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Measures**

Aboa Centre for Economics

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ABSTRACT

In recent years, a number of countries have modified their monetary institutions, focusing, in many cases, on increasing of the independence of national central banks. This attracted attention of academics and policymakers, who have shown continuing interest in various monetary institutions with respect to the formulation of monetary policy. This paper analyzes some of them. Especially, it reviews and criticizes generally accepted indices of central bank independence. The analysis names several imprecisions among measures that cover the subjectivity, criteria and weighting problem. It brings the conclusion that neither of measures, whether it is the widely accepted Cukierman index (1992) or work based on Grilli, Masciandaro and Tabellini (1991), are not free of criticism. Additional problem appears when countries with different levels of development are concerned. Here, the Borda Count method is used among ten transition economies to determine the country with the most independent central bank, based on four different measures. With the wide criticism of indices, this work questions the robustness and representation of empirical studies and their results.

JEL Classification: E50

Keywords: institution, central bank independence

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1 Introduction

The breakdown of institutions designed to safeguard price stability, especially the Bretton Woods System, was an impetus for scientists and countries to search for alternatives. Encouraged by positive example of the German Bundesbank and history of low inflation in this country, economists and political scientists concentrated their work on solving credibility and flexibility problems. Among various solutions, the impact of central bank autonomy became the centre of interest for many.

Neither obvious definition, nor methodology of calculating the degree of central bank independence (CBI hereafter) has been easy to outline. Early definition, provided by Friedman (1962), correlates central bank independence with relation between the central bank and the government. Walsh (2005), in his work on CBI prepared for the New Palgrave Dictionary, narrows this definition and explains it as "the freedom of monetary policymakers from direct political or government influence in the conduct of policy". Debelle and Fischer (1994) go further by distinguishing between *goals* and *instruments* independence.

The lasting interest in independence of monetary institutions has been inspired by the empirical justification for central bank autonomy demonstrating that such autonomy is 'free lunch', i.e. it reduces average inflation at no real cost. Cross-country data for developed countries show a negative relation between a degree of central bank independence and inflation, and no correlation with output or employment (see e.g. Bade and Parkin (1998), Grilli et al. (1991), Cukierman (1992, ch. 19), Eijffinger and Schaling (1993)). Alesina and Summers (1993), while proving negative correlation between CBI and inflation rate for 16 developed countries, find no correlation with other real variables, including output. Despite evidence for correlation however, Posen (1993, 1995) argues this relationship is not causal and may be caused by society's preferences for low and stable inflation. Rather, it has been argued that countries that are inflation - averse may develop institutions to support this aversion. If this is the case, Fischer (1995) indicates that simply educating the public about the true costs of inflation may be the best way to reduce inflation.

This work acknowledges the literature contribution in finding the universal definition and measure of CBI and presents the review and discussion on the central bank autonomy indices. However, being a part of the larger project, it concentrates mainly on the comparison of the central bank independence measures with respect to their similarities, precision and accuracy. One intuition behind this study is to present various understanding of CBI and what comes after, various definition of this phenomenon. Second has been inspired by wide criticism of so far formulated central bank independence indices (see e.g Mangano, 1998; Banaian, Burdekin and Willet, 1998; Forder, 2005). Above all, however, the most significant influence it has on

the robustness and representation of empirical studies and their results.

This paper is organized as follows. Section 2 presents the brief literature discussion on institutions and incentives determining the design of the central bank. The literature finds many possibilities of obtaining price stability by proper institutional composition, with central bank independence being one of the most popular and challenging options. Section 3 surveys base indicators of legal independence. Finally, the comparison of CBI measures can be found in section 4.

2 Theoretical outline

There is a wide agreement concerning major goals of economic policy: high employment, stable prices and rapid growth. There is not, however, a clear strategy of achieving these goals since for many, these aims seem to be incompatible. As the result, it is difficult to give optimal weights to fiscal and monetary policy instruments. Despite this optimizing problem, there is little doubt in the importance of institutions' and organizations' credibility of implementing the successful policy. The government's ability to credibly commit to its goals announcements is crucial in implementing effective policies. Keefer and Stasavage (2000), as well as others, argue that delegation authority to an agency that does not have incentives to change announced policy, is a way to gain credibility. Among many policies, the most adequate governments' strategy seems to be a delegation for monetary policy.

The following section focuses on presenting the literature achievement in looking for the central bank design solution. They all aim to find the answer, which would lead to better macroeconomic outcomes. Many observers believe that certain institutional design will help in controlling the inflation rate. In the centre of their interest lays central bank independence. On the other hand, institutions like inflation targeting or contracts for CB governors, being a performance incentives, find their supporters as well.

2.1 The time-consistency problem

The time-inconsistency problem, suggested by Kydland and Prescott (1977), developed later by Barro and Gordon (1983) is the most prominent argument for central bank independence. Despite the asymmetry of information, private sector understands determinants of government policy and formulates its expectations based on this knowledge. Current decisions of agents depend as well on their expectations of future policy actions. Hence, any change in social objective function will have an immediate effect on agents' expectations. Kydland and Prescott show that a rational and forward-looking government will re-optimize and change its plan later once having an opportunity to do so, even if he has previously chosen a plan for policy that

maximizes the well-being of citizens. The government that is unable to make binding commitments will suffer from a *credibility problem*.

$$\begin{aligned}\pi &= \frac{b^2\pi^e + a\pi^* + b(y - \bar{y})}{a + b^2} \\ &= \pi^* + \frac{b}{a + b^2}(y^* - \bar{y}) + \frac{b^2}{a + b^2}(\pi^e - \pi^*).\end{aligned}\tag{1}$$

Equation (1) shows the policymaker's incentive to pursue expansionary policy. The marginal cost of slightly higher inflation is zero, when the public expects the policymaker to choose the optimal inflation, π^* . Moreover, the marginal benefit of the resulting higher output is positive. In setting the equilibrium inflation rate, all the policymaker's discretion does is to increase inflation without affecting output. Willingness to deviate from the policy chosen after the formation of public's expectations affects an increase in the public's inflation expectation. It results in worsening the menu of choices that the policymaker faces. The idea of dynamic inconsistency arises also in other situation. For instance, policymakers, choosing a method of capital taxation, may want to encourage capital accumulation by adopting a low tax rate. Once the capital is accumulated, however, it may be optimal for policymaker to tax it at the higher rates.

The idea described by Kydland and Prescott has been restated and popularized by Barro and Gordon (1983), who initiated a still ongoing discussion of how an appropriate institutional design may lead to the best macroeconomic outcomes. Lohman (1992) presents a number of institutional arrangements that are associated with different tradeoffs between credibility and flexibility problems.

2.2 Institutions and incentives in shaping central banks

The institutional design approach focuses on restraining the central bank from engaging in high-inflation policies using legislative means (Waller, 1995). Legislation becomes a tool, which the central bank's objective function can be manipulated with. The literature concentrates on several areas and some focus on restricting central bank's operating procedures with targeting rules (e.g. Alesina, 1988; Lohmann, 1992; Svensson, 1997); some advocates the solution of performance contracts imposed on central bankers (e.g. Persson and Tabellini, 1993; Fratianni et al. 1993; Walsh, 1995; Waller, 1995); others decide to delegate monetary policy to an independent central banks. These solutions are based on arrangements that a constitutional or institutional-design stage creates principles of the central bank behavior, which cannot be easily changed because changing the institution *ex post* is costly or/and it can take time. This issue has also find itself in the area of criticism, in particular by McCallum (1996) and Posen (1993), who argue that some of

proposed solutions “do not fix the dynamic inconsistency” but they “merely relocate it” (Persson, Tabellini, 1997). Criticized authors agree with the possibility of potential renegeing on the institution. Nevertheless, Persson and Tabellini dispute, that in the main model that dominates in the literature, a high cost for changing the institution within the time horizon of existing nominal contracts may be sufficient to solve the problem. Practical relevance of models with institutional design of monetary policy based on the appropriate incentive scheme is seen for instance as targeting inflation (e.g. in New Zealand, Canada, or United Kingdom).

Targeting rule Targeting rules are regulations on the basis of which the central bank aims to achieve a specified earlier value for some macro variables and which can play the role for the future judgment of the central bank’s performance. The central bank is assigned a loss function, which can feature only one target variable, for instance inflation, or some additional variables like income. ‘Target variables’ are endogenous variables introduced in a loss function; ‘targeting’ is minimizing such a loss function (Svensson, Woodford, 2005). Targeting rules depends on the nature of the central bank’s objectives as well as the constraints imposed by the economy’s structure. The broad study on this topic can be found in e.g. Svensson (1998, 2005), whereas McCallum and Nelson (2004), present some critical views on this matter.

Inflation targeting and exchange rate pegs with a low inflation country are examples of targeting rules. Other targeting regimes that are analyzed in the literature are, for instance, price level targeting (see e.g. Dittmar, Gavin, and Kydland 1999), hybrid price level-inflation targeting (Batini and Yates 2000), average inflation targeting (Nessén and Vestin 2000), and regimes based on the change in the output gap or its quasi-difference (Jensen and McCallum 2002).

Performance contracts The idea behind this institutional solution is to offer the central banker a performance contract and hence tying central banker’s salary or the bank’s budget to the macroeconomic performance for example the degree of inflation rate. In one of attempts to this idea, Walsh (1995) suggests a presentation as a *principal-agent problem*. A principal (an individual or a group) delegates control over policy to an agent (another individual or a group), conditioned on a contract as an incentive, for instance a stage-contingent wage contract. This contract is set to prevent an agent from choosing different from the principal’s desired objectives and from introducing a policy that is different from the principal’s most desired outcome. This approach, on contrary to other solutions to the time-inconsistency problem, involves society to pursuit the self-interest by choosing the central bank achieving the socially desirable outcome. With the performance contract, the central bank becomes accountable for its actions. *Central bank announcements* may affect the variety of contracts and

hence the optimal policy. Thanks to its announcement of θ^1 , the central bank can choose among several of contracts, which are all linear in realized inflation. Persson and Tabellini (1994, p. 292 - 296) show that it is possible to design the optimal contract in which the agent is telling the truth. The literature questions the importance of CB's announcements, and underlines that it matters what central banks do, not what they say.

Independent central bank The concept of independence implies that the central bank is able to set policy without interference or restriction from other agents. This general definition is accompanied with an idea that an independent central bank acts as a signal to private agents about forthcoming policy actions. Hence, the central bank provides society with better information in forming expectations. In the institutional analysis and comparison of monetary standards, Beck (1994, pp. 195) suggests that even the most dependent central bank seems to be quite independent by the standards of agency theory. It may take place because central banks have information advantage over the executive and hence it may be troublesome to monitor these institutions. This theory is proved with the example of Bank of England in the 1960s, when, despite high legal dependence, it still had certain grounds of freedom thanks to its monopoly on monetary information and expertise.

Being one of the first, Rogoff (1985) introduces an independent and conservative central banker and illustrates strategic delegation of monetary policy to this institution. A 'Rogoff-conservative' type of central bank is described based on the weight placed on inflation objectives; this type of a central bank appears when the central bank's weight on inflation exceeds that of the elected government. In the general central bank objective function

$$V = \frac{1}{2}\lambda(y - y_n - k)^2 + \frac{1}{2}\pi^2 \quad (2)$$

a parameter λ measures the weight on output relative to a weight normalized to 1 on inflation objectives. The central bank is a 'Rogoff-conservative' type when the central bank places relatively higher weight on the inflation objective than society does that is, having preferences of the form given by (2), it gives a weight to inflation of $(1 + \delta > 1)$. When the central bank is placing weight on inflation rather than 1, the inflation under discretion will equal

$$\pi^d(\delta) = \Delta m + v = \frac{a\lambda k}{1 + \delta} - \left(\frac{a\lambda}{1 + \delta + a^2\lambda} \right) e + v \quad (3)$$

Conclusions coming from (3) are of two kinds. First, the inflation biased is reduced, since $(1 + \delta > 1)$. Lower average inflation makes it optimal to delegate monetary policy to a conservative central banker. The second

¹ θ denotes shocks to the economy that change the welfare effects of a given inflation rate or unexpected inflation rate.

conclusion concerns less output stabilization that will limit the degree of the central bank conservativeness (Walsh, 2003: pp. 393 - 397).

The theoretical study on central bank independence is challenged by Debelle (1996) who underlines that previous study on CBI assumed central bank's actions done in isolation from the actions of other policymakers. This, Debelle continues, is not acceptable because monetary policy is not the only policy in the economy and therefore CBI is not generally exogenous to other policy institutions. The central bank's preferences are no longer the main determining factor of the state of the economy. They are accompanied by the preferences of the fiscal authority, the nature of the policy game, and the obligation to repay debt. One of conclusion drawn from Debelle analysis may give an answer to a fundamental question concerning differences in central banks design across countries. The more weight the society places on inflation, the more inflation averse a central bank will be chosen. Hence, according to this study, the central bank institutional framework depends on decisions made by societies with different objective functions, and moreover, "the empirical relationship between central bank independence and inflation may simply reflect differences in inflation aversion across countries" (Debelle, 1996, pp. 12).

2.3 Determinants of CBI

The study of central bank independence has theoretically and empirically examined the determinants of CBI. In theory, Cukierman (1994) assumes that a commitment and delegation rule play the key role in this issue. Politicians specify the objectives of the central bank as well as the scale of power to execute its monetary policy, and determine the extent of their commitment to a policy rule. The more powers are in central bank's hands, the more credible monetary policy is. On the other hand, the degree of independence given to CB determines the degree of flexibility in monetary policymaking. The balance between flexibility and credibility decides upon the optimal degree of autonomy of the central bank.

Based on various theoretical considerations, Eijffinger and de Haan (1996) as well as later Eijffinger (1997) summarize economic and political determinants of central bank independence. They are (1) the equilibrium or natural rate of unemployment; (2) the stock of government debt; (3) political instability; (4) supervision of financial institutions; (5) financial opposition to inflation; (6) public opposition to inflation, and (7) other determinants. Various studies have empirically verified these determinants. Naming few it is possible to mention Cukierman 1992 (political instability), Posen 1993 (financial opposition to inflation), or Eijffinger and Schaling 1995 (NAIRU, relative number of years of socialist government, variance of output growth, compensation of employees paid by resident producers).

The models of output variability and inflation performance presented by,

for example, Barro and Gordon (1983), Rogoff (1985) and Alesina (1998), suggest that countries which have smaller real shocks are more likely to choose to have central bank independence². When the role of law and customs on institutional design is concerned, King (2004) suggests that countries, which have not experienced hyperinflation, may be less willing to strengthen monetary arrangements with constitutional paragraphs. Central Bank law is therefore subjected to the monetary authorities' inflation-aversion and can result in legislated inflation target as the anchor for price stability. The relative autonomy of the central bank, Siklos (2004) argues, may be as well influenced by whether the political system is a two-party, a multi-party with proportional or mixed representation or a 'Westminster' style of parliamentary democracy. The differences lay in the easiness or difficulty in changing the central bank legislation within a part, for example, that concerns the degree of central bank's autonomy. Additionally, Siklos underlines the importance of 'custom', played in every economy. It is a term that describes the role played by a free market, a developed financial system or the presence of stable and respected institutions.

3 Measures of central bank independence

Literature on shaping the monetary authority presents a number of central bank independence measures. It is difficult to decide which measure gives the most accurate value of a degree of independence. Political analysis of central bank autonomy concentrates on the studies of legal framework of monetary authorities, by understanding constitutional paragraphs or statutes. Cukierman (1992) indicates that central bank independence, conferred on the bank by law, is called the 'actual' (as opposed to 'formal') independence. Apart from the laws, this type of independence depends on less structured institutions like informal contracts with the government, the quality of the bank's research department or personal features of important representatives of the bank. Legal independence, being a part of actual one, is of a special interest due to several factors. First, it shows the actual degree of independence, which was meant to be granted on central banks by legislators; second, it is of interest of many researchers trying to quantify the degree of banks' autonomy.

In general, it is possible to distinguish five groups of central bank factors. First, independence of central banks is related to their CEOs, in particular it is linked with the appointment and dismissal rules, and the length of terms. It also covers members of the Board in a similar area. A second group is related to policy formulation. A central bank is examined whether it is able to conduct monetary policy without the government's influence on it. In particular, it relates to the authorship of setting discount rates, of supervi-

²For a theoretical review and empirical proves see for example Crosby (1998).

sion and banking regulation and how the central bank is accountable. Third, independence is related to policy objectives, where it is assumed to be high if price stability is the only or at least the primary objective of the central bank. A fourth group concerns the (dis)ability of the government to borrow from the central bank. Finally, external monetary relations are important as well, for example the exchange rate and capital controls. Hence, central banks are classified as the most independent in case, when:

1. The central bank governor's legal term of office is longer, and in which the government has little authority in appointment and dismissal process of both a governor and the Board (personnel independence).
2. Central banks possess wider authority in area of policy making, especially when they become the *final* authority in case of conflicts with the government (policy independence).
3. Central bank chooses price stability as its main objective (policy (goal) independence).
4. Central bank is not allowed to give advances for the government or when advances are the subject to restrictions (financial independence).

The general division of CBI measures concentrates on a distinction between legal and non-legal measures of independence. The first group contains indices based on the analysis of formal documents constituting the shape of monetary authorities that is on central banks' law and national constitutions. Non-legal measures include those based on questionnaires sent to central bankers, as well as indices capturing elements of 'actual' CBI, for example those considering the central bank governor turnover.

The indices mentioned the most often in the group of legal measures of independence are those constructed by Alesina (1988, 1989), Grilli, Masciandaro and Tabellini (1991), Cukierman (1992) and Eijffinger and Schaling (1992, 1993). Major assumption behind these measures lays in attaching a numerical value to selected central bank institutional factors, which constitute the power and ability to conduct monetary policy. Non-legal measures include those based on a questionnaire (see for instance Cukierman, 1992, Masciandaro and Spinelli, 1994 or Fry, Goodhart, and Almeida, 1996) and indices based on the central bank governors' turnover (for example Cukierman and Webb 1995). The former method formulates an index with the use of central bankers' subjective perception of what central bank independence really is. Rarely used for its 'subjectivity' problem, this method can point out certain problems in actual CBI. The political vulnerability index is thought to reflect both the frequency and the percentage of political changes that are followed by variations in the governorship in the central bank.

It is unquestionable that several indices needs to be mentioned for their contribution in the literature. The first attempts of Bade and Parkin (1988),

Alesina (1988, 1989) or Burdekin and Willet (1991) brought the topic into discussion. However, more important works due to their deep analysis of macroeconomic influence are those prepared by Grilli, Masciandaro and Tabellini (1991) and Cukierman with co-authors (1992, 1995).

3.1 Index of economic and political independence

The legacy of Grilli, Masciandaro and Tabellini (GMT hereafter) lays in introducing the distinction between *political* and *economic* central bank independence, which describes monetary institutions. “Political independence is the capacity to choose the *final goal* of monetary policy, such as inflation or the level of economic activity. Economic independence is the capacity to choose the *instruments* with which to pursue the goals” (italics in original).

Three aspects primarily determine *political independence*: (1) the procedure leading to appoint members of central bank boards; (2) the relationship between monetary authorities and the government; and (3) the formal responsibilities of central banks. Several features are taken as well to describe economic independence; firstly, the government’s ability to influence their amounts of borrowings from the central bank, and secondly, the nature of the monetary instruments, which remain under control of the central bank. All aspects constrain different central banks attributes, which are used to measure CBI and later to analyze CBI effects on inflation rate. Using the combination of these attributes, GMT formulate synthetic indicators of the political and economic independence of the central bank. The studies done by GMT focuses on 18 industrial countries. Index of economic and political independence describe its level in the range of (1) to (7) or (1) to (8) depending how many attributes are taken in the description. Zero means total dependency from political authorities.

Authors focus on monetary institutional features and the degree of inflation. The correlation between inflation rate and economic independence shows a strong and negative sign, with significance in the periods of high inflation. Higher sensitivity of relations between the two, exactly during periods of higher inflation, might indicate that in this correlation the presence of influential observations is crucial. The indicator of political independence has a negative sign as well, it is significant however only during the periods of 1970s. EMS dummy, though shows strong negative correlation with inflation rate, has appeared to be not significantly different from zero. GMT summarizes their findings: “... monetary institutions matter, indirectly, through their effects on credibility, and directly, by shaping the central bank incentives”.

3.2 Legal and nonlegal measures of CBI

The introduction of advanced, in the technique and data sample, CBI indices, done by Cukierman alone or co-authored with Webb, and Neyapti, brought the breakthrough into the discussion. Legal index of central bank independence (LVAU), index based on the governor turnover (TOR), or the vulnerability index have been used in many studies until the current date. Their popularity is based on their comprehensiveness.

Indices of legal central bank independence utilize a limited but relatively precise number of legal characteristics; each central bank and each characteristic has a specific code. Additionally all legal characteristics are divided into four groups depending on their area they describe: chief executive officer, policy formulation, final objectives, and limitations on lending. Given detailed characteristics and their coding, Cukierman (1992) focuses on the sample composed by up to seventy countries, including developed countries as well as forty-nine less developed countries. The range of coding [0; 1] specify the degree of legal independence such that 0 means the smallest level and 1 indicates the highest level of independence.

The results of the analysis over the period 1950-1989 show the median level of legal independence similar in both groups of countries (around 0.32), with the higher concentration of developed countries at the top 10 percent, and developing ones at the bottom 10 percent of the distribution. Additionally, preliminary observations suggest that “legal central bank independence may be neither nor sufficient for low inflation” (Cukierman, 1992). This conclusion has been drawn having examples of Panama, Japan or Belgium, where very low rates of inflation had been observed within the interested time, but at the same time, they are ranked in the lowest quartile of legal CB inflation. On the other hand, countries with the relatively highest level of inflation, like Argentina, Peru and Nicaragua have had their rankings of legal independence above the median.

The turnover rate of governor (TOR) and political vulnerability (VUL) indices are called to be those measuring “the actual” independence, since their construction is not based on the legislation analysis but the actual practice in central banks concerning the stability of the banks’ CEO position. TOR’s main message is that a higher turnover of central banks governors, means a lower level of independence. Political authorities often have the power to decide about governor candidates and the final choice. Moreover, they have also an incentive to choose a governor, which will represent their inflation preferences, over the ones with different preferences. VUL, on the other hand, refers to the probability of dismissing a central bank governor shortly after a political change of government. The intuition behind this study lays in the belief that different kinds of political instability could have different effects on institutions, such as a central bank. Cukierman and Webb explain: “If political changes reflected changes in basic attitude

toward economic policy or if they were traumatic and irreversible for the politicians involved, then the instability would motivate politicians to control the central bank tightly and keep it at their disposal to help them stay in power”.

3.3 Measuring CBI in countries with transition economies

Only in recent years, the amount of empirical literature on CBI in transition countries has been considerably growing. Loungani and Sheets (1997) for instance, construct their index by combining elements of the GMT index considering Debelle and Fisher methodology. They also consider the Bundesbank as the anchor for measuring CBI in transition countries. Maliszewski (2000) contributes with the slightly modified GMT index for 20 countries. Aima (1998) measures the degree of legal CBI in the Baltic countries using the Cukierman and the GMT indices. De Haan, Berger and Fraassen (2001) concentrate on choosing the right disinflationary instrument for these countries considering independent central bank and currency board. Both independence and accountability has been in interest of Lybek (1999) who constructs a combined *de jure* index for the 15 successor states of the former Soviet Union. Recent contribution to measuring CBI in transition countries includes Cukierman et al. (2002) and their new indices of CBI for 26 former socialist economies. A questionnaire-based survey prepared by Beblavy (2003) presents a subjective understanding of what constitutes the central bank independence according to monetary authorities’ members.

4 Comparison of central bank independence measures

4.1 Precision

The precision of indices can rely on the proper understanding of CB laws and status, knowledge of the researcher concerning monetary policy or political science, or how detail certain characteristic is analyzed. Equally important, however, is also the weight, the importance given to certain characteristics by the author of an analysis. The relativity of opinions and assigning certain values to central bank attributes brings the problem of subjectivity in CBI measures.

Undertaking the process of formulating independence measures, authors indicate difficulties they face. For instance, Alesina (1988, p. 40) underlines, how difficult it is to quantify all elements of what constitute the ‘independence’ into one measure. Later he mentions work of Bade and Parkin (1988), and Masciandaro and Tabellini (1988) and acknowledges their pioneer work by calling it ‘courageous attempts’. Grilli, Masciandaro and Tabellini (1991,

p. 367) conclude the list of attributes they prepared with a statement “combining them is unavoidably arbitrary so we adopt the simplest procedure of adding them up”. Similarly, Cukierman, Webb and Neyapti (1992, p. 383) also admit, “(...) unavoidably, there were subjective or arbitrary decisions in coding, classifying, and weighting legal information”. Concluding these ‘confessions’, Forder (1999) emphasizes how surprising it is that, despite these difficulties, the literature seems to have reached the consensus that there is an inverse relationship between the degree of central bank independence and the rate of inflation.

Eijffinger, Rooij, and Schaling (1996) indicate another problem - unavoidable arbitrariness. Each economist, while building an index, may be biased in favour of his/her country. Greater knowledge of the case “brings the recognition of the greater freedom of behaviour acquired in current practice by the national central bank compared to the formal rule”. Therefore, Eijffinger and Schaling (1993, p.50) put stress on three types of choice involved when constructing any index, where elements of subjectivity are often present. That is: (1) which criteria should be included in the index; (2) how should the legislation be interpreted with respect to each retained criterion (which leads to their individual valuation?), and (3) what weight should be attributed to each criterion in the composite index. Similarly Mangano (1998) stresses that problem.

Table 1: Subjectivity and arbitrariness of selected CBI attributes

Attribute	Cukierman	Maliszewski (based on GMT)	Loungani and Sheets	Rank (Fry et al.)
CEO	20	31.25	46	2
Policy Formulation	30	37.5	38.5	1
Lending Restrictions	50	31.25	15.5	3

Notes: Values for three first measures represent the percentage of focus put on certain attribute compared to the total number of CB factors. The fourth value is the rank given by central bankers. 1 indicates the most important.

Going further, Forder (2000) names ‘traps’ in the measurement of central bank independence, while focusing on the analysis of central bank statutes and law that is the method used by many authors. He guesses, the designers of statute-reading measures postulate an opinion that a central bank always sets what they believe to be the best policy once given the power to do so. Similar opinion presents Woolley (1994) who remarks a lack of interest presented by measures in an area that should be of central importance, that is, whether, independent central banks are actually able to act contrary to the government wishes. As a comment, Forder brings an argument that the true power of an institution is determined rather by the actual practice in enforcing own decisions than the formal rules and ‘the surface appearance’. Elgie and Thompson (1998, p.26) bring opinion presented originally by Woolley (1994) and say that the determinants of independence are:

Table 2: Importance of CBI criteria according to central bankers

	Mean: Central Europe	Mean: Industrial Countries	Difference
Provisions in the CB law on conflict resolution	2.5	7	-4.5
CB not in the primary govt. debt market	1	5	-4
Rest of the board not appointed directly by the government	7	4	3
Requirement in the CB law that CB pursues monetary stability	6	9	-3

Notes: The higher value, the greater importance
Source: Beblavy (2003).

not purely formal; they are not simply to be found in legal statutes and standing orders. Instead, they reflect the practice of core executive/central bank relations. In this sense, they reflect the behavioural relationship between the central bank and the core executive than just the statutory relationship.

The difficulty appears in finding a remedy to the problem of a ‘shallow’ statutes analysis. Elgie and Thompson (1998) suggest including data on the actual procedures, which are very often informal ones. In their methodology, not only written law but also, or even especially, practical procedures used by central bank can satisfy the condition that constitutes central bank independence. This approach meets the criticism of Forder (2000) who argues that this solution “does not turn the resultant index into a measure of the extent to which monetary policy is set independently”. He suggests an examination of the broader constitutional and intellectual environment to ameliorate or even replace the statute-reading methodology.

4.2 Criticism

Many approaches so far are vulnerable to the criticism of subjectivity. Going in this direction, Mangano (1998) underlines the seriousness of the measurement problems that affect most CBI indices, and implies that both GMT and Cukierman legal CBI index “suffer from a rather large subjectivity spread”. He continues acknowledging that any empirical result based on these two indices may be imprecise and questionable. This opinion is shared by Siklos (2002, p. 67) who underlines existence of some inaccuracies in Cukierman’s index for the period of 1980s. Siklos’ major accusation concerns “weak justification for the decennial choice of periods to analyze” and names several reasons why one could question its soundness: (1) the chosen periods correspond poorly to the dates of actual changes in legal acts of several central banks; (2) there exists considerable diversity across countries in the dating of the end of exchange rate regimes; (3) there are no changes in any of

the elements that make up Cukierman's index across most of the decades considered.

A different approach has been presented by Banaian, Burdekin, and Willett al. (1998). Here, the analysis lays on the ground of finding the relationship among 15 institutional categories of central bank frameworks and average inflation rates. Banaian et al. use a 'principal components analysis' to find out, which categories out of 16 used by Cukierman seem to be more important in practice. The results point out that the majority of the attributes included in the Cukierman index are either insignificant or of the wrong sign and therefore imply the possibility of wrong coding used by Cukierman especially for 'policy independence'.

In other work, authors (Banaian, Burdekin and Willett, 1995), although acknowledging the contribution of Cukierman's indices, argue that it is not sufficient to read central bank laws on the financial relationship between central bank and government. This method is not explaining the pressures on central banks when open market operations are concerned. Further, authors continue, the turnover rate reveals little information about government influence on central banks, and what effect the degree of TOR will have on inflation in industrial countries. Moreover, it is possible, that a low degree of turnover means no more but an 'accommodative' governor, who is unlikely to be replaced.

Brumm (2000) follows this view and shows imperfections of this indicator arguing, it might not consider the possibility that central banks governor might stay long at the post simply thanks to an agreement with political leaders. Forder (2005) names several criticisms of CBI measures considering theoretical imprecision. First, he mentions theory of bureaucracy and an aspect of support for independence expressed in its failure to respond to the issues raised by this theory. Second, he finds another fault on the empirical level. If central bank independence is to be laid on presumption that the statutes of a bank determine its objectives and behaviour, then it is in opposite to the norms of conventional analysis.

Challenging the criticism of subjectivity in constructing CBI measures, Fry, Julius, Mahadeva, Roger and Sterne (2000) define their independence index based on central bank attributes mentioned in previous studies. Authors combine a range of characteristics, taken from Cukierman (1992) and Grilli et al. (1991), that covers issues of legal objectives, goals, instruments, finance of the government deficit, and term of office of the governor. This measure is based upon the responses of central banks, therefore, as authors underline, this approach is vulnerable to the criticism of subjectivity. Main groups of questions contain those concerning self-assessment of the degree of independence; target-setting capacity; instrument independence; absence of deficit finance; statutory objectives; and long term of office of Governor. Analysis of relations between these factors and level of inflation in the previous two years for sample countries shows that freedom of deficit finance obli-

gation and the self-assessment measures were significantly correlated with inflation rate.

4.3 Presence of decisive central bank attributes

The literature on political and economic influence on economy by an independent central bank pays careful attention to the detailed precision of central bank institutional attributes. The attention is concentrated on the question, what are the most important elements of a strongly anti-inflationary institutional structure of the central bank. The problem appears when the approach of finding the most important attributes is undertaken, because the recent literature on central bank defines and classifies its independence in different ways.

Eijffinger and Schaling (1993) decide to call a ‘decisive’ attribute the one concerning final policy authority. It results with asymmetry in favour of this matter, giving lower importance to questions concerning the presence of a government official in the board or the board appointments procedure. Similarly, Banaian et al. (1995, 1998) argue, that basic theoretical principles contribute the priority to attributes concerning the formal ability of the central bank to set monetary policy autonomously. Hence, they assign lesser importance to the central bank as an interventionist in the market for government securities. Naturally, all attributes, including the procedure of appointment or financial relationship with government are informative when the political pressure placed on monetary authorities is concerned. However, “where the government makes the basic policy decisions and the role of the central bank is limited to simply implementing the government’s instructions, the effects of these other attributes are likely to be severely compromised”(Banaian et al., 1998). Further, it is possible that CBI measures simply do not consider the amount of disagreement that has arisen as to the relative importance of the different institutional features that may be significant for central bank independence.

Constructing effective and optimal measure means knowing which attributes are ‘good’ ones, and which are poor. Forder (1999) argues that in practice, the literature distinguishes effective from non-effective measures on the basis of their relations to inflation. That is, optimum index will show (expectably) negative relation with inflation rate, whereas a poor index will not show a relation of this kind. On the other hand, Elgie (1998) implies that the best measure is the one that uses the largest number of central bank attributes. In this sense, the approach of Cukierman et al. (1992) is ‘by far the most sophisticated methodology’. Forder (2000) challenges this opinion stating that increasing the number of characteristics in the measure may be damaging if they are of no relevance to the practical ability of central bank to resist government pressure.

A detailed study on how to construct a ‘good’ measure of independence

is done by Forder (1999) who compares three, different in methodology and criteria, measures; that is the one initiated by Parkin and Bade (1978)³ and followed by Alesina (1988, 1989); the index formulated by Grilli, Masciandaro and Tabellini (1991); and finally the turnover rate of CB governors index by Cukierman, Webb and Neyapti (1992). All measures point the same way and seem reasonable even though they differ in three important aspects: different approaches to measurement; different resultant measures; and different results from comparing the resultant measures with inflation. Interpreting three measures, Forder (1999, p. 27) summarizes “None of these papers presents a true test of the independence hypothesis. They have, in various ways, identified more or less plausible proxies for independence that are related to inflation; but in the process they have identified equally plausible proxies that are not”. Further he continues, these studies have different understanding of what he claims is the ‘key issue’ of independence, that is, what constitutes independence on an empirical level. Therefore, Forder summarizes, “mutually confirming studies are more in the nature of being mutually contradictory”.

The importance of certain CBI attributes is often given on the basis of the researcher’s personal opinion. Table 4 presents the summary of such subjective choice and indicate, which of the following characteristics are present in seven chosen measures. Additionally, the last column gives a scope of what is important to central bankers. Hence, monetary financing of the budget deficit seems to be out of the direct interest of banking specialists.

Banaian and Luksetich (2001) calculate, that Grilli et al. (1991) weight the fiscal relations between CB and government as much as 5/7 of all economic attributes, whereas it is over half of criteria in the Cukierman index. The Cukierman index gives three times as much importance to the central bank’s participation in the primary market for government securities that it is attached to policy formulation. They further conclude, referring to Banaian et al. (1995), that the key issues can be reduced to three questions:

1. Who has the authority to formulate monetary policy, central bank or government?
2. Can the government issue directives to central bank to pursue goals other than price stability?
3. If the government can issue these directives, is there any cost of doing so?

The first question relates to policy independence, whereas two other can be treated as the institutional independence of the central bank.

³Parkin, Michael and Robert Bade. (1978), “Central Bank Laws and Monetary Policies: A Preliminary Investigation”, in M. Porter (ed.), *The Australian Monetary System in the 1970s*, Monash University, Clayton, Australia.

Table 3: Institutional determinants of CBI in the literature

Determinants	1	2	3	4	5	6	7	8
Governor appointments		*	*		*	*	*	4
Governor term	*	*	*		*	*	*	5
Central bank Board appointment	*	*		*	*	*	*	4
Central bank Board term	*	*			*	*	*	5
Government participation in the Board	*	*		*	*	*	*	4
Policy responsibility on monetary policy	*	*	*	*	*	*	*	2
(Legal) Provisions in case of conflicts Government - Central bank		*	*		*		*	
Central bank statutory goals		*	*	*	*	*	*	3
Monetary financing of the budget deficit		*	*		*	*	*	6
Discount rate setting		*			*		*	
Policy responsibility on banking supervision		*			*		*	
Central bank control monetary instruments						*		1

Notes: 1 = Bade and Parkin; 2 = GMT; 3 = Cukierman; 4 = Eijffinger and Schaling; 5 = Masciandaro and Spinelli; 6 = Loungani and Sheets; 7 = Maliszewski; 8 = Questionnaire (ranking of importance according to Fry et al. 2000)

Source: Bade and Parkin (1988), Grilli, Masciandaro and Tabellini (1991), Cukierman (1992), Eijffinger and Schaling (1993), Masciandaro and Spinelli (1994), Loungani and Sheets (1997), Maliszewski (2000), Fry et al. (2000).

4.4 Legal and non-legal measures comparison - the findings

Simple tests, undertaken and presented below, aim to discover how close certain measures are to each other. In other words, we wish to show, how authors understand the definition of independence. The results of measuring the degree of central bank independence vary depending on the index. The reasons of this can be found in different understanding of certain key issues that constitute the idea of monetary authorities' independence (as presented in the previous sections). Despite the fact that central bank independence indices are constructed in a different way, they commonly show an empirical relationship between CBI and inflation. Thus, they appear to be mutually confirming. This brings the question: do certain attributes matter or not? Is the precision of measures really a key argument or is it enough to describe in general institutional framework of central banks?

4.4.1 Legal independence measures

One of the methods, while looking for similarities among measures, is to calculate simple correlation coefficients. It seems rational to expect high values between indices, which, at least theoretically, measure the same phenomenon. Table 4 presents Kendall's correlation coefficients for indices with 'normalized' data, that is brought into the same scale. The lower part consists of data calculated for the full sample, whereas the upper part excludes

Germany and Switzerland. The reason behind lowering the number of countries in the second round lays in the fact that Germany and Switzerland may bias the results. The results show that indices, which describe similar group of attributes and countries, show high values of correlation; AL (Alesina, 1988) contributes mainly from the only rational predecessor - BP. Indices based on averages also show rather high correlation. GMTP, political legal index formulated for 15 attributes, does not show significant correlation with three indices (BP, AL, and ES). It is rather surprising since the methodology and intuition is the same as in these three mentioned indices. Fratianni and Huang distance method, which assumes the Bundesbank as the most independent, correlates with the majority of indices with significance 0.05.

Table 4: Pearson and Kendall's correlation coefficients

Index	BP	AL	GMTP	GMTE	ES	Mean of AL and GMT	Mean of 5	Fratianni and Huang
BP	1	0.891***	0	0.08	0.564	0.553	0.063	0.418
AL	0.937**	1	0.151	0.425	0.188	0.762**	0.313	0.500*
GMTP	0.324	0.365	1	0.218	0.041	0.439	0.608**	0.248
GMTE	0.387	0.568*	0.356	1	-0.081	0.505*	0.473*	0.1
ES	0.740**	0.435*	0.266	0.18	1	0.129	0.089	0.297
Mean of AL and GMT	0.740*	0.834**	0.559*	0.619**	0.379	1	0.694**	0.552*
Mean of 5	0.416	0.513*	0.681**	0.582**	0.326	0.755**	1	0.438
Fratianni and Huang	0.634*	0.651**	0.426*	0.316	0.501*	0.682**	0.596**	1

*Significant for $\alpha = 0.05$. **Significant for $\alpha = 0.01$. Kendall's without Germany and Switzerland (upper part) and Kendall's (lower part). Original sample includes measures for 18 developed countries, calculated for the 1980s.

Source: Own calculations based on data from: Bade and Parkin, Alesina, Grilli et al., Eijffinger and Schaling, Alesina and Summers, and Fratianni and Huang.

The reasons for a low correlation between e.g. GMT and BP can be found firstly, in a variety of criteria taken to construct index; secondly, in the way authors interpret the relevant bank laws. GMT index covers both economic and political independence and brings 15 different CB attributes. Bade and Parkin concentrates on four general criteria which determine 'policy' independence, included by authors to a group of 'legal' independence. GMT index is criticized (e.g. by Eijffinger and Schaling, 1993) for the use of too many attributes, and therefore, for undermining the most important criteria.

The other problem lays in understanding the law in each country. Greater familiarity and knowledge of central banking in certain countries could effect the biggest variations in the value of the index for this country. For instance, Eijffinger and de Haan (1996, pp. 24) comment on Cukierman's (1992) interpretation on the Dutch central bank law, which they are most familiar with. Their knowledge let them believe that the Nederlandsche Bank is more independent than Cukierman's coding suggests. Similar misinterpretation happens for Bade and Parkin (1988) ranking for Italy, as Alesina (1998, 1989) explains, that resulted with a different value of ranks presented

by authors. Index constructed by Eijffinger and Schaling (1992, and later 1995) covers the biggest number of similar attributes of those in BP and AI indices. This can be seen in higher values of coefficients.

Indices based on averages correlate with their original sources. However, when their informative abilities are concerned, the voice of doubts appears. Eijffinger and de Haan (1996, pp. 25) argue that due to differences and low correlation of some indices, reliable ones, based on an average of various measures previously formulated, cannot be constructed. Hence, they undermine reliability of e.g. Alesina and Summers (1993), and Fratianni and Huang (1994) indices.

Often studies on central bank independence treat Bundesbank as a model, 'perfectly' independent central bank. In some of them, level of CBI is not even calculated assuming the highest value. Similar situation appears with central bank of Switzerland. It is thus possible that CBI values for these examples may bias the results of correlation between indices. Excluding Germany and Switzerland from the sample shows even greater lack of any correlations between measures. Forder (1999) stresses that it may be a matter of concern when measures of the same thing give rise to such wide divergences in a substantial number of cases. Moreover, he claims, any similarity of measures depend highly on agreement that the central banks in Germany and Switzerland are independent.

What strikes the most is a negative sign of coefficient marking relation between GMT economic and ES. Both indices have been constructed at the same time (beginning of 1990s) thus, their source of information, that is statutes and laws should be similar. One explanation can be connected with the fact that economic index of independence by GMT includes more detailed criteria that cover areas in monetary financing of budget deficit, and monetary instruments.

Table 5: Sample values for GMT E and P and ES

Country	GMT Economic (1-8)	GMT Political (1-9)	ES Policy (1-4)
Australia	6	3	1
Canada	7	4	1
Japan	5	1	3
New Zealand	3	0	3 ^a

^a Extension for New Zealand comes from Eijffinger and Van Keulen, "Central Bank Independence" (1995). It refers to central bank laws adjusted during the last ten years.

Source: Grilli, Masciandaro and Tabellini (1991), and Eijffinger and Schaling (1992)

The choice of attributes (e.g. subjects responsible for formulation mon-

etary policy) in constructing ES index indicates closer relations to GMT political one. Nevertheless, even here the coefficient is close to zero, when Germany and Switzerland are excluded. Table 5 presents examples of contradictions among three indices. The case of Australia and Canada proves GMTE and ES may describe different areas of CBI and points closer relations between the latter and GMTP. Values of GMT political for Japan and New Zealand on the other hand, contradict this supposition.

4.4.2 Measures of CBI in transition countries

Formulating indices has been so far a process of finding the unified measure for various groups of countries. Authors challenge previous approaches with different combinations of attributes in the analysis. Increasing the number of characteristics and countries in the sample helped to attract attention from other researchers but at the same time did not eliminate from the wave of criticism from others. Meanwhile, it may be reasonable to question whether it is reasonable to look for a 'perfect', suiting every country index knowing that unification of the world economic market may never become true. Is it worth of effort to search for an ideal measure of an idea like central bank independence, which does not even have a unified, clear definition? The figure 2 (see Appendix) presents result of the questionnaire-based survey prepared by Fry, Julius, Mahadeva, Roger, and Sterne (2000), sent to central bankers in nearly 100 central banks. It represents understanding of independence in different countries. Certainly, all answers are biased by subjectivity. However, as it was underlined already, this kind of subjectivity comes from the knowledge of specialists in national economy, finance or law, and therefore may be treated as an advantage. Hence, a problem appears whether researcher's objectivity, who can be seen as an outsider in this analysis, is a sufficient reason to discard knowledge of central bankers.

Measuring central bank independence in countries with transition economies is another challenge for researchers. We can observe a spreading trend of adjusting central banks from mono-banking into autonomous modern monetary institutions, and at the same time have doubts, whether democratic rules are obeyed in these countries. Table 1 in Appendix provides interesting results; National Bank of Poland is more independent than European Central Bank. The Table presents rankings of legal central bank independence for developed and transition countries, based on the comprehensive method formulated by Cukierman, Webb and Neyapti (1992) and updated by Cukierman, Miller and Neyapti (2002), and Siklos (2002). Columns contains a summary of statistics for developed countries with data presented in the original study for the period 1950-1989 (column 1); for developed countries with data updated for 1990s that includes European Central Bank (column 2); sample of 26 transition countries (column 3), and eight EU member states since May 2004 enlarged with CBI for Romania and Bul-

garia. It is immediately obvious that there are high variations of central bank independence, and what surprises the most are much higher values in a sample of transition, and later new EU member countries. Among developed countries, common obligation of increasing central bank independence as detailed in the Maastricht Treaty and common trend for non-European countries is visible for instance comparing median and mean for two different periods. Figure 3 (Appendix) presents graphical presentation of major statistics.

It is evident from the table that political authorities in transition countries made significant efforts to increase the degree of central bank independence. It raises an important question, however, if such a big difference between two groups of countries would be sustained when actual CBI is considered. Clearly, it is almost obvious that the degree of actual independence in transition countries cannot be as high, taking under consideration market imperfections, budgetary and deficit problems and much shorter monetary policy tradition than in developed countries. Cukierman et al. (2002) present similar comment stating that actual independence depends on the general regard for the law, which is likely to be higher in developed countries with long democratic and free market tradition than in transition countries, especially during their first years of transformation from planned to market economy. When looking for relations between CBI and inflation in these countries, immaturity of democracy and market would show that many factors like active regional conflicts that took place for at least part of the 'democratic' time, wars and price decontrols or the extent of liberalization also exerted an influence on inflation rate.

Incompleteness and noisiness of legal indicators of CBI, especially in developing countries have been widely acknowledged. For example, inconsistency of measures due to country specifications is underlined in De Haan, Eijffinger and Waller (2005; pp: 175 - 176). Authors present example of Poland and opposite directions of degree of central bank independence calculated for this country when two different measures are used. According to measures of legal independence, prepared by e.g. Loungani and Sheets (1997), Lybek (1999) or Maliszewski (2001), Poland has by far the highest scores in a group of new European Union member countries. However, when turnover rate of governors is calculated, Poland registers one of the highest values, what means the lowest degree of independence. The problem of a country type specification is noticed also by Eijffinger and Stadhouders (2003) who argue that a shift from legal to actual central bank independence depends on the 'rule of law' in a country. Therefore, in their analysis of the degree of autonomy in both developed and developing countries, they introduce institutional quality indicators (IQIs) as proxies for the rule of the law. Their result speaks loud by finding that the rule of law and the institutional framework matter in keeping the rate of inflation low, especially in transition countries. Hence, it has also impact on the actual central bank

independence.

Certain differences across countries and economic performance are noticed by Havrilesky and Granato (1993), who are willing to divide the sample with respect to the degree of corporatist structures' development. Authors argue that countries without a sectoral strife but with significant corporatist restraints on political rent-seeking tend to have relatively autonomous central banks and inflation rate that is seldom permitted to reach a double digit level. On the other hand, countries with weak corporatist restraints on political rent-seeking, for instance some Latin America countries, will characterize with low anti-inflationary credibility and presumably politically dependent central bank. Therefore, authors conclude, there exists a positive correlation between central bank autonomy and the strength of corporatism structures. When transition countries are concerned, Cukierman et al. (2002) formulate 'tentative hypotheses' regarding factors that may be conducive to higher CBI. First, authors mention the cultural impact on countries that are geographically nearer to Western Europe. Second hypothesis underlines willingness for membership in the EMU that plays the role of the accelerator for institutional improvements of CB. The degree of mutual interactions between a central bank and other institutions depends on the political-economic environment in which the bank operates. It varies whether the economy is open or close, on the labour- and goods-market institutions, or the inflation preferences of a government.

Franzese (1999) argues that the degree of central bank independence is connected with its ability to introduce the anti-inflationary actions. Moreover, the level of CBI cannot be constant and therefore it must vary with the broader political-economic environment in which the bank operates. Left-wing and right-wing governments are said to differ in the area of inflationary and wage pressures. Being aware of these differences, central bank's level of autonomy should be greater in a market with left-wing (socialist) government and therefore the anti-inflationary impact of central bank independence should be greater as well. These specific arguments about central bank independence show that the effects of any given institution are contextual; they depend on political, economic, structural, and institutional configuration and interactions among them.

4.4.3 CBI in practice - comparison

This section presents a comparison of recent indices measuring the degree of central bank independence in transition countries that is measures proposed by Maliszewski (2000), Cukierman, Miller and Neyapti (2002), Freytag (2003), and Freytag and Masciandaro (2005). This choice can be justified with certain characteristics of these measures such as originality of their method; including countries being under investigation; and the fact that they were calculated after the most important law amendments took

place in those countries. The group of transition countries is narrowed to ten new European Union members from the Central and Eastern Europe. The intuition behind this narrow choice is simple and concerns the problem that worries many: do we need an independent central bank to undertake efficient monetary policy? This question will be asked here with connection to the optimal central bank design on the way to joining the monetary union.

Based on Grilli, Masciandaro and Tabellini (1992), Maliszewski has calculated the measure for 20 transition countries. He enriches previous authors' list of attributes with two new ones and looks for relationship between the degree of CBI and inflation. The alternative method has been suggested by Cukierman (1992) and used by Cukierman et al. (2002) for transition countries. Its description can be found in the previous section of this paper. Freytag (2003), and Freytag and Masciandaro (2005) construct indices, which covers both internal and external central bank attributes and conditions. Hence, they include clusters of characteristics concerning: stated objectives of monetary policy (0,1); locus of legal commitment (0,1); discretionary power belonging to the government (0,1); conditions of appointment and dismissal of the CEO (0,1); condition of the lending to the government (0,3); accountability of the central bank (0); external pledges of the government (0,1); convertibility restrictions (0,15); interactions with other currencies (0,05) (Freytag and Masciandaro 2005, pp. 30-31)¹. Additionally, Freytag has included the central bank attribute concerning supervision and regulation of the financial system by the central bank.

Table 6: Pearson and Kendall correlation coefficients

Index	Maliszewski	Cukierman et al.	Freytag	Freytag and Masciandaro
Maliszewski	1	0.66*	0.47	0.28
Cukierman et al.	0.395	1	0.15	-0.21
Freytag	0.35	0.07	1	0.84**
Freytag and Masciandaro	0.28	-0.14	0.78**	1

**Correlation is significant at the 0.01 level (2-tailed); *Correlation is significant at the 0.05 level (2-tailed). Original sample includes measures for 10 transition countries, calculated for the 1990s. Upper part presets Pearson's coefficients, lower - Kendall's.

Source: Based on data provided by authors

Table 6 presents simple correlation coefficients for measures being under analysis. Except for two measures with the common author, indices show very small correlation or no correlation at all. The Maliszewski index seems to be the most correlated (Pearson) with the measures presented by Cukierman et al. However, the next part with graphical representation will show certain inconsistencies between these two measures. Small value of the Kendall's coefficient may indicate these inconsistencies.

Maliszewski vs. Cukierman When two indices calculated for transition

Table 7: CBI ranking: comparison of indices and Borda Count ordering

Maliszewski 2000	Cukierman et al. 2002	Freytag 2003	Freytag and Masciandaro 2005	Borda Count
Bulgaria	Poland	Estonia	Bulgaria	Estonia
Lithuania	Estonia	Bulgaria	Estonia	Lithuania
Poland	Lithuania	Latvia	Latvia	Bulgaria
Czech Rep.	Czech Rep.	Czech Rep.	Lithuania	Czech Rep.
Estonia	Hungary	Lithuania	Romania	Poland
Latvia	Slovakia	Hungary	Czech Rep.	Latvia
Slovakia	Slovenia	Poland	Slovakia	Hungary
Slovenia	Bulgaria	Romania	Hungary	Slovak Rep.
Hungary	Latvia	Slovakia	Poland	Romania
Romania	Romania	Slovenia	Slovenia	Slovenia

Source: Based on data provided by authors. Borda Count - own calculations.

economies are compared, certain inconsistencies in values can be found. Figure 4 (Appendix) presents two scatter plots with distribution of values for two central bank independence measures. The reasoning behind presenting two plots lays in different ways of normalization of the Maliszewski index, and therefore the second plot is for the reason of precision. Arrows in the first scatter plot indicate outliers of inconsistency between two measures. The greatest difference in values can be noticed in the quarter marked A, where CBI indices calculated by Maliszewski reached values higher than 0,6 and lower than 0,6 according to the Cukierman index. Points marked with arrows indicate Albania, Bulgaria, Croatia, Kyrgyz Republic, Latvia, Macedonia and Russia. In a quarter C, an arrow points on Ukraine. The greatest harmony between two indices is seen in a B quarter, where, even though values may differ, all points stands for a high level of independence according to both measures ($CBI > 0.6$).

Country rankings of independence and Borda Count Measuring results of CBI presented by different authors place countries on various positions in a ranking scale of the most and the least independent central banks. Table 7 summarizes outcomes of four different indices by ordering countries according to their degree of CBI (top of the table stands for the most independent central bank). The first look at the table can give the impression of complete inconsistency of four chosen measures. Poland has the highest value in Cukierman, and one of the lowest in Freytag and Masciandaro in this group of 10 countries. Similarly values for Bulgaria can differ a lot when Maliszewski and Cukierman are compared with each other. Such big differences can be explained with different methods used to calculate these indices. However, all of them are based on the law and statutes of central banks.

To decide, what is the final order of countries with respect to their level of CBI, as well as to find which of those indices may be the most accurate,

Table 8: Rankings of CBI in transition countries

Country	I	II	III	IV	Mean	Rank
Bulgaria	1	0,62	0,91	1	0,8825	2
Czech Republic	0,87	0,82	0,81	0,75	0,8125	4
Estonia	0,87	0,88	1	1	0,9375	1
Hungary	0,67	0,75	0,78	0,65	0,7125	7
Latvia	0,8	0,55	0,84	0,81	0,75	6
Lithuania	1	0,88	0,81	0,77	0,865	3
Poland	0,93	1	0,668	0,55	0,787	5
Romania	0,47	0,38	0,67	0,77	0,5725	10
Slovak Rep.	0,73	0,7	0,6	0,72	0,6875	8
Slovenia	0,73	0,71	0,53	0,47	0,61	9

Notes: Referring is made to the following studies: I = Maliszewski (2000), II = Cukierman et al. (2002), III = Freytag (2003), IV = Freytag and Masciandaro (2005).

the Borda Count⁴ method has been used by assigning weights to each rank. Countries with the same original value obtain the same rank; values are given from the range of (0; 1). The Borda count method shows the final ranking of countries and discovers the following result (column 5 in the table 7).

Estonia and Lithuania are the leading countries when central bank independence is concerned. Bulgaria, the EU member since 2007 has placed itself very high comparing to other transition countries. Romania, which is often mentioned as the country with the largest problems in the area of convergence with EU standards is placed almost at the bottom of the list. The most astonishing result, however, is represented by Slovenia, which, according to four measures, has the least independent central bank. This outcome is the most surprising because Slovenia is the country which joined the EMU the soonest of all other transition countries. It means its monetary as well as fiscal policies have fulfilled the Maastricht Treaty conditions the soonest. If this is the case, the following conclusion could be drawn: a high degree of central bank independence is neither a sufficient nor necessary condition to conduct efficient monetary policy in transition countries.

An alternative approach to ranking the countries and finding their final rank based on four measures is to construct standardised rankings. In the table, the degree of independence of central bank i ($i = 1...10$) as computed in the study j ($j = 1...4$) and shown in column j is redefined as a percentage of the figure assigned to the most independent bank in study j . The last two columns give the mean values and the final rank of countries. Once again, Estonia, Lithuania and Bulgaria turn out to enjoy the highest levels of independence. Romania and Slovenia on the other hand, proved again to have the least independent central banks in this group.

⁴For a survey on the Borda Count, see e.g. Nurmi, H. (2007), *Assessing Borda's Rule and Its Modifications*, Aboa Center for Economics Discussion Paper, No. 15/07

5 Conclusions

This study has discussed the theoretical literature on central-bank independence. Its review of various measures of CBI proves that all of them have their limitations. Hence, this paper tried to discuss main criticism, analyze similarities and differences, and finally investigate discrepancies in understanding CBI, depending on the type of economy. This all leads to the idea that further research on the reliability of measures and the search for their alternatives is necessary.

This paper names several imprecisions among measures that covers the subjectivity, criteria and weighting problem. Main accusation lays in the method of constructing the majority of measures, that is the focus on central banks' statutes and law, instead of analyzing, if independent central banks are actually able to act contrary to the government wishes. It brings the conclusion that neither of measures, whether it is the widely accepted Cukierman index (1992) or work based on Grilli, Masciandaro and Tabellini (1991), are not free of criticism.

The obligation of introducing the institutions for safeguarding central-bank independence is widely accepted, both in the academics and practitioners views. However, it has been showed that an independent central bank is neither a sufficient nor necessary condition for price stability. In this study, Slovenia proves to be the example. Nevertheless, the growing trend in increasing monetary authority autonomy is difficult to deny.

A set of empirical studies investigating relations between CBI and macroeconomic variables, especially inflation rate, seems to guarantee the justification of this trend. However, this and other studies on the precision of CBI indices spread doubts concerning their robustness and representation. It is another argument for the continuation of the research on the optimal central bank design as well as measures, trying to capture this phenomenon.

6 References

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A Appendix

Figure 1: CBI indices: consistency of normalized values (first eight measures for the 80s, two last – update until 2003).

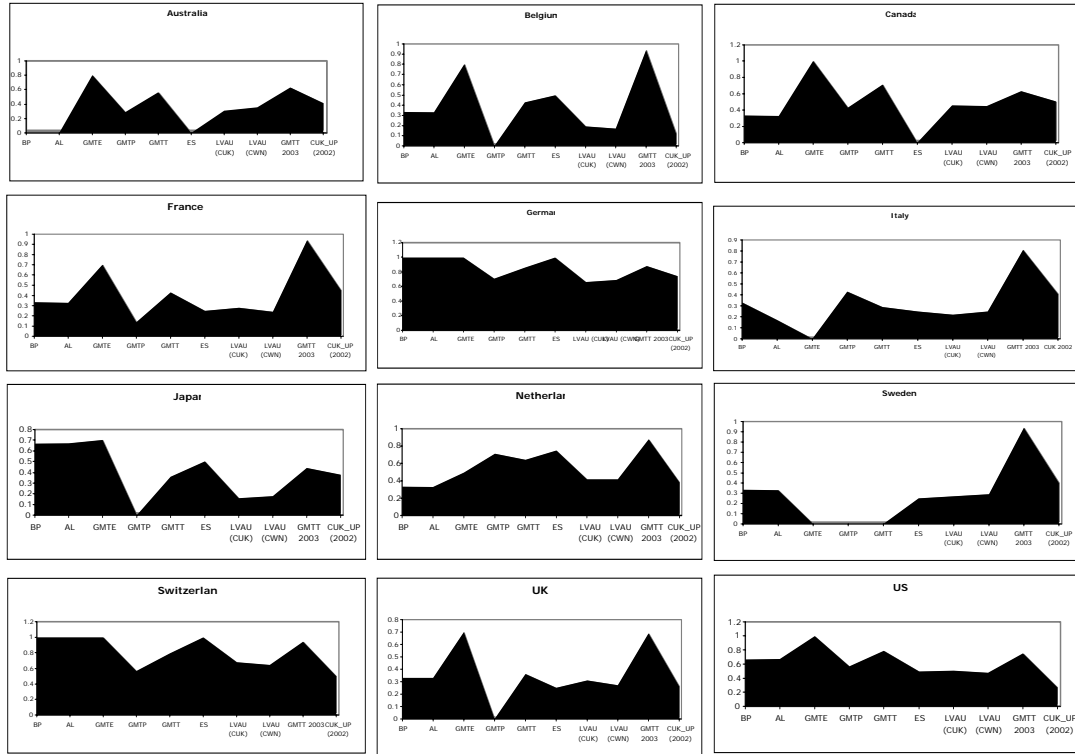
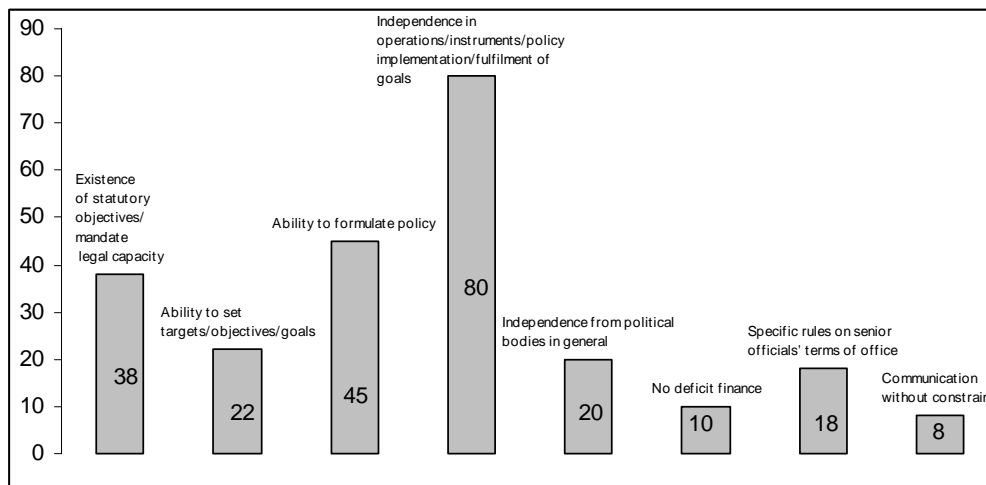
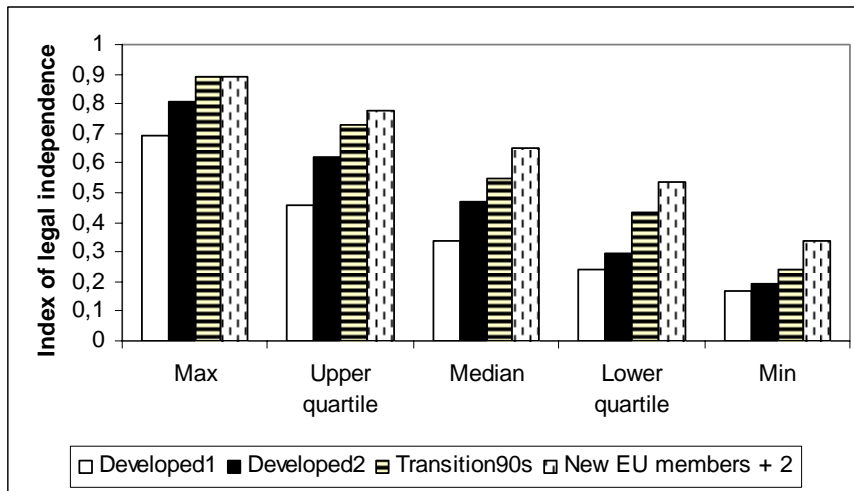


Figure 2. Factors mentioned by central bankers as important in the definition of independence



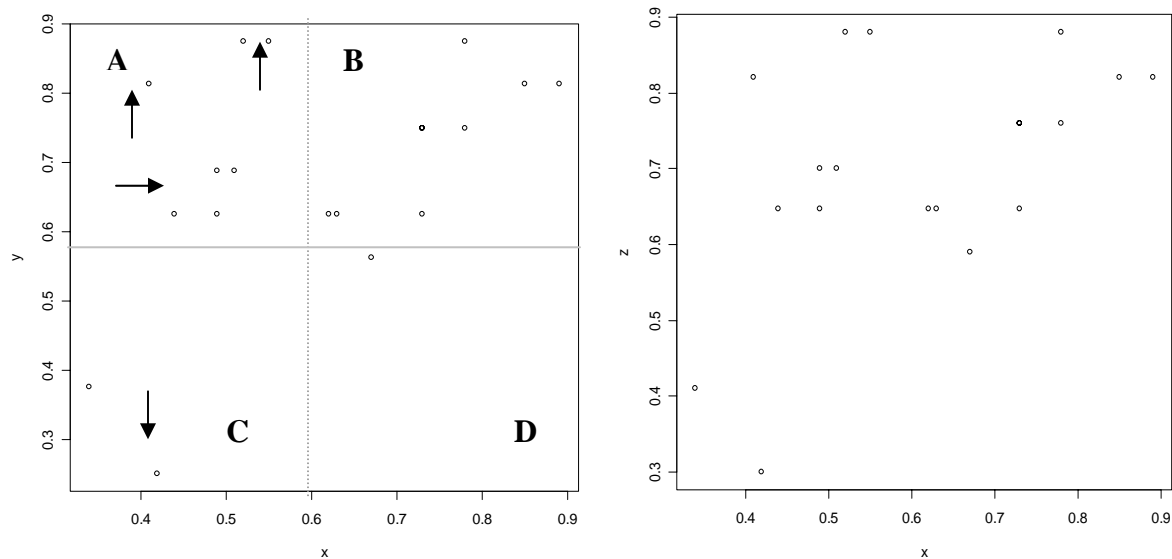
Notes: Values in percentage of all answers to the question 'How would you define central bank independence?'.
Source: Fry et al., (2000), *Key Issues in the Choice of Monetary Policy Framework*

Figure 3. Distribution of legal indices of central bank independence



Notes: Developed1: 22 developed countries with values for the period of 1959-89
 Developed2: 21 developed countries with values updated for 1990s (including ECB)
 Transition90: 26 transition countries with values after the newest law amendments
 New EU members + 2: 8 EU members since May 2004 with Bulgaria and Romania
 Source: Cukierman, Webb, and Neyapti (1992), Cukierman, Miller, and Neyapti (2002), Siklos(2002)

Figure 4. Distribution of CBI values: Cukierman et al. and Maliszewski indices



Notes: X – axis = Cukierman; Y (Z) – axis = Maliszewski
 Source: Cukierman et al. (2002) and Maliszewski (2000)

	Developed countries (1950-89) (1)		Developed countries (update for the 90s) (2)		Transition countries (90s) (3)		New EU members + 2 (4)	
	Country	Index of legal CBI	Country	Index of legal CBI	Country	Index of legal CBI	Country	Index of legal CBI
Max	Germany	0,69	ECB	0,81	Poland	0,89	Poland	0,89
Upper quartile	Canada, US, Denmark	0,4575	Germany, Switzerland, New Zealand, Spain	0,62	Belarus, Czech Republic, Georgia, Moldova	0,73	Estonia, Lithuania	0,78
Median	Australia, Iceland, Luxemburg	0,34	Sweden, Canada, Denmark, Portugal	0,47	Bulgaria, Mongolia, Uzbekistan	0,55	Hungary, Slovenia	0,65
Lower quartile	Italy, UK, France, New Zealand, Sweden, Spain	0,24	Australia, France, Finland	0,295	Croatia, Kazakhstan	0,435	Bulgaria	0,535
Min	Belgium, Norway	0,17	Belgium	0,19	Azerbaijan	0,24	Romania	0,34
N		22		21		26		10
Mean		0,36		0,47		0,57		0,65
Std. Dev.		0,15		0,18		0,18		0,16

Table 9: Cross-national comparison of legal central bank independence
Source: Based on Cukierman, Webb, and Neyapti (1992), Cukierman, Miller, and Neyapti (2002), Siklos (2002)

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