI in Transition Economies

Table C1. TOR Index in selected countries*

	Period of Reference	TOR Index
Countries in Transition		
Belarus	Jan.1991-Feb.2002	0.36
Czech Republic	Dec.1992-Aug.2000	0.23
Hungary	Dec.1991-Aug.2000	0.38
Poland	Feb.1989-Aug.2000	0.49
Slovakia	Nov.1992-Aug.2000	0.23
Slovenia	June 1991-Aug.2000	0.17
Ukraine	1991-2002	0.31
Average TOR in group		0.31
Developed Countries		
Iceland	1950-1989	0.03
Spain	1950-1989	0.20
Average TOR in group**		0.11
Developing Countries		
Malaysia	1950-1989	0.13
Argentina	1950-1989	0.93
Average TOR in group**		0.26

*Transition countries are chosen according to availability of data, TOR for Ukraine and Belarus is calculated by myself, while data on other transition countries is taken from Dvorsky (2000). For other two groups only the highest and lowest scores are chosen from Cukierman (1992).

** Average is calculated for whole sample from Cukierman (1992)

Table C2. GMT and LVAW Indices for Transition Economies*

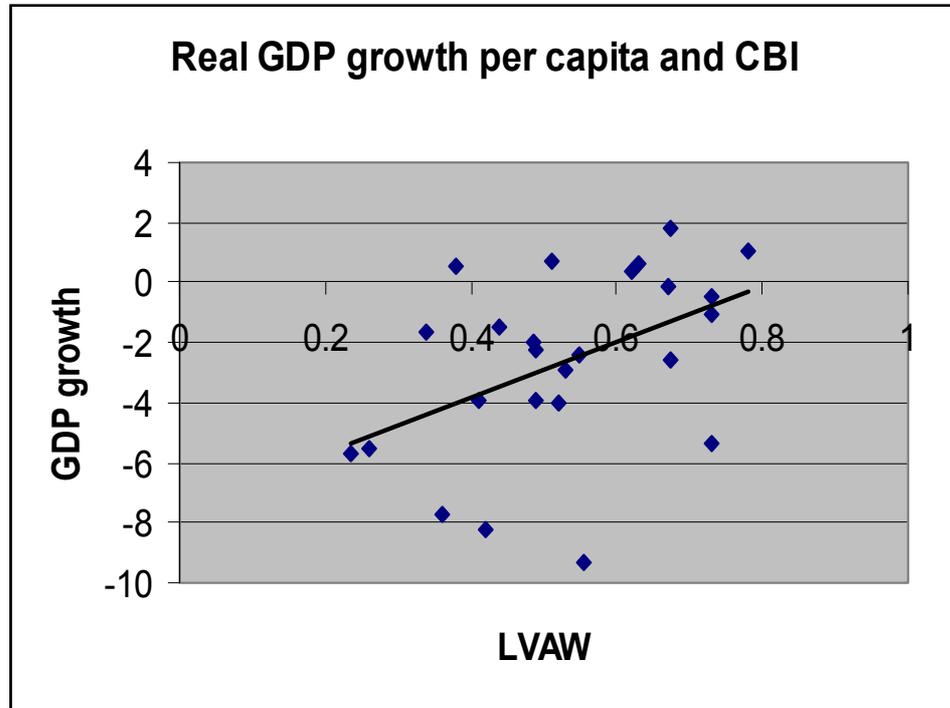
	PI	EI	GMT	LVAW
Bulgaria	8	7	15	0.55
Lithuania	8	7	15	0.78
Kyrgyz Rep.	8	7	15	0.52
Poland	7	7	14	0.89
Armenia	7	7	14	0.85
Macedonia	8	6	14	0.41
Georgia	7	6	13	0.73
Moldova	8	5	13	0.73
Estonia	6	7	13	0.78
Czech Rep.	8	5	13	0.73
Albania	6	6	12	0.51
Latvia	9	3	12	0.49
Belarus 1991	5	6	11	0.73
Croatia	7	4	11	0.44
Russia	5	6	11	0.49
Slovak Republic	5	6	11	0.62
Slovenia	7	4	11	0.63
Hungary	3	7	10	0.67
Belarus 2000	5	2	7	0.52
Romania	4	3	7	0.34
Ukraine	3	2	5	0.42

* Scores on GMT are taken from Maliszewski (2000) and scores on LVAW are from Cukierman et al. (2001)

Appendix D. The Relationship between CBI and Economic Variables on Diagram.

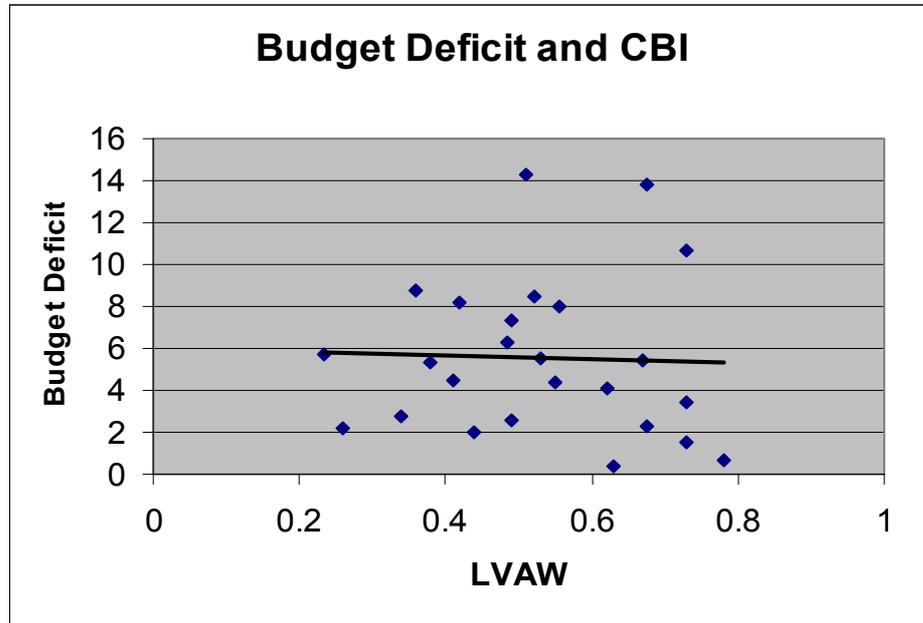
The following graphs show the relationship between the degree of Central Bank Independence, measured by LVAW index, and rate of depreciation in the real value of money, rate of GDP growth, size of budget deficit and level of Foreign Direct Investment. All variables are taken as average in transition time from T to T+8 year.

Figure D1. The relationship between the degree of CBI and rate of growth of real GDP per capita in transition economies.



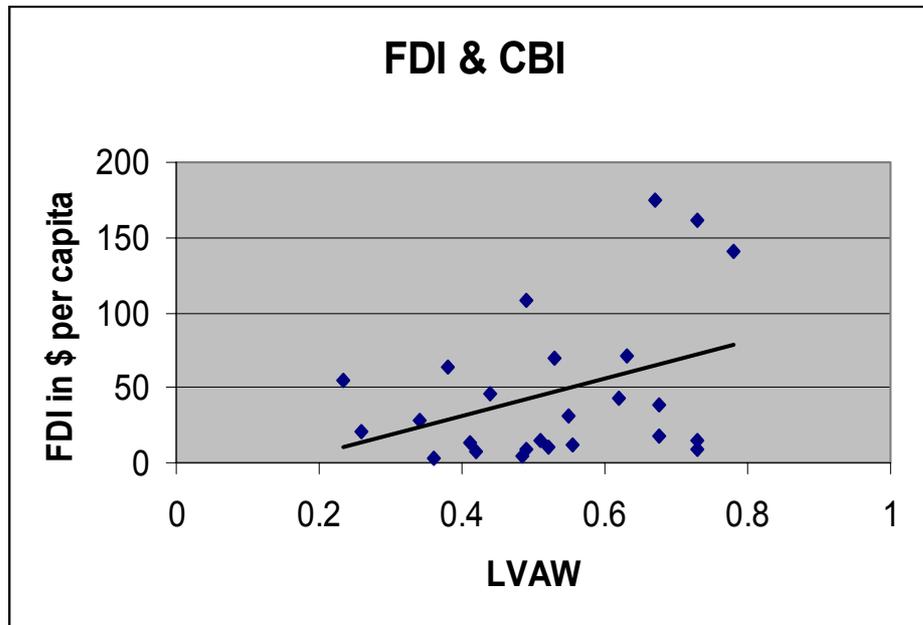
Correlation coefficient is 0.46

Figure D2. The relationship between the degree of CBI and size of budget deficit in transition economies.



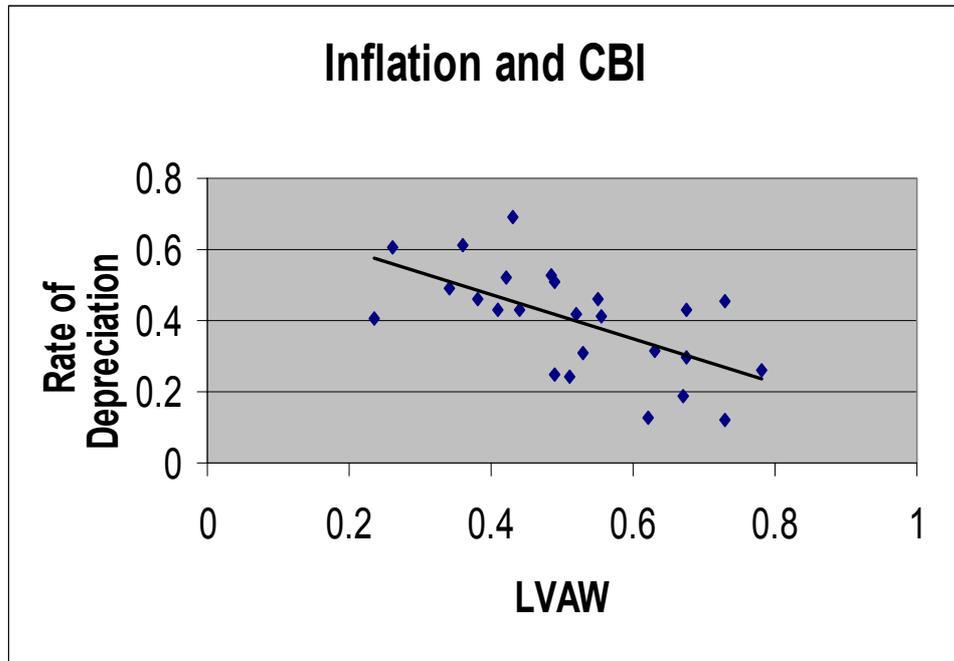
Correlation coefficient is -0.03

Figure D3. The relationship between the degree of CBI and Foreign Direct Investment in transition economies.



Correlation coefficient is 0.38

Figure D4. The relationship between the degree of CBI and inflation rate in transition economies.



Correlation coefficient -0.62

BIBLIOGRAPHY

- Abed, George T., Hamid R. Davoodi, 2000. *Corruption, Structural Reforms, and Economic Performance in the Transition Economies*, IMF Working Paper, No. 132. Available at <http://www.imf.org>
- Aima, Kustaa. 1998. "Central Bank Independence in the Baltic Countries", *Bank of Finland Review of Economies in Transition* 4/98: 5-36
- Akhand, Hafiz A. 1998. "Central Bank Independence and Growth: A Sensitivity Analysis", *Canadian Journal of Economics*, Vol.31:303-317
- Alesina, Alberto, Lawrence H. Summers. 1993. "Central Bank Independence and Macroeconomic Performance: Some Comparative Evidence", *Journal of Money, Credit and Banking*, Vol. 25(2): 151-162
- Backus, David, John Driffill. 1985. "Inflation and Reputation", *American Economic Review*, Vol. 75: 530-538
- Banking Code of the Republic of Belarus, № 441-3 from 25.10.2000
- Barro, Robert. 1995. "Inflation and Economic Growth", *Bank of England Quarterly Bulletin*: 166-176
- Barro, Robert, David Gordon. 1983a. "A Positive Theory of Monetary Policy in a Natural Rate Model.", *Journal of Political Economy*, Vol.91:589-610
- Barro, Robert, David Gordon. 1983b. "Rules, Discretion, and Reputation in a Model of Monetary Policy", *Journal of Monetary Economics*, Vol.12: 101-122
- Berg, Andrew, Jeffrey Sachs. 1992. "Structural Adjustment and International Trade in Eastern Europe: The Case of Poland", *Economic Policy*, Vol.14: 118-155
- Berg, Andrew, Eduardo Borensztein, Ratna Sahay, and Jeromin Zettlemayer. 1999. *The Evolution of Output in Transition Economies*, IMF Working Paper, No. 73. Available at <http://www.imf.org>
- Blinder, Alan S. 1999. *Central Banking in Theory and Practice*. Cambridge, Mass.: MIT Press
- Bruno, Michael, William Easterly. 1996. "Inflation Crises and Long-Run Growth", *Journal of Monetary Economics*, Vol.41 (1): 3-26
- Campos, Nauro F., Fabrizio Coricelli. 2002. *Growth in Transition: What we Know, What We Don't and What we Should*, CEPR Discussion Paper №3246. Available at <http://www.cepr.org>

- Christoffersen, Peter, Peter Doyle. 2000. "From Inflation to Growth", *Economics of Transition*, Vol. 8(2): 421-451
- Comments on project of Banking Code of the Republic of Belarus, prepared by experts of IMF Law Department, 12.01.2000
- Cukierman, Alex. 1992. *Central Bank Strategies, Credibility and Independence*. Cambridge, Mass.: MIT Press
- Cukierman Alex. 1995. *The Economics of Central Banking*, Preliminary paper prepared for the Eleventh World Congress of the International Economic Association, Tunis
- Cukierman, Alex, Geoffrey P. Miller and Bilin Neyapti, 2002. "Central Bank Reform, Liberalization and Inflation in Transition Economies – an International Perspective", - *Journal of Monetary Economics*, Vol.49: 237-264
- Debelle, Guy, Stanley Fischer. 1994. *How Independent should a Central Bank be?* Federal Reserve Bank of San-Francisco Working Paper № 94-05
- Decree of the President of the Republic of Belarus "On some Measures of Coordination of National Bank Activity", №152 from 20.03.1998
- De Melo, Martha, Cevdet Denizer, and Alan Gelb. 1996. "From Plan to Market: Patterns of Transition", *World Bank Economic Review*, Vol.10
- De Melo, Martha, Cevdet Denizer, Alan Gelb, and Stoyan Tenev. 1997. *Circumstance and Choice: The Role of Initial Conditions and Policies in Transition Economies*", World Bank Policy Research Working Paper, No.1866. Available at <http://www.worldbank.org>
- Doi, Takero. 1998. *Central Bank Independence Promotes Budgetary Efficiency*. University of Tokyo, Discussion Paper No. F-68
- Downes, Patrick, Reza Vaez-Zadeh, eds. 1991. *The Evolving Role of Central Banks*. Washington D.C.: International Monetary Fund
- Dvorsky, Sandra. 2000. "Measuring Central Bank Independence in Selected Transition Countries", *Focus on Transition. Austrian National Bank*, Vol.2: 77-95
- Dvorsky, Sandra. 2000. *Measuring Central Bank Independence in Selected Transition Countries and the Disinflation Process*, BOFIT Discussion Papers, Vol.13
- EBRD Transition Report 2000, European Bank for Reconstruction and Development
- Eijffinger, Sylvester, Marco Hoeberichts, and Eric Schaling. 1998 *A Theory of Central Bank Accountability*, CentER for Eco-

- conomic Research, Tilburg University, Working Paper.
- Eijffinger, Sylvester, Eric Schaling. 1995. *The Ultimate Determinants of Central Bank Independence*, CentER for Economic Research, Tilburg University, Working Paper.
- Filer, Randall K., Jan Hanousek. 2000. *Output Changes and Inflationary Bias in Transition*, CERGE-EI Working Paper
- Fischer, Stanley, Ratna Sahay, and Carlos Vegh. 1996a. "Stabilization and Growth in Transition Economies: The Early Experience", *Journal of Economic Perspectives*, Vol. 10(2): 45-66
- Fischer, Stanley, Ratna Sahay, and Carlos Vegh. 1996b. "Economies in Transition: The Beginnings of Growth", *The American Economic Review*, Vol. 86(2): 229-233
- Fischer, Stanley, Ratna Sahay. 2000. *The Transition Economies after Ten Years*, IMF Working Paper, No. 30. Available at <http://www.imf.org>
- Green, William H. 2000. *Econometric Analysis*, Upper Saddle River, NJ: Prentice Hall
- Grili, Vittorio, Donato Masciandaro, and Guido Tabellini. 1991. "Political and Monetary Institutions and Public Finance Policies in the Industrial Countries", *Economic Policy*, Vol. 13: 341-392
- Haan , Jakob de, Willem J. Kooi. 1998. "Does central bank independence really matter? New evidence for developing countries using a new indicator", Department of Economics, University of Groningen
- Haan, Jakob de, Fabian Amtenbrink, and Sylvester Eijffinger. 1998. *Accountability of Central Banks: Aspects and Quantification*, CentER for Economic Research, Tilburg University, Working Paper
- Havrylyshyn, Oleh, Ivailo Izvorski, and Ron van Rooden. 1998. *Recovery and Growth in Transition Economies 1990-97: A Stylized Regression Analysis*, IMF Working Paper, Vol. 141. Available at <http://www.imf.org>
- Hochreiter, Eduard, Tadeusz Kowalski. 2000. *Central Banks in European Emerging Market Economies in the 1990-s*. Austrian National Bank Working Paper No.40
- Konieczny, Jerzy D. 2001. "Changes in the Practice of Central Banking", Unpublished
- Kydland, Finn, Edward Prescott. 1977. "Rules Rather than Discretion: The Inconsistency of Optimal Plans", *Journal of Political Economy*, Vol.85: 473-490
- Leamer, Edward E. 1985. "Sensitivity Analyses Would Help", *The American Economic Review*, Vol.75 (3): 308-313

- Leamer, Edward E., Herman Leonard. 1983. "Reporting the Fragility of Regression Estimates", *The Review of Economics and Statistics*, Vol.65(2): 306-317
- Levine, Ross, Sara J. Zervos. 1991. "What we Have Learned about Policy and Growth from Cross-Country Regressions?", *The American Economic Review*, Vol.83(2): 426-430
- Levine, Ross, David Renelt. 1992. "A Sensitivity Analysis of Cross-Country Growth Regressions", *The American Economic Review*, Vol.82 (4): 942-963
- Loungani, Prakash, Nathan Sheets. 1997. "Central Bank Independence, Inflation and Growth in Transition Economies", *Journal of Money, Credit and Banking*, Vol.29(3): 381-399
- Luis, Jacome H. 2001. *Legal Central Bank Independence and Inflation in Latin America during the 1990s*, IMF Working Paper, Vol.212. Available at <http://www.imf.org>
- Lybek, Tonny. 1999. *Central Bank Autonomy, and Inflation and Output Performance in the Baltic States, Russia, and Other Countries of the Former Soviet Union, 1995-1997*, IMF Working Paper, No. 4. Available at <http://www.imf.org>
- Maliszewski, Wojciech S. 2000. "Central Bank Independence in Transition Economies", CASE. Available at <http://www.case.pl>
- National Bank of Belarus, National Bank Statute, № 320 from 13.06.2001
- Pirttila, Jukka. 2000. *Fiscal Policy and Structural Reforms in Transition Economies: An Empirical Analysis*. BOFIT Discussion Papers, Vol. 5
- Posen, Adam. 1995. "Central Bank Independence and Disinflationary Credibility: A Missing Link", *Federal Reserve Bank of New York, Staff Reports*.
- Radzyner, Olga, Sandra Riesenger. 1997. "Central Bank Independence in Transition: Legislation and Reality in Central and Eastern Europe", *Focus on Transition, Austrian National Bank*, Vol.1 :57-90
- Rogoff, Kenneth. 1985. "The optimal Degree of Commitment to an Intermediate Monetary Target", *Quarterly Journal of Economics*, Vol.100 (4): 1169-1189
- Romer, David. 2001. *Advanced Macroeconomics*. New York: McGraw-Hill.
- Sala-I-Martin, Xavier X. 1997. "I Just Run Two Million Regressions", *The American Economic Review* Vol.87 (2):178-183
- Selowsky, Marcelo, Ricardo Martin. 1997. "The Transition from Socialism: Policy Performance and Output Growth in the

- Transition Economies”, *American Economic Review*, Vol.87(2):350-353
- Sikken, Bernd J., Jacob de Haan. 1998. “Budget Deficits, Monetization and Central Bank Independence in Developing Countries”, *Oxford Economic Papers*, Vol.50: 493-511
- Tosunyan, G.A., A. Y. Vikulin, A. M. Ekmalyan. 1999. *The Banking Law of Russian Federation*, Moscow, Yurist: 313 (on Russian)
- Ustinovich, Anna. 2002. “Central Bank Independence as a Mean of Reducing Inflation”, *The Banking Bulletin*, Vol. 10: 18-24 (on Russian)
- Verbeek, Marno. 2000. *Modern Econometrics*, John Wiley & Sons, Ltd
- Wagner, Helmut. 1998. *Central Banking in Transition Countries*, IMF Working Paper No. 126. Available at <http://www.imf.org>
- Wagner, Helmut. 1999. “Central Bank Independence and the Lessons for Transition Economies from Developed and Developing Countries”, *Comparative Economic Studies*, Vol. XLI: 1-22.
- Waller, Christopher J. 1989. “Monetary Policy Games and Central Bank Politics”, *Journal of Money, Credit and Banking*, Vol.21(4): 422-431
- Waller, Christopher J., Carl E. Walsh. 1996. “Central Bank Independence, Economic Behavior and Optimal Term Length”, *American Economic Review*, Vol. 86(5): 1139-1153
- Walsh, Carl E. 1998. *Monetary Theory and Policy*. Cambridge, Mass.: MIT Press.

INDEXA

Aristotle,3