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Prohlašuji, že jsem disertační práci vypracoval samostatně a použil pouze uvedené prameny a literaturu.

Hereby I declare that I compiled this thesis independently, using only the listed literature and resources.

Prague, 17 January 2006

Adam Geršl

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INTRODUCTION

This dissertation thesis presents a collection of six research papers that I wrote during my PhD studies at the Charles University in Prague between 2001 and 2005. All of them deal with macroeconomic policies, a topic that I personally consider one of the most interesting areas of research in economics due to three main reasons.

First, in contrast to theoretical macroeconomics and macroeconomic modeling, macroeconomic policies are often subject to daily discussions at many levels of the public debate, reaching from high-level international political meetings over academic disputes up to the citizens' quarrels in the streets. Clearly, given the effect on standards of living macroeconomic policies have, monetary policy, exchange rate policy or fiscal policy, to name the most important ones, are of crucial relevance not only from the theoretical point of view, but also for the daily life of households and businesses. Interestingly, the arguments used in the debates at all these levels still lack a consensual view on macroeconomic policies, indicating that there is a scope for further research of determinants and effects of specific macroeconomic policies, and for dissemination of the research results to the general public.

Second, macroeconomic policies are usually decided and implemented by policymakers in the political arena, or very close to it in case the policymaker is not an elected politician. Thus, macroeconomic policies stand at the cross-section of economics and politics. Most macroeconomic theories and models simply assume that the policymaker's role is to implement "optimal" macroeconomic policies, an assumption that is – when expressed very modestly – probably not fully in line with the observed reality. The methodological problem of how to account for policymakers' behavior in the political environment that differs from the usual assumption, as politicians have their own interests and faces many political constraints, represents another area worth researching.

Third, similarly to today's macroeconomic theory, macroeconomic policies benefit as well from introducing microeconomic features into the analysis. In the same ways as firms or households maximize their profit or utility function under a set of constraints, the policymaker is assumed to maximize his or her objective function under existing constraints. Given that policymakers operate on the border between economics and politics, their objective function and constraints they face include not only economic, but also political variables. From this perspective, it is possible to use the microeconomic apparatus to analyze the determinants of individual policies.

The first aspect of macroeconomic policies mentioned above leads to what is known as the traditional economic approach: the effects of different policy measures are analyzed and the suitability of use of such measures is assessed using information from the analysis, assuming that optimal policies will be implemented by policymakers. The first two chapters of this dissertation thesis, dealing with foreign exchange interventions as a tool of exchange rate and monetary policy, completely fit into the traditional economic perspective.

However, I am rather fond of the approach based on the other two aspects of macroeconomic policies, i.e. the closeness to politics and microeconomic perspective, namely of the political economy approach. This approach is not new: at least since Anthony Downs' seminal work written in 1957 *An Economic Theory of Democracy*, policymakers operating in political environment are treated as self-interested individuals whose objective is to maximize re-election or re-appointment chances. The public choice literature and especially the political business cycle models made use of such assumptions in the area of macroeconomic policy already during 1970s. The last four chapters of this dissertation apply the political economy perspective to monetary and fiscal policies not only within a theoretical framework, but also – in case of chapter IV – using quantitative empirical analysis.

This dissertation, however, offers additional value added to the political economy literature in that it applies institutional perspective in the realm of macroeconomic policies. In principle, policymakers' objective function and constraints they face are determined by the institutional framework within which policymakers operate. As decisions about macroeconomic policies are usually taken in or close to political arena, political institutions, i.e. rules which govern and constrain actions and interactions of agents in political markets, play a crucial role in what policies will be implemented.

An economic analysis or institutional framework in both economic and political markets is a subject of constitutional political economy (or constitutional economics), a research program founded and developed especially by James Buchanan in 1970s and 1980s. Having its roots in public choice, constitutional economics applies a rigorous microeconomic approach when analyzing institutional structures. It claims that economic outcomes, as we may observe them in reality, are results of individuals' interactions in economic and political markets under a specific set of rules that constrain them. In addition it claims that these rules, or at least most of them, are subject to deliberate change. Thus, in order to obtain "better" economic outcomes, one has to reform institutions that influence individuals' actions and interactions.

This dissertation makes use of the constitutional economics perspective in the area of macroeconomic policies. If we as citizens want to have "better" economic policies, in terms of better macroeconomic management that could virtually pass the test of consensual agreement of members of the society, we have to analyze and reform rules that influence decisions of policymakers in charge of these policies. This perspective is applied fully in chapters III, V and VI, and partially in the chapter IV, focusing on institutional framework within which monetary and fiscal policies are chosen and implemented, i.e. on monetary and fiscal constitution.

In the Czech Republic, probably similarly to other transition economies, discussions were led during 1990s about what should have the primacy in economic policies, if macroeconomic policies aimed at stabilization, or institutional policies aimed at improvements in legal framework. The most interesting feature of these discussions was that individual arguments were put in a way as if macroeconomic and institutional perspective in economics had nothing in common. This dissertation tries to overcome this gap and offers a unifying perspective: an institutional analysis may help to understand how macroeconomic policies are formed and offers a good guidance towards possible improvements via reforming institutional structures under which macroeconomic management is made.

Chapter I focuses on an interesting part of exchange rate policy, namely on foreign exchange intervention. The strong appreciation of the Czech koruna in 2001 - 2002 and foreign exchange interventions conducted by the Czech central bank under inflation targeting regime provided a nice opportunity to summarize the existing pros and cons of this controversial monetary and exchange rate policy instrument. In this paper, the strong Czech koruna appreciation, its possible causes, and policy measures taken by the central bank against it are described. The chapter also presents the main motives for conducting FX interventions, theoretical channels through which foreign exchange intervention may influence exchange rate, and some basic empirical evidence on their effectiveness. Finally, the foreign exchange interventions conducted by the Czech central bank in 2001 and 2002 are discussed and those done in July – September 2002 in a rather secret manner assessed as relatively efficient.

Chapter II provides a natural follow-up of chapter I, as it tries to measure the effect of Czech National Bank's FX interventions on exchange rate, thus assessing the effectiveness of this interesting exchange rate policy instrument. The chapter reviews several approaches to testing the effectiveness of foreign exchange interventions and applies some of them to the data on interventions conducted by the Czech National Bank in 2001 and 2002. The reaction function of the central bank and the impact of interventions on exchange rate level and conditional and

implied volatility is estimated, and the successfulness of interventions discussed within the event-study approach. The results indicate that interventions conducted by the Czech National Bank had only small short-term effect on exchange rate level and to a certain extent contributed to the increased conditional and implied volatility.

Chapter III reviews the literature on dynamic inconsistency of monetary policy, and discusses, also in a formalized way, the different measures how to limit the incentive of policymakers to use inflation to maximize their objective function, leading to an inefficient outcome of higher than necessary inflation without any impact on real economy. The nature of the dynamic inconsistency problem is presented in a game theory framework and the chapter then discusses the rules versus discretion dilemma, reputation building, flexibility versus credibility trade-off, independence of central banks, and optimal contracts for central bankers, i.e. issues in the monetary constitution that attracted a lot of attention over the last two decades. The value added above the review of standard solutions to inflation bias lies in the use of constitutional economics perspective when discussing the role of rules in monetary policy and in the discussion of checks and balances as a means to solve the flexibility versus credibility problem.

Chapter IV follows the public choice approach to monetary policy and applies a methodology originally developed by an American economist Thomas Havrilesky in late 1980s and early 1990s for measuring political pressure on central banks and testing whether such pressure influences monetary policy. The methodology is applied to the Czech National Bank, next to the original Federal Reserve and the Deutsche Bundesbank the third central bank to which this methodology has been applied. We aim at answering the question whether there has been political pressure exercised on the Czech National Bank between 1997 and 2005, and whether the bank has fallen prey to it, accommodating the revealed preferences of those executing the pressure. Using the same methodology that has been applied to the Federal Reserve and the Deutsche Bundesbank also allows some basic comparisons of all three central banks in terms of the amount of political pressure they face and their responsiveness to it.

Chapter V, which is a joint work with Nils Goldschmidt (Walter Eucken Institute, Freiburg) and Ekkehard Köhler (University of Freiburg), discusses the concept of central bank independence from the constitutional economics perspective. In principle, what we look for is an “optimal” monetary constitution that would, on the one hand, insulate the central bank from short-term political pressures, but on the other hand, it would reflect citizens’ preferences as to the desired range of inflation and responsiveness to economic shocks. The chapter reviews the proposals that have been already made within the constitutional economics and related sub-disciplines such as the German ordoliberalism or arguments made by F.A. von Hayek, and discusses in detail elements of monetary constitution that serve to link central banks and politics. We argue that the optimal set of institutional elements must also allow some dependence of central bank on politics, but must at the same time guarantee that monetary policy is not misused for narrow political purposes.

Chapter VI uses a dynamic inconsistency model known from monetary policy to assess three alternative proposals how to reform fiscal constitution in order to limit government’s incentive to use fiscal policy for maximizing political support. The return to ever-balanced-budget rule, state-contingent rules, and the establishment of an independent Fiscal Policy Committee with power to set public deficit with the aim of stabilizing the economy are discussed from the constitutional perspective, analyzing different incentives that these proposals create for government and alternative means to enhance credibility of the arrangement.

Despite the unifying focus on macroeconomic policies, all papers collected in this dissertation were written independently and represent stand-alone contributions to the understanding of how macroeconomic policies are chosen and implemented, and what consequences they may

have. Thus, in order to make it easier for the reader to select, read and further disseminate only those contributions he or she considers the most interesting, the chapters have their own independent ordering of sub-chapters, tables, charts, equations and footnotes, and also their own list of references.

Next to the stimuli coming from the activities at the Institute of Economic Studies of the Charles University in Prague, such as teaching, participation at many research seminars, and discussions with my consultant and colleagues, there were three other sources of influence that shaped the focus of this dissertation. The first drafts of the chapters I and III were written when I was at the research stay at the University of Freiburg in 2002-2003. The possibility to co-operate there also with the Walter Eucken Institute, the main European research center focusing on ordoliberal intellectual tradition and modern constitutional economics, has significantly contributed to the approach adopted throughout the whole dissertation. Chapter V, which was written as a joint work with Nils Goldschmidt from the Walter Eucken Institute and Ekkehard Köhler from the University of Freiburg during my short-term research stays at the Walter Eucken Institute in autumn 2004 and summer 2005, reflects this tradition to a full extent.

Second, the whole chapter II and parts of the chapters I and V were written while I was working for the Czech National Bank. The central bank's intellectual environment and the daily contact with issues related to monetary policy and, especially in 2001 and 2002, to exchange rate management and the use of FX interventions, have provided enough intellectual material for this dissertation and actually shaped the main focus of the dissertation on macroeconomic policies. Having been close to the CNB's Bank Board at those times, I began to understand how important it is for a central bank to be insulated from short-term political pressures, and how difficult it is to make decisions related to macroeconomic policies in the environment of inevitable uncertainty.

Third, chapters IV and VI were written while I was working for the European Central Bank in 2004-2005. Working for a European institution gave me again a valuable insight into how macroeconomic policies are formed and what role the political considerations can play. At that time, actually, the discussions surrounding the proposed reforms of the EU fiscal framework, the Stability and Growth Pact, provided me with an input into the chapter VI on fiscal constitution. There I also realized how important fiscal constitution and the resulting fiscal policy are in monetary policy decisions.

Chapter IV was presented at the 1st IES Young Scholars Conference in Prague (September 2005) and at the 4th Europaeum Workshop in Bologna (October 2005), while chapter VI was presented at the 2nd Jean Monnet Workshop in Prague (September 2004) and at the 4th Walter Eucken Institut Workshop "Ordnungspolitik und Recht" in Freiburg (October 2004). Chapter I was published in the *Finance a úvěr – Czech Journal of Economics and Finance* No 3-4/2004, chapter III was published as a Merit Research Working ePaper No 7/2005, chapter IV was published as a Merit Research Working ePaper No 8/2005 and accepted for publication in an early 2006 issue of the *Finance a úvěr – Czech Journal of Economics and Finance*, and chapter VI was published as an IES Working Paper No 98/2005.

I FOREIGN EXCHANGE INTERVENTION: THE THEORETICAL DEBATE AND THE CZECH KORUNA EPISODE*

1. Introduction

In the last twenty years, a large amount of literature emerged on whether and how sterilized foreign exchange intervention can affect the exchange rate. However, the whole debate still lacks clear and unambiguous conclusions. As a result, without having sound arguments for or against its use, monetary authorities often decide about official intervention in the foreign exchange market according to some kind of “flair”.

The strong appreciation of the Czech koruna and foreign exchange interventions conducted by the Czech central bank in 2001-2002 provide an opportunity to summarize existing arguments and assess this controversial monetary policy instrument in the light of the current theoretical debate and the empirical evidence on foreign exchange intervention.

The paper is organized as follows: in section 2, the “appreciation episode” of the Czech koruna is described. Section 3 is devoted to the theoretical debate on foreign exchange intervention, discussing motives and channels through which intervention can influence exchange rates. Section 4 shortly surveys the literature about empirical evidence on foreign exchange intervention and section 5 concludes by reinterpreting the Czech experience in the light of the current debate.

2. The “Appreciation Episode” of the Czech Koruna

During the last quarter of the year 2001 and in 2002, the central bank of the Czech Republic (the Czech National Bank, CNB) intervened several times in the foreign exchange market to reduce the value of the Czech koruna that began to appreciate sharply in September 2001 against the euro in nominal as well as in real terms. Since 1999, the appreciation trend at about 4 % annually in nominal terms was an obvious fact that could have been easily explained by means of the textbook theories on the basis of economic fundamentals (including the Balassa-Samuelson effect). The trend was generally accepted by most economists as well as by the central bank and government officials. However, between September 2001 and July 2002 the koruna strongly appreciated another 15 % against the euro nominally, representing considerable risks for the export-oriented Czech economy.

Central bank economists and other economic experts considered this acceleration as being driven mainly by market expectations of significant increase in privatization revenues in euro in the Czech Republic and their conversion into the domestic currency on the foreign exchange market, i.e. by a temporary one-off event and not by economic fundamentals or interest rate differentials. In the media, the CNB representatives called the upward path of the koruna an irrational “speculative bubble” that must burst sooner or later. As the koruna was appreciating, export-oriented firms who had not hedged their exchange rate risk were suffering huge losses and the pressure on the central bank and government to stop the appreciation increased. According to the official central bank statement, a strong koruna and the coincident downturn of economic growth in the EU in that period could “harm the competitiveness of Czech exports, significantly decrease economic growth in the Czech Republic and cause the GDP to depart from its balanced level again. The present combination of factors also presents a risk for the current account, i.e. for the external balance of the Czech economy. Sooner or later the exchange rate would have to weaken back to its fundamentally

* This paper was published in *Finance a úvěr – Czech Journal of Economics and Finance* 3-4/2004, pp. 94-116.

justified value, but the aforementioned exchange rate fluctuations would have negative consequences for the economy". (Czech National Bank 2002).

Under the term "negative consequences" we have to understand not only a temporary decrease in economic growth or even an economic decline, but as well a risk of higher inflation volatility and the resulting multiple miss of the inflation target, set by the central bank as a primary monetary policy objective in the inflation targeting regime. As stated by Wadhvani (2000), without any policy measures taken against it, an overvaluation of the domestic currency in terms of deviation from the equilibrium trend could have a strong "hysteresis" effect. An overvalued currency will cause a number of firms to go out of the business because of losses from export revenues or lower domestic sales due to cheaper imported goods. A decline in economic activity results in higher unemployment and a lower rate of inflation, that can be deeply under the target or target band. At some uncertain date in the future when the exchange rate comes back to the fundamentally justified level the economy will go upwards with the risk of inflationary overshoot in this recovery phase.

The resulting volatility in the inflation rate could be very damaging to the credibility of the central bank as well, raising further inflation risks through the channel of inflation expectations. For all the above-mentioned reasons a consensus between the central bank representatives and the government was reached about the necessity to weaken the koruna back to the more fundamental value. The government was interested in the weakening not only because of a threat of an economic decline and a rise in unemployment in export-oriented sectors but also because of a decline of expected privatization revenues when converted from the euro into the very strong koruna.

The effort to reduce the value of the koruna does not have to be a deviation from the monetary policy's primary goal. In the inflation-targeting regime, the primary aim of the monetary authority is to hit the inflation target expressed in terms of a point or a band. Such a single objective of the monetary policy does not mean that the central bank does not pay attention to the other macroeconomic variables like the GDP, the exchange rate or unemployment. On the contrary, because of interdependencies in economy and different transmission channels through which the monetary policy operates, such aggregates are very important to consider, when maintaining the price stability. Thus, although it may look like trying to prevent an economic decline by helping the exporters to restore their revenues, measures taken against further appreciation of the koruna with the aim to reduce the hysteresis effect are consistent with maintaining price stability as the primary goal of the monetary policy.

The consensus reached between the central bank and government about weakening the domestic currency does not have to mean giving up the independence of the central bank either. The nature of the appreciation based mainly on expectations of government behavior prevents the central bank from using the standard monetary policy instrument – the interest rates – to combat excessive appreciation. Additional tools are required that can directly alter the expectations of traders in the foreign exchange market. The *Strategy for Dealing with the Exchange Rate Effects of Capital Inflows from Privatization of State Property and from Other Foreign Exchange Revenues of the State* (the Strategy, hereafter), proposed by the central bank, approved and really followed by the government, represents not only such a tool but as well a kind of contract between two equally independent bodies. Such an act is then to be interpreted as the actual exercise of the central banks' independence rather than its failure.

The "action plan" against excessive appreciation, of course never called such a way and considered ex post rather than ex ante, consisted of three elements: the Strategy, the decline in central bank's interest rates and the foreign exchange intervention. Holub (2003, p. 17) identifies these three "policy measures" as well. In the Strategy, the government promised not to convert the current and future privatization proceeds into the koruna in the foreign

exchange market but to sell them directly into the CNB's foreign exchange reserves.¹ As we can see from *Figure 1*, the approval of the Strategy by the government did not have a substantial effect on the exchange rate trend. One of the reasons could be that the market did not believe that the government met its obligations stated in the Strategy. However, the government surprisingly followed the Strategy in May 2002, when the revenues from the first privatization deal² an amount of more than four billions euro were purchased by the CNB directly into its foreign exchange reserves. But the market expectations as the main cause for koruna appreciation was altered much more by the announcement of the cancellation some big privatization deals in October and November 2002 that were previously regarded as a certainty (with expected revenues of more than two billions euros).

The second instrument in the fight against the strong koruna was a decline in the interest rate, which was reduced five times in a period of nine months. The key central bank's interest rate – the two-week repo rate – was cut from 5.25 % in November 2001 to 3 % at the end of July 2002.³ The reasons for the decline in interest rates were of course, presented in the usual way, in the inflation targeting communication: the rapid koruna appreciation creates a sudden tightening of monetary conditions that, according to the new inflation forecast, situates the annual inflation below the targeted band, thus providing reasons for cutting interest rates. Beyond these words, we have to understand that the export firms, their sub-suppliers and producers for the domestic market affected with a sudden decline in their competitiveness are put under pressure to quickly increase their productivity or to lower costs. Because of the relative downward rigidity of wages and other inputs (loans with fixed interest, for example), the central bank faces the following choices: to either let the firms go out of business, which has strong effects on the macroeconomic stability of the very open Czech economy, or to help them a little by cutting interest rates and reduce the burden that they bear.

The third instrument used by the central bank, which is much more ambiguous and without clear empirical evidence, was the foreign exchange intervention. There were two phases of interventions. In the first phase, starting in October 2001 and ending in April 2002, the central bank intervened four times in the foreign exchange market (see *Figure 1*) in a very similar way. After an ordinary or extraordinary meeting, the Banks' Board announced to the press not only its decision to intervene, but as well the fact that – at the time of announcement – it was already intervening. However, this kind of intervention had only a very small and temporary impact on the exchange rate (see again *Figure 1*), thus a change of intervention strategy came. In the second phase of interventions, beginning in July 2002 and ending in September 2002, the central bank intervened secretly, without any announcement to the public. Some of the interventions were immediately confirmed by dealers in the foreign exchange market (when the central bank bought the euro itself) or subsequently revealed by publishing the Bank Board meeting minutes, which are regularly put on the central bank's web site with a lag of 12 days (when the central bank intervened through some foreign banks). During both phases, a number of verbal interventions made by the Bank Board members accompanied the official interventions.

The effect of the secret interventions on reversing the exchange rate development was not small, mainly because the central bank managed to keep the traders in uncertainty about

¹ The Strategy comprises more arrangements and provisions that the government should meet, all of them relating to the foreign exchange revenues. For example, there is an obligation of the government not to issue bonds denominated in foreign currencies – see CNB (2002). Some kind of agreement between central bank and government about neutralizing foreign exchange revenues of the state existed and was followed already before the new Strategy was approved.

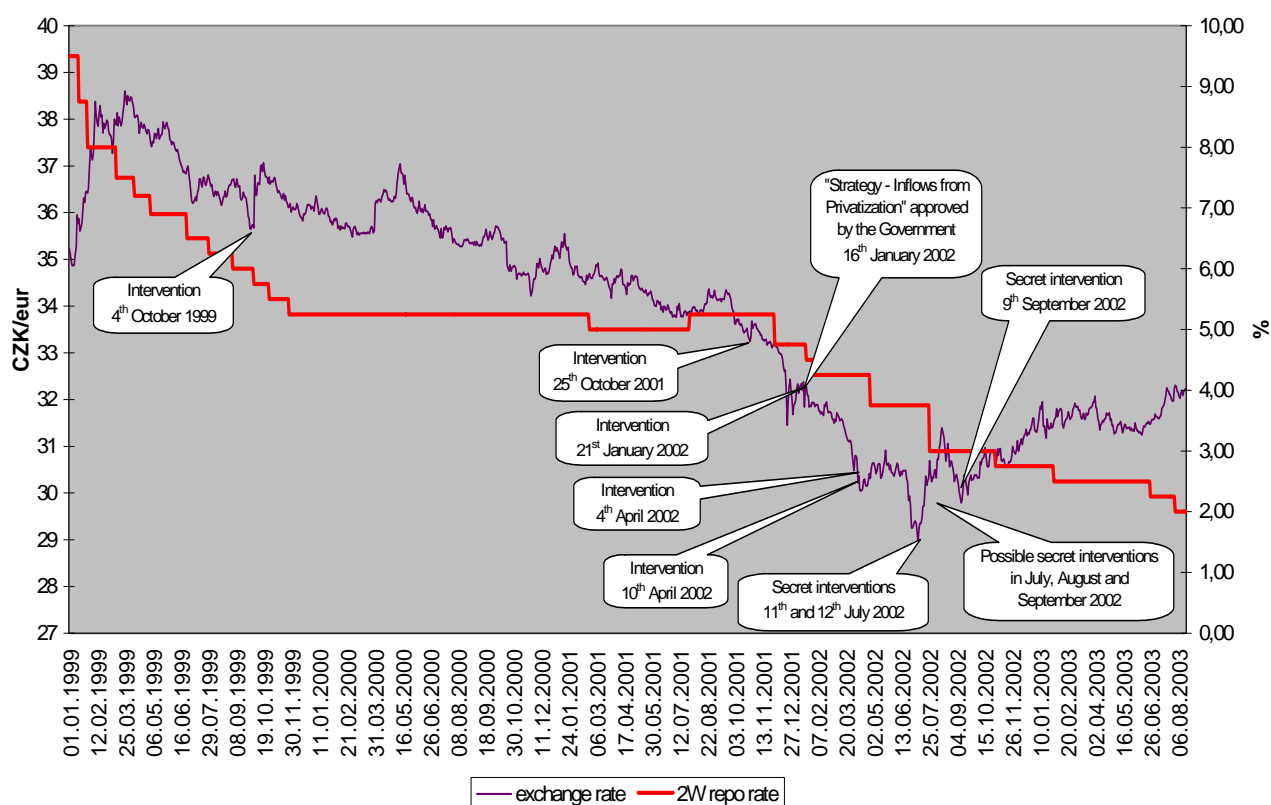
² Transgas, a. s., an European natural gas transporter and importer of natural gas to the Czech Republic, was sold to the German company RWE Gas AG.

³ Since July 2002, the interest rates were further lowered, standing at 2 % in August 2003.

future interventions and exchange rate development. On the other hand, it is not easy to confirm empirically that the desired depreciation of the koruna, starting in August 2002, was due to the interventions. The expectations of traders were further influenced by other factors like the process of government building in July 2002, announced changes in government economic policy, resulting in canceling some privatizations later in October and November 2002, as well as by the expected economic effects of the flood that surprised the Czech Republic in August 2002.

Looking at the exchange rate development in Figure 1, we can see the “appreciation bubble” at the time axis somewhere between November 2001 and December 2002. We could imagine a stable koruna appreciation of 4 % annually in this “bubble” period as well, resulting in the same exchange rate values in the first months of 2003. Thus, one can argue that the central bank succeeded not only in reversing the very sharp appreciation, but as well in “putting” the contemporary exchange rates on the “right” values, i.e. consistent, according to the central bank’s opinions, with economic fundamentals.

Figure 1: The development of CZK/EUR exchange rate, repo rate and foreign exchange interventions



Source: Czech National Bank (www.cnb.cz); Czech economic press, in particular www.ihned.cz.

Note: Secret intervention means intervention that was ex post confirmed by the CNB.

The question that remains is that of the role of the foreign exchange interventions in this episode. Should the central bank under inflation targeting make use of foreign exchange intervention when facing sharp and undesirable changes in the exchange rate of the domestic currency? If the “action plan” of the Czech National Bank had failed, the answer would have been obviously no. However, the plan succeeded, providing further arguments to the contemporary theoretical debate about the efficiency and desirability of foreign exchange intervention, even if the size of the intervention effect, in comparison with other factors contributing to the reversion of the koruna appreciation is unknown. The debate is described in the next section.

3. The Debate about Foreign Exchange Intervention⁴

The debate about efficiency and desirability of foreign exchange intervention started predominantly with the break-up of the Bretton Woods System in 1971 when the participating countries decided to abandon fixed exchange rates and moved one after the other to managed floating. Of course, foreign exchange intervention as a central bank's tool had already been practiced before.⁵ However, in the era of gold standard, gold exchange standard or in the Bretton Woods System, i.e. in regimes with adherence to some kind of fixed exchange rate, intervention was not viewed as a discretionary policy instrument available in policy tool kits of monetary authorities. It was rather a passive act of buying or selling foreign currency used to help maintain the exchange rate within prescribed margins and as such, it was largely practiced in the Bretton Woods era (Dominguez and Frankel 1993a; Edison 1993; Lehment 1980).

With the introduction of floating exchange rates in 1971-1973, the scale of intervention even increased (Edison 1993; Bopp 1982; Lehment 1980). Because in the floating-rate regime the central bank is not obliged to purchase or sell foreign currency to maintain some level of exchange rate, one has to ask why central banks intervened at all.

3.1 Motives for Intervention

Edison (1993) in his often-cited study, lists four possible motives given by monetary authorities for intervening in the floating-rate regime: (1) to calm disorderly markets, (2) to influence exchange rate movements, (3) to target exchange rates, or simply (4) to support other central banks' exchange-rate operations (for example, to help settle large transactions). Regarding the first goal, there is a long-lasting consensus that disorderly foreign exchange market conditions (low liquidity, high bid-ask spreads or even missing transaction counterparties, for example no buyers of some currency) can justify the using of intervention (Jurgensen 1983; Emminger 1986, p. 307). However, the definition of "disorderly" is naturally ambiguous: some countries intervened almost daily in order to prevent even an emergence of "disorderly conditions", other countries waited till some "crisis" or a large liquidity shortage in the foreign exchange market actually had appeared.

Most of the studies on foreign exchange intervention emphasize the second motive, i.e. influencing the exchange rate development (Jurgensen 1983; Edison 1993). Neely (2001) discusses empirical evidence from a survey of foreign exchange practices: 89.5 % of 22 surveyed authorities intervened sometimes or always to resist short-run volatility in exchange rates and 66.7 % of the authorities used intervention to correct medium-term "misalignments" of exchange rates away from "fundamental" values. Baillie and Osterberg (1997) cite some other studies and public statements in which central banks stand ready to influence the level of an exchange rate and/or to reduce its volatility.

Dominguez and Frankel (1993a) ask more generally whether monetary authorities need an independent policy tool for influencing exchange rates at all, thus restating the problem in terms of the classic debate over costs and benefits of two polar cases, fixed rates and floating

⁴ Frait (1997) already introduced the theoretical debate on foreign exchange intervention to the Czech economic audience. In this paper, however, the section brings additionally some new arguments relating intervention and the inflation-targeting regime, discusses some new channels of influence, and covers new literature since 1997 as well.

⁵ In the case of the Czech Republic, for example, the predecessor of the National Bank of Czechoslovakia and first monetary authority in the Czechoslovakia in the period 1919-1926 – the Banking Department of Ministry of Finance – made a large use of foreign exchange intervention with the aim to strengthen the new currency (Czechoslovak koruna). The monetary regime of that period was a kind of managed floating with heavy exchange restrictions on current and capital account transactions.

rates.⁶ If a country opts for a floating rate, why should its monetary authority further aim to affect the exchange rate development?

There are two answers usually held by advocates of intervention. In the short run, floating exchange rates tend to be volatile and create uncertainty about their future development, thus discouraging international economic activities. Stabilization of exchange rates via daily interventions, for example by “leaning-against-the-wind” strategy, i.e. attempting to move an exchange rate in the opposite direction from its current trend, can help promote exports, imports and international lending. Short-run fluctuations of exchange rates were often included in the disorderly market conditions by policy makers (Jurgensen 1983; Emminger 1986).

In the medium-term, imperfections in the foreign exchange market can prevent the exchange rate from playing its appropriate role as a signal. Some practitioners (Emminger 1986, p. 325; Jurgensen 1983) as well as some theoreticians (Dominguez and Frankel 1993a, p. 38) in the field often argue that foreign exchange markets are far from being efficient. Bandwagon effects, herding behavior and self-fulfilling expectations may cause speculative bubbles and large exchange rate misalignment from fundamental values. This creates a false signal for economic subjects and may lead to misallocation of resources that can turn into large real costs after the speculative bubble bursts. Thus, interventions aiming to bring the exchange rate back to a fundamental value, decrease possible real costs of misalignment and raise market efficiency.

Targeting some exchange rate level or trend seems like compromising fixed and floating rates: the exchange rate is floating, thus allowing market forces to do their work, i.e. create signals, accommodate external shocks and prevent sudden balance of payment crises, but at the same time monetary authorities stands ready to defend a particular exchange rate level, thus lowering uncertainty about exchange rate development. However, there are at least three problems associated with such an exchange rate policy. First, if monetary authority targets an exchange rate that is not based on economic fundamentals, including monetary conditions, a conflict may soon arise between external and internal economic policy goals. Second, even if the central bank tries to target a fundamental-based level there is the problem of how to find this level. Third, targeting some exchange rate levels can bring economic subjects into morally hazardous situations: firms involved in international transactions may give up protecting themselves against exchange risk by hedging their bets on the forward markets, relying on the ability of the central bank to defend the announced level. When the central bank fails to defend a particular exchange rate level by mean of intervention, firms suffer huge losses as in the case of financial crises in the fixed-rate regime. As a result, countries adopt this strategy often as a temporary stage between fixed-rate and floating-rate regime.⁷

Another approach to the motives for intervening, highly relevant for the Czech case, emerged in the last years with the inflation-targeting framework.⁸ Because the main goal of monetary policy is price stability, defined in terms of moderate annual inflation and interpreted often in terms of small volatility around the inflation target (Wadhvani 2000), any measure that helps reach the goal without having undesirable side effects is allowed (see as well the discussion of the “hysteresis” hypothesis mentioned above). Heikensten and Borg (2002, pp. 31-32) from

⁶ For a discussion of cost and benefits of fixed-rate versus floating-rate regime see Krugman and Obstfeld (2000, pp. 569-577), Husted and Melvin (2001, pp. 483-485) or Lawler and Seddighi (2001, pp. 247-249).

⁷ The “crawling-peg” regime adopted by some post-socialist countries like Hungary or by Israel is a good example of such policy – see Krugman and Obstfeld (2000, p. 486), for the case of Israel see Klein (2001) or the web-site of the Bank of Israel (<http://www.bankisrael.gov.il/>).

⁸ For the discussion of inflation targeting regime see Bernanke et al. (1999), Mishkin and Schmidt-Hebbel (2001), Svensson (1999), or from the monetary rules point of view McCallum (1997).

the inflation targeting central bank of Sweden (Riksbank) justify using intervention in the inflation targeting regime to influence exchange rates “as a means of contributing to a future development of the exchange rate that aided the inflation rate to develop in line with the Riksbank’s target”. Intervention as a monetary policy tool can be further used in those cases when the traditional interest rate instrument no longer functions effectively. For example, if the nominal interest rate is close to zero, or if the effect of interest rate change is considered to be small, or if it can help support the general objectives of economic policy (for example GDP growth and low unemployment), without neglecting the inflation target, the intervention is allowed.

3.2 How Can Intervention Work in Theory?

Foreign exchange market intervention is usually defined as “those foreign exchange transactions of monetary authorities designed to influence exchange rates” (Neely 2001; Sarno and Taylor 2001).⁹ The Central bank thus sells the domestic currency (or domestic assets) for a foreign currency (or foreign assets) if it wants to decrease the value of domestic currency and, likewise, sells foreign assets for domestic assets when aiming to increase the value of domestic currency. Such transactions can influence exchange rates through several channels.

Before we discuss the channels in detail, it is necessary to distinguish between sterilized intervention, which does not affect the money supply, and non-sterilized intervention, which does. According to Sarno and Taylor (2001), official intervention is said to be sterilized when the authorities take action to offset the effects of a change in official foreign asset holdings on the domestic monetary base. For example, when the central bank sells foreign currency for domestic currency, it decreases monetary base and money supply. In order to sterilize this side effect the central bank must provide – simultaneously or within a very short time span – money of the same size via traditional open market operations (i.e. by providing money against domestic assets as collateral). If it does not do that, the intervention remains non-sterilized and is simply another way of conducting monetary policy, the only difference being that the monetary base is altered through a change in foreign, rather than domestic, asset holdings. As Edison (1993, p. 10) summarizes, “sterilized intervention is a “pure” change in the relative stocks of domestic and foreign assets held by the public [...] It changes only the currency composition of the assets held by the public by changing the composition of the monetary authorities’ portfolio.” As such, sterilized intervention constitutes an independent policy tool.

In addition, one more issue deserves our attention, namely the asymmetry of interventions against appreciation and against depreciations. In principle, a central bank can infinitely intervene against appreciation, i.e. buy foreign currency, as it is not limited and can expand its balance sheet accordingly via issuing new money. This is of course not true in case of interventions against depreciation, where the central bank sells foreign currency, as here it is limited by the overall size of its foreign exchange reserves. As market participants understand this asymmetry very well, the interventions against appreciation should be more credible and effective as well. Thus, because the Czech National Bank intervened in 2001-2002 against appreciation, it had better chances to succeed compared to a case in which it would have been intervening against depreciation.

⁹ Central banks usually define official foreign exchange intervention more broadly as “any official sale or purchase of foreign assets against domestic assets” (Dominguez and Frankel 1993a, p. 55). However, this definition also includes operations intended to influence the country’s stock of foreign exchange reserves.

3.2.1 The “Market” Channel

The simplest channel, surprisingly not discussed in the literature perhaps because of its obvious simplicity, is based on the theoretical functioning of foreign exchange markets (hence, I call it the market channel). A central bank that is acting in the foreign exchange market alters the demand or supply of foreign currency and thus the actual price (i.e. the exchange rate) as well. More technically, if the daily official exchange rate is for example computed as the average of all trades that took place that day, then every transaction executed by the central bank and its counterparties at exchange rates different from prevailing one will influence the official rate. How it is possible for the central bank to trade at exchange rates different from the prevailing rate? Because the central bank’s motive is not to make profit but to influence exchange rate it does not have to care so much about the profitability of its transactions and can thus “lean against the wind”.¹⁰ By offering to buy foreign currency at a price that is higher than the market price (or higher than the lowest market offer to sell foreign currency), the central bank that is aiming to decrease the value of domestic currency immediately executes the trade and moves the daily average exchange rate upwards.

What is wrong with this simple channel? First, the described mechanism may work this way in theory, but in reality, the contacted subject (commercial bank or another market maker) usually offers the price of the contract.¹¹ However, the contacted commercial bank knows that the central bank is intervening in order to influence the exchange rate and not to make profits, so that a price offer advantageous for the commercial bank and disadvantageous for the central bank will be accepted.

Second, the monetary authority would have to trade an enormous volume of currency if it wanted to alter the (daily average) exchange rate or even to reverse an exchange rate trend. The volumes traded in foreign exchange markets rose considerably in last 20 years: the average daily foreign exchange market turnover worldwide in April 2001 was USD 1,210 billion, which is very large compared to a central bank’s foreign exchange reserves (Galati and Melick 2002, p. 2). In the U.S. market, the volume of trading averaged around USD 100 billion a day in 1989 (and rose to USD 192 billion only three years later), whereas the average size of U.S. operations in the 1980s was about USD 200 million a day, i.e. 0.2 % of daily turnover (Dominguez and Frankel 1993a, p. 89; Edison 1993, p. 11). One can hardly imagine that such intervention can have any effects.

The third argument against the market channel challenges the sustainability of the intervention effect: even if the central bank managed to move the official exchange rate in the desired direction via intervention, the effect must be inevitably short-run. If market expectations do not change “in the desired direction”, the central bank would have to intervene daily in order to offset the market demand. Such behavior could furthermore create risk-free profit opportunities for speculators, thus raising the volume of intervention needed to maintain the desired level of exchange rates.

On the other hand, under the following assumptions the market channel can work quite well. First, if the foreign exchange market is “thin” and liquidity is low, the intervention can have at least a short-term considerable effect (a possible long-term effect is discussed later in the part devoted to the noise trading channel). This seems to be also the case of the Czech koruna episode: the average volume of spot trading in the foreign exchange market in April 2002 was about USD 700 million a day (and only USD 375 million of CZK-EUR trading), whereas the average size of intervention could have been about USD 300 million a day. Moreover,

¹⁰ Profitability, although not being the motive for intervention at all – see Neely (2001) – is of course of relevance for the central bank – see for example Edison (1993, pp. 42-46).

¹¹ I owe this comment to one anonymous referee.

the central bank intervened often on Fridays when the market liquidity was supposed to be low.¹²

Second, if the central bank is not bound by the volume of its foreign exchange reserves (i.e. it is buying foreign currency in order to decrease the value of domestic currency), it can theoretically intervene without limit, as opposed to the fight against depreciation. The only condition is that the costs of sterilization must be sufficiently low or even negative, for example through the negative interest rate differential (higher interest rate on the acquired foreign exchange reserves than on the domestic currency that is bought by the central bank when sterilizing), so that the central bank does not accumulate losses.

3.2.2 The Monetary Channel

The monetary channel, discussed for example by Galati and Melick (2002), works only if the intervention is not (or not to the full extent) sterilized. In this case, intervention influences domestic monetary base, money supply in the money market and thus short-term interest rates. The interest rate change affects through the uncovered interest rate parity, the demand for domestic assets and the exchange rate, as described in traditional monetary models of exchange rate determination.¹³ Suppose that the central bank wants to depreciate the domestic currency and purchases foreign currency, without offsetting the effect of the resulting higher money supply. Short-term interest rates in money market decline, investors sell domestic assets for (now more profitable) foreign assets and the domestic currency depreciates.

There is a strong consensus that non-sterilized intervention can influence exchange rates similarly to monetary policy via affecting money supply, interest rates and market expectation (Sarno and Taylor 2001; Edison 1993). On the other hand, continuing discussion about the precise effects of changes in monetary base on interest rates (for example, in the presence of standing facilities preventing the market interest rates from deviating too much from the central bank's main policy rate) and that of interest rates changes on exchange rates (Bilson and Marston 1984; Taylor 1995) signals some further research into the functioning of this channel – see for example Borio (1997).

3.2.3 The Portfolio Balance Channel

Most of the literature emphasizes only two channels through which intervention can affect the exchange rate: the portfolio balance channel and the signaling (or expectations) channel (Edison 1993). The effects of intervention through the portfolio balance channel are analyzed within the framework of a portfolio balance model of exchange rate determination, a dynamic model based on the interactions of international asset markets and current account imbalances.¹⁴ The key assumption that distinguishes this kind of model from monetary models of exchange rate determination is the imperfect substitutability between domestic and foreign assets. Investors diversify their holdings among domestic and foreign assets as functions of expected rates of return.

Taylor (1995) or Edison (1993) set out a very basic portfolio balance model that, slightly modified here, can be used to explain how the channel works: net financial wealth (in domestic currency) of the domestic private sector (W) is divided into three components: money (M), domestic bonds (B) and foreign bonds (B^*). With foreign and domestic interest

¹² The data and estimates are available on the official web site of Czech National Bank (www.cnb.cz) or in Czech economic press (for example www.ihted.cz).

¹³ For a survey and discussion of monetary models of exchange rate determination, see for example Bilson and Marston (1984).

¹⁴ For portfolio balance models see Branson (1983), Branson and Henderson (1985), Bilson and Marston (1984) or Taylor (1995).

rates given by i and i^* , we can calculate simple domestic demand functions and definition of the net wealth as follows:

$$M^D = M(i, i^* + \hat{S}^e, W), \quad M_i < 0, M_{i^* + \hat{S}^e} < 0, M_W = 0 \quad (1)$$

$$B^D = B(i, i^* + \hat{S}^e, W), \quad B_i > 0, B_{i^* + \hat{S}^e} < 0, B_W > 0 \quad (2)$$

$$B^{*D} = \frac{1}{S} B^*(i, i^* + \hat{S}^e, W), \quad B^*_i < 0, B^*_{i^* + \hat{S}^e} > 0, B^*_W > 0 \quad (3)$$

$$W \equiv M + B + SB^* \quad (4)$$

where S denotes the spot exchange rate (domestic currency for unit of foreign currency), \hat{S}^e denotes the expected rate of depreciation of the domestic currency, and X_k denotes the partial derivative of $X(\cdot)$ with respect to k for $X = M, B$ and B^* . Assume that the supplies of money (M^S), domestic bonds (B^S) and foreign bonds (B^{*S}) are predetermined and that the domestic economy is in equilibrium (i.e. supply equals demand for money and both kinds of bonds). Now, if the monetary authority wants to depreciate the domestic currency by sterilized intervention, it purchases foreign bonds from private investors and sell them domestic bonds. However, because the economy was already in equilibrium, the private investors will require a higher expected return on domestic assets relative to foreign assets to willingly hold the increased supply of domestic bonds and lower their holdings of foreign bonds. If interest rates, due to their determination in money market and sterilization operations, do not change, then the exchange rate must change, i.e. in our case depreciate, in order to restore equilibrium. Depreciation, in terms of a rise in S , results in a rise in W (equation (4)), which increases the demand for domestic assets, and cuts the demand for foreign assets according to equations (3) and (4).¹⁵

The portfolio balance channel is much more controversial than the monetary channel. First, according to the standard literature, there is a problem of testing the theory (Edison 1993; Dominguez and Frankel 1993b). All tests, usually estimating the risk premium gained from inverted asset demand functions as a function of asset supplies, are necessarily tests of the joint hypothesis on the degree of asset substitutability and on expectation formations.

Second, a theoretical discussion about the models assumptions has emerged. If, for example, the Ricardian equivalence holds, i.e. the government bonds entail a public liability of future taxation, investors will not consider bonds as “true” assets forming their wealth, thus swaps in currency composition of investors’ portfolios will have no effect on the foreign exchange market equilibrium. Another argument against this channel is that domestic bonds and foreign bonds are perfect substitutes, so that changes in their relative supply may have no effects (Dominguez and Frankel 1993b; Sarno and Taylor 2001).

¹⁵ The demand for domestic money remains by assumption unchanged. Even if the depreciation increases demand for foreign assets B^* (measured in domestic currency) through a rise in W , it reduces also the final demand B^{*D} (measured in foreign currency) through the term $\frac{1}{S}$ in equation (3). The resulting effect is negative

by assumptions not noted here – see Branson and Henderson (1985, p. 757, fn. 9). Lyons (2001, p. 300, fn. 8) explains the change in exchange rate in another way, via the expected depreciation term in equations (2) and (3).

Third, the whole theory does not explain the mechanism of how the exchange rate changes. The standard macroeconomic explanation, that the exchange rate must have changed because it was necessary to restore equilibrium, lack not only microeconomic or structural foundations, but could be simply wrong. Even if the monetary authority, in our case, managed to purchase from the investors, foreign assets for domestic assets, the only way in which it can do that is to accept a price (exchange rate) that is profitable for the contacted counterparty. This is nothing else but our simple market channel with all its problems, the one of negligible volume of intervention as compared to the market turnover being perhaps the most relevant here. As Henderson (1984, p. 391) writes, “the argument that intervention policy may not alter the exchange rate when securities are imperfect substitutes represents a more fundamental challenge to [the] theory [...] When the intervention, changing the holdings of private investors, i.e. the composition of their portfolios, does not affect expectation, private agents simply alter their direct holdings in an offsetting way, leaving the exchange rate unchanged.”

Because of ambiguous test results and the theoretical critique just described, a consensus slowly emerges that the portfolio balance channel cannot adequately explain how intervention influences exchange rates, without providing a microeconomic mechanism for changing market expectations. We cannot be therefore surprised that Heikensten and Borg (2002) devote in their comprehensive article about intervention, just two sentences to the portfolio balance channel, beginning with “historically” and ending with “of little importance”.

3.2.4 The Signaling (Expectations) Channel

Through the signaling channel, the intervention (whether sterilized or not) can affect exchange rates via providing new relevant information – or information already known but not fully used by market traders in the determination of exchange rates – to the market, thus influencing exchange rate expectations. This channel assumes that monetary authorities have better information to market participants and that they are willing to reveal it to the public (Sarno and Taylor 2001; Dominguez and Frankel 1993a).

There are two ways for a central bank to change market expectations by intervention: first, the central bank may signal to the market agents that they are using available information and interpreting the current and expected evolution of relevant fundamentals in the wrong way, which leads to a misalignment in exchange rate determination. If, for example, the central bank believes that the exchange rate has appreciated more than economic fundamentals justify, it will buy foreign currency, signaling with it that the exchange rate level should be lower. If market participants believe that the central bank is right, they will correct their expectations and lower the exchange rate by trading with the new information. However, there are two questions about this way. First, why should the central bank have better information about fundamentals to the market participants (a discussion of this argument can be found for example in Humpage and Osterberg (2000)), and second, even if it has, why should the market agents believe that the central bank is right?

The second way in which intervention can influence expectations partly responds to these two questions. First, monetary authorities may not have superior information to the public in all fundamental issues that contribute to the exchange rate determination. However, they have surely superior information in the field of future monetary policy. Thus, foreign exchange intervention may signal changes in future monetary policy. Second, intervention provides very credible information about future monetary policy because the monetary authorities stake their capital in support of that policy, as stated for the first time by Mussa (1981). In this sense, the mere announcement of future monetary policy or other verbal interventions, in order to affect exchange rate expectations do not represent credible statements. If, for example, a central bank wants to depreciate the domestic currency, it will buy foreign bonds, signaling with it future monetary ease, i.e. fall in interest rates. Because such an intervention

as a signal of future monetary policy is credible – the central bank would otherwise suffer losses if it failed to validate its signals – the market traders will change their expectations of future interest rates. In the portfolio balance framework, for example, the private investors will thus expect depreciation of domestic currency, which lowers the demand for domestic bonds and raises the demand for foreign bonds according to the equations (2) and (3), leading to current depreciation.

The second, more persuasive way is currently discussed in the literature as a possible way of influencing the exchange rate via affecting market expectations (Heikensten and Borg 2002). However, there are still some relevant questions. First, if the intervention must be accommodated by subsequent changes in monetary policy, it represents no more than an independent policy instrument. Second, within the inflation targeting regime, central banks gain credibility by sound monetary practices, transparency and inflation forecasts aimed to influence market expectations. Why should such a central bank use another means to “buy credibility” such as intervention if it wants to announce changes in future monetary policy? Svensson (2001, p. 48) thus argues, “[interventions] may have more substantial effects only when they are interpreted as signals or threats of future interest rate changes. A transparent central bank has better ways of sending such signals, though [...] I see no reason why a transparent inflation-targeter should undertake foreign exchange interventions.” Third, discussed in the literature under the term “secrecy puzzle” (Edison 1993; Sarno and Taylor 2001; Dominguez and Frankel 1993a), if monetary authorities want to signal future monetary policy by intervention, why do they often maintain secrecy of intervention operations?

3.2.5 The Microstructure (Order Flow) Channel

Even if the signaling channel explains more than the portfolio balance channel, there are some questions, take secrecy puzzle for example, left for further research. In recent literature, the research interest moves to the microstructure approach to foreign exchange market (D’Souza 2002; Lyons 1997, 2001; Peiers 1997; Frankel et al. 1996). The microstructure channel is very similar to the market channel because it focuses on the functioning of foreign exchange markets. Private information, institutions (trading mechanisms) and different motives of players in the market are relevant features that can affect market prices (i.e. exchange rates) but cannot be at the same time explained in the traditional macroeconomic framework of exchange rate determination.

In this channel, order flow, i.e. transaction volume that is signed according to the initiation of transaction (minus for active selling, plus for active purchasing) plays the central role. If an investor sells EUR 200 million for dollars in the foreign exchange markets at the best bid price, then the transaction volume is EUR 200 million, but order flow is –EUR 200 million. Thus, over time, we can measure order flow as the sum of the signed buyer-initiated and seller-initiated orders. If order flow approaches zero, there is a balance between buyer-initiated and seller-initiated transactions, as opposed to, for example, the financial crisis where the central bank is usually the only buyer of domestic currency (i.e. order flow is significantly negative). Order flow thus carries relevant information about market pressures, fundamentals or market expectations that are often not public. There is asymmetric information; some agents (typically large players) in the market are better informed than others are because they observe more order flow.

The channel works as follows (Peiers 1997): the central bank intervenes rather secretly and without an official announcement in the foreign exchange market through some commercial bank. Such a bank, by receiving a market order from the central bank, gains information advantage and a short-term profit opportunity. Thus, it adjusts its order flows and prices. Other banks in the market learn from the order flows that there is an informed agent in the market (i.e. a trader that knows relevant information regarding fundamental determinants of exchange rate) and, in order to minimize losses, will adjust their positions accordingly.

However, after all commercial banks gain the information that it was the central bank having given the first impulse, they will return to their pre-intervention trading strategies.

This channel implies that, under the assumption of asymmetric information between informed and uninformed traders and when intervening “secretly” (at least to some extent), the central bank does not have to buy or sell large volumes of currency as in the simple market channel if it aims to influence the spot exchange rate. At the same time, the effect of intervention is not as short lasting as in the market channel. On the other hand, even if the secret intervention strategy, aiming to maintain the traders in some kind of uncertainty about fundamentals, can temporarily weaken the exchange rate misalignment, it is still a kind of “fooling” of the market and provides no durable solution to the very problem of market expectations. Thus, again, this channel may serve only to signal the “right” value of exchange rates to the market participants.

3.2.6 The Noise Trading Channel

The question that remains after discussing all the relevant channels is whether intervention could really have longer-lasting effects. Hung (1997) suggested a new transmission channel – again based on the functioning and microstructure of the foreign exchange market – through which the central bank can influence not only the immediate exchange rate, but as well the market expectations about the future exchange rate trend.

The basic logic starts with the assumption that there are “noise traders” in the foreign exchange market, i.e. traders whose behavior is influenced by beliefs or market sentiments not fully consistent with economic fundamentals. Noise traders are chartists who usually follow past trends, relying on some kind of feedback rule, use technical analysis to generate buying or selling signals, and often trade in a correlated fashion. If most of the traders in the foreign exchange market are noise traders, the probability of speculative bubbles and long-term misalignment rises.

If the central bank intervenes secretly in a thin market where chartists operate, the immediate transitory and short-lasting effect may induce the noise traders to perceive that the prevailing trend has broken and to incorporate this new information into their trend analysis. Because chartists usually assign much heavier weight to the most recent exchange rate movement in their forecasts, they may take the effect of intervention as a warning signal of a change in the market direction and even reverse their behavior, for example from buying the currency to selling it.

This kind of intervention, by enhancing the exchange rate volatility and thus promoting a sense of two-way risk in the market, seems to be at the first sight a contradiction of one of the main motive for intervention, i.e. to lower the exchange rate volatility. However, only in this way can the traders be maintained, in the uncertainty about the future exchange rate development. In addition, this channel offers a satisfactory explanation why monetary authorities often intervene in a thin market, why they intervene secretly and why they hope (and sometimes manage) to reach a longer-lasting effect on the exchange rate.

3.2.7 The Coordination Channel

Sarno and Taylor (2001) present a new channel, not yet discussed in the literature, based on coordination failure of foreign exchange market. If there is an irrational speculative bubble brought about, for example, by technical trading rules, it may be very hard for individual traders to bring about a reversion of the exchange rate, even if they believe it to be misaligned, due to a coordination failure. If, for example, the Czech koruna was overvalued and all traders knew this, they would still prefer not to sell it because no one wants to be the first to burst the bubble.

This intervention can be seen as fulfilling a coordinating role because it brings other traders into the market and can turn the trend. However, because of its novelty, this channel has not yet been discussed theoretically and there is as well no persuasive empirical evidence of its functioning.

4. Is Foreign Exchange Intervention Efficient? Empirical Evidence

A large amount of literature is devoted to the problem whether (sterilized) foreign exchange intervention, working through any of the described channels, was in reality efficient, i.e. whether monetary authorities actually reached the intended aim through this instrument. The empirical evidence is mixed; in the 1980s, most of the studies largely rejected the effectiveness of intervention. In the 1990s, a number of studies have shown that intervention could be, under some circumstances, efficient. As Sarno and Taylor (2001) argue, however, the studies from the 1980s lack availability of relevant data on intervention (change in foreign exchange reserves was usually used as proxy) and expectations (rational expectations were assumed but not tested). Thus, we should take the new studies more seriously than the older ones.

The first of the empirical studies on intervention, the famous Jurgensen Report (Jurgensen 1983), prepared by an intergovernmental working group of G-7, did not provide very explicit conclusions about the efficiency of intervention. The main results can be summarized as follows: sterilized intervention affects exchange rates much less than non-sterilized intervention; sterilized intervention can influence exchange rates only in the short run; coordinated intervention (i.e. concerted intervention of more than one central bank) can be much more powerful, relative to official intervention by a single country's authorities. Thus, being unable to affect exchange rates in the long run, the intervention was regarded by most authorities as inefficient, the U.S. Treasury in 1981-1985 being the best example.¹⁶ Even if the U.S. dollar significantly appreciated in this period as a result of the Paul Volcker's disinflation program, the monetary authorities refrained from intervention.

Another famous study, written by Edison (1993), surveys most of the literature between 1982 and 1992. Regarding the portfolio balance channel, the surveyed studies find no or very weak (Gosh 1992) portfolio balance effect on the exchange rate. The signaling channel is more promising, showing some significant empirical relations between official intervention and future monetary policy. Dominguez and Frankel (1993a, 1993b) show that there are statistically significant effects of both portfolio balance and signaling channels, using official data on intervention and modeling the exchange rate expectations via market forecasts. Especially coordinated intervention has been successful at moving the exchange rate in the desired direction, the best evidence being the coordinated intervention aimed to burst the appreciation bubble of the dollar in 1985 (as embodied in the so-called Plaza Agreement, settled in September 1985 at the G-5 meeting in the New York's Plaza Hotel). On the other hand, Kaminsky and Lewis (1996) find in their empirical study that the U.S. interventions, in some periods of 1980s, signaled future monetary policy in an opposite direction than predicted by the signaling channel.¹⁷

¹⁶ From the beginning of the floating in 1973 to 1981, the U.S. Treasury, responsible for foreign exchange intervention, intervened together with the Federal Reserve System – through the Federal Reserve Bank of New York – quite heavily against depreciation in late 1970s, however with ambiguous results, providing a strong argument against intervention (Dominguez and Frankel 1993a).

¹⁷ For further discussion of empirical evidence and for surveys of the relevant literature see Edison (1993), Dominguez and Frankel (1993a), Baillie et al. (1999) or Sarno and Taylor (2001). Ideally, one should discuss the empirical evidence for interventions against appreciation and against depreciation separately. However, a number of studies do not differentiate between these two modes when testing the effectiveness.

Thus, as well as the theoretical debate about intervention channels, the empirical evidence on the effectiveness of foreign exchange intervention remains ambiguous. Some concerted, large interventions actually affected exchange rates for more than hours, but if they were not in correspondence with underlying fundamentals and monetary policy, they had only a short-term impact. With some exceptions (Hung 1997; Peiers 1997), the microstructure and the noise trading channel have not been empirically estimated, so that one has to rely on some stylized facts, which however support so far the relevance of both micro-transmission channels when estimating the effectiveness of intervention.

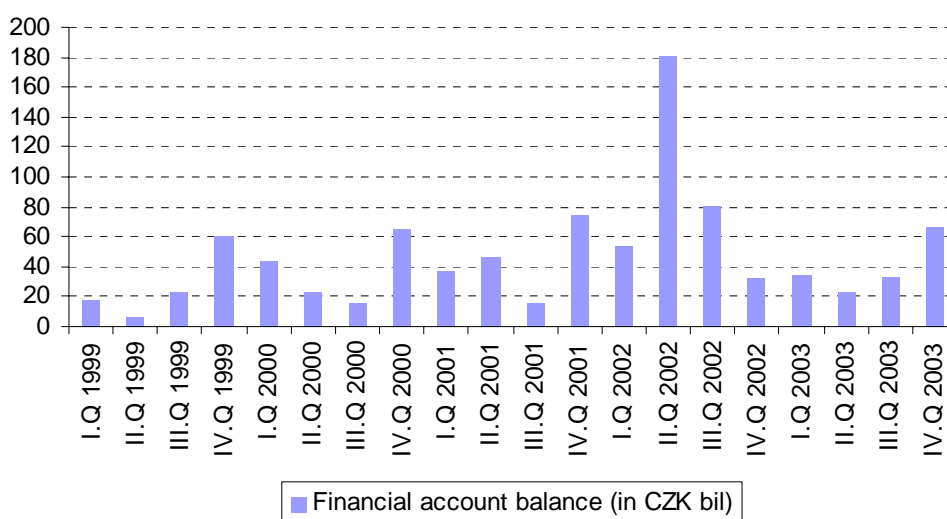
5. Conclusion: The Czech Koruna Episode Reinterpreted

In the light of the theoretical debate and empirical evidence, how are we now to interpret the Czech experience including the use of official intervention? In this respect, there are at least two questions to answer.

Firstly, as already noted, the question is whether a central bank under inflation targeting should use foreign exchange intervention at all. So far, there is no clear answer to this question, given either by theory or by international experience. The theoretical positions reached from the negative one made by Svensson (2001) about redundancy of this instrument as a signal up to the positive one made for example by Wadhvani (2000) about preventing the hysteresis effect. The international experience gives no clear answers as well. The praxis of the inflation targeting central banks reaches from the “no intervention” strategy of the inflation-targeting pioneer New Zealand (has not intervened since 1985) to the more pragmatic approach taken by central banks of Australia or Sweden (Heikensten and Borg 2002) that occasionally intervene.¹⁸ However, the use of foreign exchange intervention is always somehow justified and regarded as exceptional (for example if the interest rate instrument does not work efficiently). As already noted, specific causes of the excessive koruna appreciation – regarded as misalignment – together with the risks such appreciation, may for a very open Czech economy justify the use of intervention.

Figure 2 shows the capital inflows into the Czech economy in the period 1999-2003, as captured by the balance of the financial account of the balance of payment.

Figure 2: Capital inflows into the Czech Republic



Source: Czech National Bank.

¹⁸ See the web sites of the central banks – New Zealand <http://www.rbnz.govt.nz>, Sweden <http://www.riksbank.se/> and Australia <http://www.rba.gov.au/> for their position regarding the use of official intervention.

The revenues denominated in euro – i.e. mainly privatization to foreign entities – were mentioned as the main reason for the perceived misalignment of the exchange rate. As *Figure 2* shows, the period was indeed characterized by a relatively sizeable capital inflows when compared to previous years.¹⁹

Second, the question remains if the interventions conducted by the Czech National Bank have been effective and, if so, through which channels did they work. I have already argued that the role of official intervention – especially those in the second phase, leaving those in the first phase as inefficient at all – in the fight against the appreciation is not clear. Following, I list some arguments supporting the view that the interventions might have contributed to the reversion of the exchange rate path.

First, being performed secretly via foreign banks, the intervention might have affected the overall market expectations about further appreciation and the market sentiment. In this respect, the intervention could have worked through both the order flow channel and the noise trading channel. Through order flow, the traders might have gained the information that some other traders (foreign banks) are reversing their expectations, selling rather than buying the Czech koruna and going out of the “bubble game”. Because of rising uncertainty about privatization revenues, or more precisely because of rising certainty that the revenues would not go through the market, the bubble was already at the point of bursting, i.e. the probability of depreciation was considerably high and the share of traders expecting it was significantly increasing. Similarly, through the noise trading channel secret interventions might have increased the volatility and induced the chartists to change their strategies and to incorporate the higher probability of depreciation into their trend analyses, leading to the factual depreciation.

The second argument for the role of intervention considers the lack of other impulses or information that could have caused the sudden reversion. In July 2002, all the information regarding fundamentals, monetary policy or government intentions were already present. No new relevant information about economy arrived, the market expected further declines in interest rates, and government confirmed the will to adhere to the agreed strategy, as shown by the sale of euros from the Transgas privatization direct into the foreign exchange reserves of the central bank. Thus, the only “cause” that suddenly changed the market sentiment must have been the secret interventions.

I agree with Holub (2003) that the effectiveness of the interventions conducted in July–September 2002 was supported by other factors: (a) a changing market sentiment, caused by the expected cancellation of some large privatizations and the adherence of the government to the Strategy, (b) negative interest rate differential between the koruna-denominated and the euro-denominated assets (since the end of July 2002), making the koruna less attractive for investors, and (c) change in the market’s perception of the sterilization costs.

The negative interest rate differential not only made the foreign exchange intervention – if preventing the koruna from further appreciation – even profitable, but also contributed to the change of behavior of the main market makers – commercial banks. In the first phase of interventions in October 2001–April 2002, the commercial banks had to absorb most of the foreign currency in the market, facing a risk of losing money with lower interest rates on the euro than on the koruna. As a result, together with the expectations of continuing koruna appreciation, they offered less and less for the euro, making the koruna factually strong. In this situation, the banks used the interventions only as a welcome opportunity to get rid of the foreign currency, without any stronger effects on the offered exchange rate. However,

¹⁹ The figures must be interpreted with caution, as not all the capital inflows went through the FX market and not all of them were in euro. For example, a large size of the foreign direct investment into the Czech Republic represented reinvested earnings.

with falling domestic interest rates and changing market sentiment in July–September 2002 from appreciation to possible depreciation, foreign assets became more profitable, contributing to the reversion of the trend. In this case, the banks reacted to the interventions more sensitively than in the first phase.²⁰

From the point of view just described, one has to ask whether these “complement” factors would not have sufficed for the reversion of the exchange rate trend and whether the interventions had been necessary. This issue must be seen in a larger perspective of the traditional empirical debate on exchange rate determination. We are rarely possible to identify ex post the definitive fundamental cause of the exchange rate development. However, if fundamental variables create space for the reversion of the exchange rate trend, then interventions may play a decisive role.²¹ I argue that interventions at the right time and under favorable fundamental conditions, as mentioned above, can have a multiple effect through the described microstructure channels on the market expectations and hence on the exchange rate. This thesis is in accordance with the conclusion of Dominguez and Frankel (1993a, p. 140) as well: “It may be that sterilized intervention can only have effects in the short term. But if “short-term effects” include the bursting of a nine-month bubble earlier than it would otherwise have burst, then such an effect may be all that is needed.”

One may ask if the intervention worked also through the signaling channel, as the channel that has some empirical relevance and sound logic. Well, I argue that even if one can interpret the intervention as a signal of further decline in interest rates, the signal was redundant. Within the inflation-targeting framework, as mentioned above, the Czech National Bank has already sent a clear message of its intentions regarding interest rates through the Banks’ Board minutes, everyday communication with media, and Inflation Reports. In this regard, the Czech experience also challenges the traditional theoretical approach to the effectiveness of interventions, diminishing the relevance of the macroeconomic portfolio-balance and signaling channels, and providing more support for the microstructure channels.

We may conclude that intervention is and remains an important instrument of central banks, as a renewed interest in recent literature shows (Canales-Kriljenko et al. 2003). However, its use should be limited only to those rare situations where standard instruments (i.e. interest rates) do not work any more. When considering foreign exchange intervention, the central bank should moreover wait for the right moment in order to maximize the effect of expectations and exchange rates, and take into consideration specific circumstances, market sentiment and external factors, contributing to the exchange rate determination. From this point of view, those of the Czech National Bank’s interventions that were conducted in July–September 2002 can be assessed as quite efficient and relatively successful.

6. References

- Baillie, R. T. – Osterberg, W. P. (1997): Central bank intervention and risk in the forward market. *Journal of International Economics*, vol. 43, 1997, pp. 483-497.
- Baillie, R. T – Humpage, O. F. – Osterberg, W. P. (1999): Intervention as Information: A Survey. *Federal Reserve Bank of Cleveland Working Paper*, no. 9918.
- Bernanke, B. S. – Laubach, T. – Mishkin, F. S. – Posen, A. S. (1999): *Inflation Targeting: Lessons from the International Experience*. Princeton (New Jersey), Princeton University Press, 1999.

²⁰ I owe this comment to one anonymous referee.

²¹ I owe this comment to Oliver Landmann.

- Bilson, J. F. O. – Marston, R. C. (eds) (1984): *Exchange Rate Theory and Practice*. The University of Chicago Press, Chicago and London, 1984.
- Bopp, L. (1982): *Wechselkursmanagement der Zentralbanken*. Freiburg im Bresigau, Rudolf Haufe Verlag, 1982.
- Borio, C. (1997): The implementation of monetary policy in industrial countries: a survey. *BIS Economic Papers*, 1997, no. 47.
- Branson, W. H. (1983): Macroeconomic Determinants of Real Exchange Risk. In: Herring, R. J. (ed.): *Managing Foreign Exchange Risk*. Cambridge, Cambridge University Press, 1983.
- Branson, W. H. – Henderson, D. W. (1985): The Specification and Influence of Asset Markets. In: Jones, R. W. – Kenen, P. B. (eds): *The Handbook of International Economics*. Vol. II. Amsterdam, North-Holland, 1985, pp. 749-805.
- Canales-Kriljenko, J. I. – Guimaraes, R. – Karacadag, C. (2003): Official Intervention in the Foreign Exchange Market: Elements of Best Practice. *IMF Working Paper*, no. 03/152.
- Czech National Bank (2002): *Strategy for Dealing with the Exchange Rate Effects of Capital Inflows from Privatisation of State Property and from Other Foreign Exchange Revenues of the State*. http://www.cnb.cz/en/pdf/vlada_cnb_kurz_en.pdf
- D'Souza, Ch. (2002): A Market Microstructure Analysis of Foreign Exchange Intervention in Canada. *Bank of Canada Working Paper*, no. 2002-16.
- Dominguez, K. M. – Frankel, J. A. (1993a): *Does Foreign Exchange Intervention Work?* Washington, Institute for International Economics, 1993.
- Dominguez, K. M. – Frankel, J. A. (1993b): Does Foreign-Exchange Intervention Matter? The Portfolio Effect. *American Economic Review*, vol. 83, 1993, no. 5.
- Edison, H. J. (1993): The Effectiveness of Central Bank Intervention: A Survey of the Literature after 1982. Special papers in *International Economics*, no. 18. (Princeton, Princeton University), 1993.
- Emminger, O. (1986): *D-Mark, Dollar, Währungskrisen: Erinnerungen eines ehemaligen Bundesbankpräsidenten*. Stuttgart, Deutsche Verlags-Anstalt, 1986.
- Frait, Jan (1997): Intervence na devizových trzích v teorii a empirii. *Finance a úvěr*, roč. 47, 1997, č. 10, pp. 627-639.
- Frankel, J. A. – Galli, G. – Giovannini, A. (eds) (1996): *The Microstructure of Foreign Exchange Markets*. The University of Chicago Press, Chicago and London, 1996.
- Galati, G. – Melick, W. (2002): Central bank intervention and market expectations. *BIS Papers*, 2002, no. 10.
- Gosh, A. R. (1992): Is it signaling? Exchange intervention and the dollar-Deutschemark rate. *Journal of International Economics*, vol. 32, 1992, pp. 201-220.
- Heikensten, L. – Borg, A. (2002): The Riksbank's Foreign Exchange Interventions – Preparations, Decision and Communication. *Sveriges Riksbank Economic Review*, 2002, no. 1.
- Henderson, D. W. (1984): Exchange Market Intervention Operations: Their Role in Financial Policy and Their Effects. In: Bilson, J. F.O. – Marston, R. C. (eds): *Exchange Rate Theory and Practice*. The University of Chicago Press, Chicago and London, 1984, pp. 359-406.
- Holub, T. (2003): *Foreign Exchange Interventions under Inflation Targeting: The Czech Experience*. Paper presented at a CEPR/Deutsche Bank Research Workshop, Kronberg, 30-31 January 2003.

- Humpage, O. F. – Osterberg, W. P. (2000): Why Intervention Rarely Works. *Federal Reserve Bank of Cleveland Economic Commentary*, February 2000, pp. 1-4.
- Hung, J. H. (1997): Intervention Strategies and Exchange Rate Volatility: A Noise Trading Perspective. *Journal of International Money and Finance*, vol. 16, 1997, no. 5, pp. 779-793.
- Husted, S. – Melvin, M. (2001): *International Economics*. New York, Addison Wesley Longman, 2001.
- Jurgensen, P. et al. (1983): *Report of the Working Group on Exchange Market Intervention*. Washington D.C., U.S. Department of the Treasury, 1983.
- Kaminsky, G. L. – Lewis, K.K. (1996): Does foreign exchange intervention signal future monetary policy? *Journal of Monetary Economics*, vol. 37, 1996, pp. 285-312.
- Klein, D. (2001): *The Exchange Rate Band – an Illusion?* The Manufacturers' Association Conference, Jerusalem, June 25, 2001.
- Krugman, P. R. – Obstfeld, M. (2000): *International Economics.*, New York, Addison Wesley Longman, 2000.
- Lawler, K. – Seddighi, H. (2001): *International Economics*. London, Pearson Education, 2001.
- Lehment, H. (1980): Devisenmarktinterventionen bei flexiblen Wechselkursen. Tübingen, J.C.B. Mohr (*Kieler Studien*, 162).
- Lyons, R. K. (1997): A simultaneous trade model of the foreign exchange hot potato. *Journal of International Economics*, vol. 42, 1997, pp. 275-298.
- Lyons, R. K. (2001): *The Microstructure Approach to Exchange Rates*. The MIT Press, Cambridge and London, 2001.
- McCallum – Bennett, T. (1997): Issues in the Design of Monetary Policy Rules. *NBER Working Paper*, no. 6016.
- Mishkin, F. S. – Schmidt-Hebbel, K. (2001): One decade of inflation targeting in the world: What do we know and what do we need to know? *Banco Central de Chile Working Paper*, no. 101/2001.
- Mussa, M. (1981): The Role of Official Intervention. New York, *Group of Thirty, Occasional Paper*, no. 6.
- Neely, Ch. J. (2001): The Practice of Central Bank Intervention: Looking Under the Hood. *Federal Reserve Bank of St. Louis Review*, vol. 83, May/June 2001, no. 3, pp. 1-10.
- Peiers, B. (1997): Informed Traders, Intervention, and Price Leadership: A Deeper View of the Microstructure of the Foreign Exchange Market. *The Journal of Finance*, vol. 52, 1997, no. 4, pp. 1589-1614.
- Sarno, L. – Taylor, M. P. (2001): Official Intervention in the Foreign Exchange Market: Is It Effective and, If So, How Does It Work? *Journal of Economic Literature*, vol. XXXIX (September 2001), pp. 839-868.
- Svensson, L. E. O. (1999): How Should Monetary Policy Be Conducted in an Era of Price Stability? In: Federal Reserve Bank of Kansas City: *New Challenges for Monetary Policy*, 1999, pp. 195-259.
- Svensson, L. E. O. (2001): *Independent Review of the Operation of Monetary Policy in New Zealand: Report to the Minister of Finance*. Reserve Bank of New Zealand, 2001.
- Taylor, M. P. (1995): The Economics of Exchange Rates. *Journal of Economic Literature*, vol. XXXIII (March 1995), pp. 13-47.

Wadhvani, S. (2000): *The exchange rate and the MPC: What can we do?* Speech to the Senior Business Forum at the Centre for Economic Performance on 31 May 2000, Bank of England.

II TESTING EFFECTIVENESS OF THE CZECH NATIONAL BANK'S FOREIGN EXCHANGE INTERVENTIONS

1. Introduction

During 2001 and 2002, the Czech koruna experienced strong appreciation trend against the euro in both nominal and real terms. This appreciation was regarded by both the central bank officials and other economists as being mainly related to non-fundamental factors including market expectations of the conversion of huge privatization revenues in euro into the domestic currency in the foreign exchange market. The central bank decided to intervene in the market to stop the appreciation and eventually to reverse the trend, and it finally succeeded in bringing the exchange rate back to a more fundamental-based level.

However, as discussed in Gersl (2004), it remains a question whether it was the foreign exchange intervention that caused the appreciation bubble to burst, or whether other factors such as a change in government's privatization strategy, a significant decrease in the interest rate differential or that the government had followed the *Strategy* (CNB 2002) and had converted the euro revenues out of the market might have had more impact. In other words, we ask whether the foreign exchange intervention was in fact effective. In this article, several econometric approaches to testing effectiveness of foreign exchange intervention are reviewed and subsequently some of them applied to the Czech data.

The article is organized as follows: the section 2 reviews some recent literature on econometrics of foreign exchange intervention, concentrating more on those methods that will be subsequently used. In the section 3 several econometric approaches are applied to the Czech data. Section 4 concludes.

2. Review of the literature

Econometrics of foreign exchange interventions usually focus on three issues: (1) estimating the reaction function of the central bank, i.e. trying to find factors that cause the central bank to intervene in the foreign exchange market, (2) testing the relevance of a particular transmission channel of intervention, such as portfolio-balance channel, signaling channel, microstructure (order flow) channel or noise-trading channel,¹ and (3) estimating the effect of foreign exchange intervention on exchange rates in general, without any reference to a particular channel of influence. These issues are to some extent interrelated: for example, the estimated reaction function can form a part of the simultaneous system of equations when testing the impact of interventions on exchange rate in order to avoid the simultaneity problem. In following we review the relevant works from the three areas of literature.

2.1 Estimating the central bank's reaction function

Since end-1970s, a number of studies has emerged that tried to find out whether central bank's interventions are predictable, searching for variables that trigger interventions. Most of the studies postulate the intervention reaction function *ad hoc*, without any theoretical background, even if there are some attempts to derive the reaction function from a model that is based on a loss function of the central bank (Almekinders 1995, p. 63). A typical estimated equation takes the form

$$I_t = \beta_0 + \beta_1 \Delta s_t + \beta_2 (s_t - s_t^T) + \beta_3 I_{t-1} + \varepsilon_t, \quad (1)$$

¹ For channels of influence see Gersl (2004) or Sarno and Taylor (2001).

where I_t stands for intervention (sales of foreign currency) in the period t (expressed in volume of a given currency), s_t stands for (the level of) exchange rate of the period t (expressed in units of domestic currency per one unit of foreign currency, i.e. a rise in s means depreciation), s_t^T denotes the targeted exchange rate, Δ denotes a change.²

The hypothesis behind the relationship (1) suggests that the central bank may have several motives for intervention: to “lean against the wind”, i.e. to prevent the exchange rate from moving one direction via operations with an opposite effect (selling foreign currency if Δs_t is positive, i.e. if domestic currency is depreciating), in which case β_1 would be positive, or to “lean with the wind”, i.e. pushing the exchange rate further in the trend, in which case β_1 would be negative. A significant (positive) β_2 would indicate that the central bank is targeting some specific level of the exchange rate. The lagged intervention variable is usually included to serve as a proxy for other non-observable factors, but also to control for the first order autocorrelation that is usually found in the intervention data (Ramaswamy and Samiei 2000; Ito 2003).

Edison (1993) and Almekinders (1995) survey the literature on reaction functions until 1992. In general, most of the studies have found a significant relationship and a strong evidence for the “lean-against-the-wind” motive, although the degree of significance and the size of estimated coefficients differed across periods and countries, depending on the data used (frequency of the data and proxies for the intervention variable as most of the central banks do not publish official intervention data), way of deriving the level of targeted exchange rate (moving average, PPP equilibrium level) and the estimation method.

The basic problem of estimating equation like (1) via ordinary least squares is a potential simultaneity bias, as the change of the exchange rate s may be to some extent endogenous, i.e. dependent on the interventions I in the current period. This appears to be especially serious if the estimation is carried out using low frequency data (weekly, monthly or even quarterly), because the probability of endogenous determination of exchange rate rises (if intervention is effective). Given the unavailability of official intervention data on a daily basis until early 1990s, most of the studies used monthly proxies for interventions such as changes in the central bank’s foreign exchange reserves (see Amekinders 1995, pp. 66-68). In order to avoid the simultaneity bias, some of the studies applied two-stage least squares or some other instrumental variables technique.

However, as reported for example by Galati et al. (2005), it is notoriously difficult to obtain a good instrument for the exchange rate, so that the usual approach is to replace current values of the exchange rate by the lagged values. This method bears some risks as well, again when applying it to low frequency data, as lagged values of exchange rates might be correlated with the lagged intervention variable that is included among the explanatory variables. Moreover, it is questionable whether the average exchange rate of the previous month, for example, is a good instrument for the current monthly average of exchange rate. However, with the recent availability of the official daily data on interventions the usual practice of including lagged exchange rates seems to be the most suitable and “safe” strategy. Dominguez and Frankel (1993a), using daily data for estimating Fed reaction function, follow a variation of this approach. Humpage (1999), for example, even uses early morning quotes for the exchange rate on the right hand side, as this appears to reflect to a large extent the actual behavior of monetary authorities.

Some authors (Longworth 1980; Gaiotti et al. 1989) found a strong asymmetry in the reaction to appreciation on the one hand and depreciation on the other hand. This has led researchers to

² Most studies use percentage change rather than absolute change, i.e. change in the log of exchange rate level (Dominguez and Frankel 1993a; Almekinders 1995). Some studies include also other variables, such as intervention by the other central bank in the same segment of FX market etc. (Ito 2003).

focus more on the sub-periods that are characterized by interventions of the same sign, related usually to medium-term misalignment in exchange rate – as perceived by the central bank – either towards too sharp depreciation or too sharp appreciation. Focusing on such sub-periods enabled two extensions of the research: first, it allowed including some measure of volatility among the explanatory variables, as one of the official motives for intervention often cited by central banks themselves is to “calm disorderly markets” that are characterized by high volatility (Jurgensen 1983). Second, it paved the way for using binary choice models.

If we included volatility into the more general specification (1) and estimated across sub-periods with different directions of intervention, the sign of the corresponding coefficient would not be clear and maybe also not significant, as measures of volatility are positive and the same degree of volatility in the appreciation sub-period has obviously opposite effects on the intervention variable than in the depreciation sub-period.³ However, if we estimate the reaction function within one sub-period, say appreciation one, the estimated equation – taking also into account the simultaneity problem – can take the form

$$I_t = \beta_0 + \beta_1 \Delta s_{t-1} + \beta_2 (s_{t-1} - s_{t-1}^T) + \beta_3 (\Delta s_{t-1})^2 + \beta_4 I_{t-1} + \varepsilon_t. \quad (2)$$

In this case, we expect a negative sign of β_3 if the central bank attempts to decrease volatility (for volatility the squared change in exchange rate is used in (2), as for example in Hillebrand and Schnabl (2004), but some authors include moving standard deviation or moving variance instead).

As mentioned by Ito and Yabu (2004), interventions are characterized by a large number of zero-value observations when using daily data. This may bias an OLS estimation of the reaction function coefficients, as the dependent variable is obviously truncated (Humpage 1999, p. 744). Therefore, a binary choice model such as the probit or the logit model is used to estimate the probability of intervention rather than the precise amount. The main hypothesis behind is that we can separate the decision to intervene from the decision about the amount of currency purchased or sold when intervening.

Defining a dummy D , such that $D=1$ if there was intervention and $D=0$ otherwise, the probability of intervention is estimated via maximum likelihood from a sort of following model:

$$P(D_t = 1 | x_t) = F(\beta x_t), \quad (3)$$

where the vector x include explanatory variables and the function F may be either standard normal distribution function (probit model) or logistic cumulative distribution function (logit model). Despite some minor difference between these two functions, both are equally suitable for a discrete choice analysis (Greene 2003).

The binary choice models may be estimated separately for purchases and for sales of foreign currency (Baillie and Osterberg 1997; Kim and Sheen 2002; Hillebrand and Schnabl 2004; Akinci et al. 2005), in which case the explanatory variables may in principle include the same variables as in the reaction function (2) including the lagged D . However, some studies estimate one probit/logit model across a longer period that includes both sales and purchases of foreign currency (Dominguez 1998; Ramaswamy and Samiei 2000). In such a case, the explanatory variables are slightly adjusted in order to represent factors that trigger intervention, but do not explicitly refer to the direction of intervention (such as volatility, absolute change of exchange rate, absolute deviation of exchange rate from the targeted level

³ Actually, some of the previous studies, which estimated a reaction function across different sub-periods, have also included volatility among the explanatory variables: in order to avoid the problem of the “always positive measure of volatility”, Eijffinger and Gruijters (1991), for example, multiply a five-day moving variance by the deviation from the targeted level of exchange rate.

etc.). Some studies even estimate a discrete choice model (such as ordered probit or multinomial logit) where the intervention variable D is indicator function (-1, 0 or 1) of intervention (Klein and Lewis 1991; Lewis 1995; Ito and Yabu 2004).

An obvious disadvantage of using binary choice models to estimate the intervention reaction function is that we are able to forecast only the probability of central bank intervention, but not the amount. This is particularly relevant if we want to use the intervention function within a system of simultaneous equations in order to estimate the effectiveness of interventions and avoid the simultaneity bias. Hence, more recently, the common practice is to estimate the central bank's intervention reaction function in two steps: first, to estimate the probability of intervention via discrete choice models for the decision to intervene, and second, to estimate the amount of intervention via standard reaction function similar to (1) or (2). The predicted amount of intervention is then constructed by combining both approaches, essentially in three ways:

First, if the probability of intervention given by a binary choice model reaches a given threshold, the predicted amount of intervention is taken from the standard reaction function; otherwise the amount is equal to zero. Two variants of this approach emerged in the literature: Almekinders and Eijffinger (1996) present a friction model where monetary authority does not intervene (intervention is zero) if the predicted intervention from a simple reaction function is small, i.e. if the deviation of independent variables from their "optimal" values is small.⁴ In contrast, Kearns and Rigobon (2005) estimate a simple reaction function, getting what they call "shadow interventions" and subsequently using intervention amounts of only those days where shadow intervention exceeds the given "threshold intervention".

Second, the inverse Mills ratio can be calculated from the binary choice model and used directly in the original reaction function to correct for the sample selection bias (Humpage 1999). Third, the predicted values from the original reaction function are used, but for periods in which actually no interventions took place these predicted values are dropped and replaced with zeros (Humpage 1999).

2.2 Testing the channels of influence

A lot of literature on effectiveness of foreign exchange interventions concentrated on testing the relevance of individual channels through which sterilized intervention might have impact on exchange rate level and volatility. In theory, four main channels were identified: portfolio balance channel, signaling channel, order flow channel and noise trading channel (Sarno and Taylor 2001; Gersl 2004). The first two channels were tested especially in 1980s and early 1990s, while the other ones slightly later.

As Dominguez and Frankel (1993a) explain, portfolio balance channel assumes that domestic and foreign assets are imperfect substitutes and investors thus diversify their holdings among both types of assets based on expected returns and variance in returns. An intervention operation leads investors to rebalance their portfolios, but this requires a change in expected relative returns so that investors willingly change their composition of assets held, i.e. a change in exchange rate. Edison (1993) and Dominguez and Frankel (1993a) survey studies that test this channel through an indirect approach, regressing ex post excess returns (risk premium) on asset supplies, and conclude that the majority of studies found no significant relationship. Moreover, as Edison (1993, p. 18) argues, "any test concerning the behavior of the risk premium is necessarily a test of the joint hypothesis on the degree of asset

⁴ The main reason for such a strategy is to maximize the "news" effect of intervention, as small and regular interventions may actually cause that less attention will be paid to the message contained in interventions. Ito and Yabu (2004) present another reason: for small interventions, the political cost due to necessity to consult government or other central banks does not overweight benefits in terms of very moderate effect on exchange rate.

substitutability and on expectations formation”. Some studies also included variance of returns among the explanatory variables to adjust for risk aversion, but the insignificance remained.

However, Dominguez and Frankel (1993b), in addition to including the variance variable, use survey data on expected exchange rates rather than ex post returns, finding significant portfolio balance effect, i.e. that interventions have had impact on risk premium defined as the interest rate differential minus expected depreciation. Humpage and Osterberg (1992) found significant impact of interventions on both mean and variance of the risk premium, assuming rational expectations. Similarly, Baillie and Osterberg (1997) found significant effects of intervention on risk premium defined as forward forecast error (forward exchange rate minus spot exchange rate of the future period). However, these results may be also interpreted as interventions having impact on exchange rate expectations, not necessarily due to the portfolio balance effect, but for example because of signaling channel.

In the signaling channel, intervention serves as a mean to convey inside information from the central bank to markets, either about the “correct” fundamental level of exchange rate, which may be assessed differently by the central bank than by the rest of the FX market, or about future monetary policy, hereby influencing exchange rate expectations. Empirical tests thus concentrate on these two issues: one strand of literature directly examines whether intervention influences exchange rate expectations, whilst another strand examines whether intervention is a leading indicator of changes in monetary policy. Dominguez and Frankel (1993b) find positive evidence that intervention influences exchange rate expectations, confirming the signaling effect. Similarly, most studies (Dominguez 1992; Ghosh 1992; Kaminsky and Lewis 1996) confirmed that interventions help to predict future monetary policy changes, although Klein and Rosengren (1991), for example, found opposite evidence.

The order flow model of exchange rate determination subscribes the main driving force of the exchange rate movements to the microstructure of the foreign exchange market and the way private information is transmitted throughout the market via order flows, i.e. signed buyer-initiated versus seller-initiated transactions (Lyons 2001). Scalia (2004a, 2004b), for example, tests whether order flows due to interventions have had significant effect on exchange rate using high frequency (hourly interval) data on interventions and FX market transactions in the Czech koruna-euro market in 2001-2002, finding positive evidence.

Hung (1997) introduced a new transmission channel that offers a satisfactory explanation why monetary authority may want to opt for volatility-enhancing intervention strategy in order to reach more than short-lasting effects on exchange rate level. If majority of FX traders are chartists (noise traders), i.e. relying on the most recent market developments, increased volatility may reversed their trading strategies and stop for example an exchange rate misalignment. Hung (1997) herself tests her theory by regressing realized volatility in exchange rate returns on interventions and other control variables, finding statistically significant impact of interventions, but with different signs in different periods, confirming that monetary authorities may sometimes use volatility-enhancing intervention strategies.

2.3 Testing effectiveness of intervention in general

Since mid-1990s, most literature adopt a direct approach to testing effectiveness of intervention, simply regressing changes in exchange rate moments on intervention variable and other variables of influence, taking into account particular econometric difficulties associated with such a direct approach. Even if these studies do not claim testing any particular channel of influence through which interventions might have had impact, they nevertheless indirectly refer to some of them. Research on effects of intervention on volatility necessarily relates to the argument made by Hung (1997), while the impact on the expected exchange rate reminds us of the signaling channel.

Four main areas of interest may be identified in the recent literature: first, what impact does intervention have on exchange rate level? Second, what impact does intervention have on exchange rate volatility? Third, what impact does intervention have on exchange rate expectations (both level and volatility)? And fourth, what determines the success of intervention?

In the first area, two main approaches are usually applied. A “just-do-it” approach based on regressing changes in exchange rate level on intervention variable and other control variables via ordinary least squares (OLS) is usually not followed due to possible endogeneity bias.⁵ Consider the equation (4): if intervention depends on change in exchange rate in the current period, as suggested by reaction function (1) above, estimates of γ_1 could be biased.

$$\Delta s_t = \gamma_0 + \gamma_1 I_t + \gamma_2 X_t + \varepsilon_t, \quad (4)$$

As a result, most studies use the instrumental variables approach. One possibility would be to use lagged interventions as instrument for current interventions (Fischer and Zurlinden 1999; Ramaswamy and Samiei 2000; Egert and Komarek 2005). Nevertheless, the best way is to use a sort of two-stage least squares approach (Galati et al. 2005; Disyatat and Galati 2005). The usual practice is to estimate first the reaction function such as the one in (2), using lagged exchange rate as instrument for current exchange rate, and subsequently use the predicted values of interventions from the reaction function as an instrument for current interventions in the exchange rate equation (4).⁶

Humpage (1999) took the event-study approach to testing effectiveness of intervention. Instead of regressing changes in exchange rate moments on interventions, he specified a success criterion that enabled him to differentiate between “successful events” of intervention and unsuccessful events. He defined successful events as those days of intervention in which intervention sales (purchase) of foreign exchange were associated either with domestic currency appreciation (depreciations) on that day, or smaller depreciation (appreciation) when compared to the previous day. All other intervention days were defined as unsuccessful. He then looked at the proportion of successful interventions.

By concentrating only on the days of intervention (events), the event-study approach allows to tackle the usual difficulty with time-series econometrics of interventions, namely the high number of periods of no intervention that may cause the time-series approach to find no relationship between interventions and exchange rate. However, an analysis of effectiveness of interventions based on the intra-event exchange rate change (here the change within a day) may be subject to “endogeneity” problem: as central bank’s decision to intervene may be dependent on the exchange rate development in the period of intervention, the reason to intervene would also label the intervention successful or not, thus biasing the results towards ineffectiveness.

The event does not have to be one day; and the “event window”, i.e. the number of periods forming one event, may even vary within one analysis. Fatum and Hutchison (1999), Fatum (2000), Fatum and Hutchison (2003), Edison et al. (2003), Fratzscher (2005) and Egert and Komarek (2005) define the event window according to the number of consecutive days of no intervention between days of intervention. Fatum (2000) considers for example maximum of 15 days of intervention inactivity between consecutive days of intervention, i.e. an event is identified as a series of consecutive days starting and ending with an intervention day and

⁵ Despite it, Eijffinger and Gruijters (1992) or Dominguez and Frankel (1993a) apply OLS. So do also Fischer and Zurlinden (1999), but because they use data on transaction prices, i.e. prices for which the interventions were conducted, the endogeneity problem is smaller.

⁶ Variants of this approach, based on constructing more complicated systems of simultaneous equations, can be found in Almekinders (1995) or Kearns and Rigobon (2005).

with maximum of fifteen consecutive days of no intervention allowed within the event. Moreover, as the criterion of successfulness the change in exchange rate, either after the event (in the post-event window) or between the levels prevailing before and after the event (i.e. between pre-event and post-event windows), is used in order to eliminate the endogeneity problem. Again, the length of pre-event and post-event windows may reach from one to more days, but are usually symmetric and same across the whole analysis.

The second area of interest, i.e. the impact of interventions on volatility, has attracted most attention in the literature on intervention, especially when analyzing high-frequency data (Almekinder 1995; Almekinders and Eijffinger 1996; Baillie and Osterberg 1997; Dominguez 1998; Domac and Mendoza 2002; Ito 2003; Hillebrand and Schnabl 2003; Nagayasu 2004; Guimaraes and Karacadag 2004; Akinci et al. 2005; Egert and Komarek 2005). Most studies analyze the effectiveness of interventions within a GARCH framework such as in (5a)-(5c), estimating both the effect of interventions on levels (in the mean equation) and on conditional volatility (in the variance equation).⁷

$$\Delta s_t = \gamma_0 + \gamma_1 I_t + \sum_{i=2}^n \gamma_i X_{it} + \varepsilon_t \quad (5a)$$

$$\varepsilon_t \mid \Omega_{t-1} \sim N(0, \sigma^2) \quad (5b)$$

$$\sigma_t^2 = \alpha_0 + \alpha_1 \varepsilon_{t-1}^2 + \alpha_2 \sigma_{t-1}^2 + \alpha_3 I_t + \sum_{i=4}^n \alpha_i X_{it} + u_t \quad (5c)$$

Clearly, the estimated conditional volatility within a GARCH framework necessarily provides an ex post measure of volatility. However, if intervention has some signaling effect, we should be able to detect some influence on exchange rate expectations. Next to Dominguez and Frankel (1993a), who use expected exchange rate from surveys, several studies use available market data, as expected exchange rate moments can be derived from foreign currency option prices. Thus, for example for expected volatility the options' implied volatility is used (Bonser-Neal and Tanner 1996). Moreover, the above-mentioned approaches may be used in combinations: Dominguez (1998) combine a GARCH model with implied volatility derived from foreign exchange option prices, while Galati et al. (2005) and Disyatat and Galati (2005) apply the two-stage least square (TSLS) method to exchange rate moments derived from option prices.

As to the fourth area of interest, namely what makes the interventions successful (or effective), the event-study approach is usually applied (Humpage 1999; Fatum 2000; Fratscher 2005). The events are labeled successful or unsuccessful according to specified criteria, as discussed earlier, and denoted 1 for successful and 0 for unsuccessful. Subsequently, a discrete choice model is applied (probit or logit), using the binary variable as dependent variable. Among the explanatory variables the amount of intervention, dummy for coordination among central banks concerned, changes in interest rates and other suitable factors that could have impact on the effectiveness of intervention can be found in the literature.

3. Estimating effectiveness of the Czech National Bank's interventions

In what follows we applied several methods to assess whether the interventions conducted by the Czech National Bank in 2001 and 2002 were effective. First, we present some stylized facts about interventions and subsequently estimate the reaction function of the CNB. Second, we apply the instrument variables method in order to detect impact of interventions on exchange rate level. Third, we look at whether interventions had impact on exchange rate

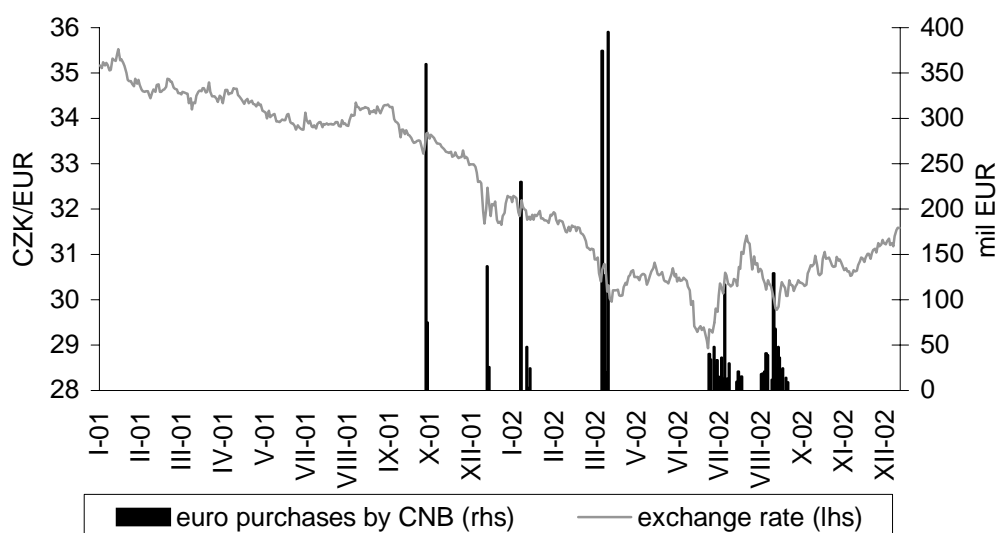
⁷ Some studies extend the GARCH framework by allowing the volatility to be regime-dependent (Markov-switching models), see Reitz (2002) or Beine et al. (2003).

volatility, using a simple GARCH model. Fourth, we shortly assess the impact of interventions on expected exchange rate volatility as derived from option prices. Finally, we adopt the event-study approach and ask what has contributed to successful interventions.

3.1 CNB's intervention activity in 2001-2002

During 2001 and 2002, the Czech National Bank intervened in the FX market, purchasing euro in order to reduce the value of the Czech koruna that began to appreciate sharply against the euro in mid-2001.⁸

Chart 1: Interventions and exchange rate development



Source: CNB, Bloomberg.

Chart 1 shows that there were actually two different periods of intervention activity: in the first period, from October 2001 to April 2002, the CNB intervened only on several days, disclosed its intervention activity to the public, and purchased huge amounts of euro, reaching almost 400 millions euro in a single day of intervention. In the second period – from July until September 2002 – the CNB intervened in a more secret manner, purchasing the euro much more frequently, but by small amounts only.

In the first period the CNB intervened on 13 days within seven months, while in the second period on 28 days within three months. The average amount of intervention was 150 million euro in the first period, while in the second it was 35 million euro only.

3.2 Reaction function

Following Ito (2003), we estimate an intervention reaction function of the following form:

$$INT_t = b_0 + b_1 \Delta s_{t-1} + b_2 (s_{t-1} - \hat{s}_{t-1}) + b_3 VOL_{t-1} + b_4 INT_{t-1} + \eta_t. \quad (6)$$

As the CNB intervened over the period of interest only against appreciated currency, i.e. purchasing euro, the intervention variable INT is defined as the amount of euro purchases, in contrast to equation (2). In line with argumentation above, the central bank is expected to intervene if the change in the spot rate is large, or if the spot exchange rate deviates from a “target” exchange rate (that is \hat{s}_{t-1} allowed to be time-dependent and was set to a

⁸ For discussion of the Czech interventions of this period see Gersl (2004), Holub (2004), Scalia (2004a, 2004b), Egert and Komarek (2005) or Disyatat and Galati (2005). The CNB intervened also during 1990s, both within the exchange rate peg 1993-1997, in the year of the currency crisis of 1997 (huge interventions against depreciation) and also later in 1998-1999 (mainly against appreciation). However, interventions before 2001 are not subject of analysis in this chapter.

10-day backward moving average), or if the volatility of the exchange rate VOL , as measured by standard deviation of changes in exchange rate over the last 5 days, is high. Moreover, interventions usually come in clusters, so that yesterday's intervention makes today's intervention more likely, a reason to include lagged intervention.

In order to address the simultaneity bias when estimating the reaction function, we follow the common practice and use only lagged values of the exchange rate. Table 1 shows the estimation results for the reaction function given by (6).

Table 1: Estimated Reaction Function

| | Coefficient | Standard error | Significance level |
|-------|-------------|----------------|--------------------|
| b_0 | -4.99 | 2.83 | 0.08 |
| b_1 | -11.34 | 13.40 | 0.39 |
| b_2 | -21.49 | 8.36 | 0.01 |
| b_3 | 79.19 | 21.98 | 0.00 |
| b_4 | 0.14 | 0.05 | 0.00 |

Estimated via OLS; adjusted $R^2 = 0.07$; $DW=2.03$

Sample: 15/1/2001 – 1/1/2003; 513 observations

Source of data: Bloomberg, CNB (for interventions).

Table 1 indicates that the central bank systematically intervened to correct the deviation of the exchange rate from the “target” value. The coefficient for the reaction on the short-term change in the spot exchange rate has the right sign, but is not statistically significant. The central bank's interventions were also triggered by higher volatility.

3.3 Impact of interventions on the level of exchange rate

Due to the endogeneity bias, we apply the instrumental variables approach and estimate the impact of interventions on the exchange rate level using the TSLS method. We estimate the following exchange rate equation:

$$\Delta s_t = d_0 + \sum_{i=0}^4 a_i INT_{t-i} + \sum_{i=1}^n c_i X_{it} + \varepsilon_t \quad (7)$$

The change in closing exchange rate s between the day $t-1$ and t is expected to be dependent on the volume of interventions (purchases of foreign currency) INT conducted by the central bank during the day t and possibly also in previous days, and on other control variables X . If intervention is effective, we expect a positive a_i (i.e. purchases of foreign currency are associated with the depreciation of the domestic currency).

As an instrument for interventions we use the predicted values from reaction function (6), modified in two ways. First, we re-estimate the reaction function in order to have only significant variables (change in the lagged spot rate and intercept are excluded). Second, low adjusted R^2 in Table 1 suggests that we are able to explain only a small part of the variance in the intervention variable. This is caused mainly by the fact that the intervention variable INT is characterized by a number of zeros, as out of the 283 business days in the sample the CNB intervened only in 41 days. This particular feature of interventions may cause any further inference based on the predicted values from the reaction function to be invalid (correlation between such an instrument and the actual variable INT is only around 25%). Thus, following

Humpage (1999), we replace the predicted values with zeros on the days of no intervention (via this correction the correlation increases to around 50%).⁹

Table 2 shows the estimation results for the exchange rate equation (7). For control variables, we have used the 3-month money market interest rate spread between CZK and EUR, changes in exchange rates of some of the “peer” currencies (SKK/EUR and HUF/EUR), as investors may treat eastern European currencies as substitutes, contributing to common movements, and changes in the Dow Jones Euro Stoxx Broad Index to control for developments in the euro area.¹⁰

The regression I aims at capturing the short-term (one-day) impact of interventions. For a possible medium-term impact, i.e. lasting more than one day, we show the results for the impact of lagged interventions on the current change in the spot exchange rate (II), and for the impact of past interventions on the change of the level of exchange rate over a period of two (III), three (IV) and four (V) days, together with cumulative interventions.

Table 2 indicates that interventions had immediate impact on the spot exchange rate in the regression I, suggesting that a purchase of 100 million euro by the CNB led to depreciation of the Czech koruna by 20 halers. However, as regards the medium-term impact, regressions II-V suggest that the impact was insignificant or with wrong signs.

Table 2: Effectiveness of Intervention

| Variable | | Regression I | Regression II | Regression III | Regression IV | Regression V |
|---|-------|-----------------|------------------|-------------------|------------------|-----------------|
| | | Δs_t | Δs_t | $s_t - s_{t-2}$ | $s_t - s_{t-3}$ | $s_t - s_{t-4}$ |
| <i>Intercept</i> | d_0 | 0.00 | 0.00 | | | |
| Int_t | a_0 | 0.002* | 0.003*** | 0.004*** | 0.001 | -0.002 |
| Int_{t-1} | a_1 | | -0.003** | -0.002 | 0.002 | 0.001 |
| Int_{t-2} | a_2 | | -0.003*** | | -0.003* | -0.001 |
| Int_{t-3} | a_3 | | 0.003*** | | | 0.001 |
| Int_{t-4} | a_4 | | 0.000 | | | |
| <i>Cumulative Int</i> | | | 0.000 | 0.000 | 0.000 | 0.000 |
| 3M money market spread | c_1 | -0.015** | -0.015** | -0.033*** | -0.047*** | -0.046*** |
| Δ HUF/EUR | c_2 | 0.014*** | 0.015** | 0.009* | 0.007 | 0.001 |
| Δ SKK/EUR | c_3 | 0.310*** | 0.299*** | 0.313*** | 0.271*** | 0.271*** |
| Δ Dow Jones Euro Stoxx Broad Index | c_4 | -0.003*** | -0.004*** | -0.004*** | -0.004*** | -0.004*** |
| adjusted R ² | | 0.14 | 0.18 | 0.16 | 0.15 | 0.15 |

Estimated via instrumental variables (TSLS); Sample: 1/1/2001 – 1/1/2003; 509 observations

*=significance at 10% level; **=significance at 5% level; ***=significance at 1% level

In regression II, the Wald test indicates that all intervention variables are jointly significant at 1% level, while in the regressions III, IV and V the null hypothesis of no joint significance of intervention variables cannot be rejected.

Source of data: Bloomberg, Reuters, ECB, CNB.

⁹ Of course, as the decision to conduct interventions might be also dependent on the development of the exchange rate, we might partly bring back the simultaneity bias. However, as the simultaneity problem is much more serious in the intervention days, for which correction is done, the resulting bias is probably negligible. Two other methods discussed in the literature to make the reaction function better predict the zero values are the binary choice model (Ito and Yabu, 2004) and the “friction” model (Almekinders and Eijffinger, 1996).

¹⁰ We report only those control variables that appeared to be significant. We have tried also other daily variables from financial markets, such as stock market indices, oil prices, other currencies and long-term interest rate spreads.

3.4 Impact of interventions on volatility

As discussed above, interventions can have impact on volatility of exchange rate. If, for example, the interventions increased volatility, hereby raising the two-sided risk in the market, market participants might have altered their expectations away from the certain appreciation trend towards a more balanced development, correcting previous trading strategies (Hung 1997). Thus, following Almekinders and Eijffinger (1996), we apply a GARCH model of the exchange rate, allowing both the change in the exchange rate and the conditional volatility to be dependent on the volume of intervention.

We estimate the GARCH model specified in (5a-c). As interventions react to volatility and changes in exchange rate levels, we control for simultaneity bias by (1) including only lagged values of interventions (regressions I and II) and by instrumental variables, using the fitted values from the reaction function for the days of interventions (regression III).¹¹

As Table 3 shows, (lagged) interventions did not have any significant impact on the level of exchange rate. Using the instrumented interventions, there might have been some effect (significant only at 12% level), a result that is in line with the preceding section. However, regressions II and III suggest that interventions may have contributed to an increased (conditional) volatility of the exchange rate, but just to a limited extent.

Table 3: GARCH Model

| | | Regression I | Regression II | Regression III |
|---|------------|--------------|---------------|----------------|
| Mean equation | | | | |
| Int_{t-1} | γ_1 | -0.0002 | | |
| Int_t (instrumented) | γ_1 | | | 0.004 |
| Intercept | γ_0 | | | |
| 3-month money market rate spread | γ_2 | -0.012** | -0.012** | -0.016** |
| Δ HUF/EUR | γ_3 | 0.012*** | 0.012*** | 0.012*** |
| Δ SKK/EUR | γ_4 | 0.270*** | 0.272*** | 0.276*** |
| Δ Dow Jones Euro Stoxx Broad Index | γ_5 | -0.003*** | -0.003*** | -0.003*** |
| Variance equation | | | | |
| Intercept | α_0 | 0.001*** | 0.001*** | 0.004*** |
| $Arch(1)$ | α_1 | 0.104*** | 0.105*** | 0.138*** |
| $Garch(1)$ | α_2 | 0.819*** | 0.810*** | 0.444*** |
| Int_{t-1} | α_3 | 0.00001 | 0.00003* | |
| Int_t (instrumented) | α_3 | | | 0.002*** |
| adjusted R^2 | | 0.13 | 0.13 | 0.12 |

Estimated via maximum likelihood; sample: 3/1/2001 – 1/1/2003; 513 observations

*=significance at 10% level; **=significance at 5% level; ***=significance at 1% level

These results confirm the findings by Egert and Komarek (2005). They apply a variety of GARCH models in order to test the impact of interventions conducted by the CNB on the CZK/EUR exchange rate level and conditional volatility over the period 1997-2002. Using a slightly different set of control variables, they find a statistically significant, but wrong-signed effect of CZK purchases on the level. For CZK sales, the intervention strategy in 2001-2002, they find statistically significant impact on the level only when using current interventions. For lagged interventions, only large koruna sales seem to have worked. They also find that CNB's interventions tend to be associated with increased volatility of the exchange rate.

¹¹ Most authors when applying GARCH models do not control for simultaneity, but they subsequently test the degree of endogeneity of interventions, for example by estimating a Probit model of reaction function (Guimaraes and Karacadag 2004) or by the Granger causality test (Egert and Komarek 2005). If the degree of endogeneity is found to be rather small, the possibility of a simultaneity bias is downplayed.

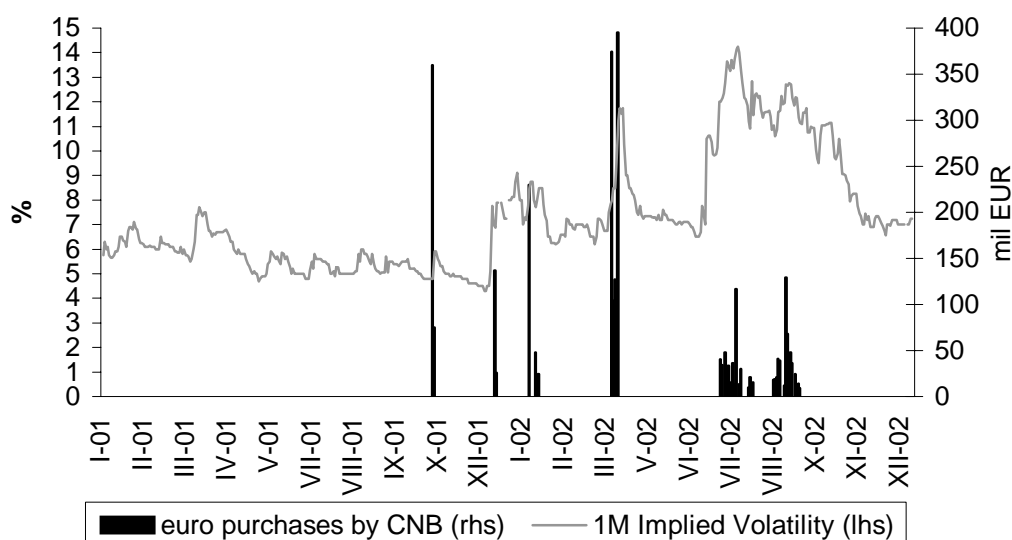
3.5 Impact of interventions on expectations

In this section we use the data on currency option prices in order to test whether interventions had impact on market expectations of the exchange rate volatility. Data on currency option prices were obtained from Citibank, the major player in the OTC market for options on central and eastern European currencies.

In the option pricing terminology, implied volatility is the expected volatility of the return of the underlying asset prevailing at the time when the option matures. It measures the degree of uncertainty that the market attaches to the future return. As the only unobserved variable in the Black and Scholes pricing formula for options is the implied volatility, it is possible to derive it from the option price for a given strike price of the option. For our analysis we use 1-week, 1-month and 3-month implied volatilities derived from prices of at-the-money call options on CZK/EUR exchange rate, i.e. options where the strike price equals the forward exchange rate. As Bonser-Neal and Tanner (1996, p. 859) argue, at-the-money options are the most sensitive to changes in volatility, and thus the most informative about the expected volatility of an exchange rate.

Chart 2 shows 1-month implied volatility together with the conducted interventions.

Chart 2: Interventions and 1-month implied volatility



Source: CNB, Citibank.

The chart suggests that interventions may have raised implied volatility, especially in the second period of interventions, as days of intervention seem to be correlated with higher implied volatility. However, as discussed in previous sections, the link can run both ways, as interventions can be triggered by increased (implied) volatility. Regressing changes in implied volatility on current interventions could hence cause the estimated coefficients to be biased.

However, in contrast to regressions on changes in the level of spot exchange rate, the simultaneity problem is probably less severe here. First, data on implied volatility were not directly observable in the market due to their OTC character. Second, the Granger causality test suggests that there is indeed a statistically significant link between interventions and implied volatility, and the link runs from interventions to volatility at quite low lag lengths (see Table 4).

Table 4: Pairwise Granger Causality Test

| Lags: | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|--|--------------------|------|------|------|------|------|------|
| | Probability | | | | | | |
| Intervention does not Grange cause 1W implied volatility | 0.00 | 0.01 | 0.02 | 0.00 | 0.00 | 0.00 | 0.00 |
| 1W implied volatility does not Grange cause intervention | 0.00 | 0.00 | 0.02 | 0.03 | 0.04 | 0.06 | 0.10 |
| Intervention does not Grange cause 1M implied volatility | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 1M implied volatility does not Grange cause intervention | 0.04 | 0.07 | 0.19 | 0.20 | 0.32 | 0.23 | 0.21 |
| Intervention does not Grange cause 3M implied volatility | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 3M implied volatility does not Grange cause intervention | 0.01 | 0.01 | 0.30 | 0.38 | 0.53 | 0.23 | 0.33 |

As the Granger causality test results suggest that there may be some degree of simultaneity, we follow Bonser-Neal and Tanner (1996) and include also lagged implied volatility among explanatory variables. If intervention is correlated with lagged implied volatility, the intervention coefficients measure the effect of intervention conditional on the level of recent volatility.¹² Thus, we estimate the equation (8) where *imvol* stands for implied volatility:

$$\Delta imvol_t = b_0 + b_1 INT_t + b_2 INT_{t-1} + b_3 imvol_{t-1} + \varepsilon_t \quad (8)$$

Table 5 shows the results of regression of implied volatilities of different maturities on current and lagged interventions.

Table 5: Interventions and implied volatility

| Dependent variable | | 1-week implied volatility | 1-month implied volatility | 3-month implied volatility |
|---------------------------|-------|---------------------------|----------------------------|----------------------------|
| <i>Intercept</i> | b_0 | 0.256*** | 0.151*** | 0.121** |
| <i>Int_t</i> | b_1 | 0.004*** | 0.002*** | 0.001*** |
| <i>Int_{t-1}</i> | b_2 | 0.002** | 0.002*** | 0.001*** |
| Lagged implied volatility | b_3 | -0.039*** | -0.024*** | -0.019*** |
| adjusted R ² | | 0.05 | 0.07 | 0.06 |

Estimated via OLS; sample: 3/1/2001 – 1/1/2003; 513 observations

*=significance at 10% level; **=significance at 5% level; ***=significance at 1% level

Table 5 indicates that interventions, both current and lagged, led to higher implied volatility. This result is also in line with the previous section. In addition, the effect is not negligible: a purchase of 100 million EUR raises 1W implied volatility by 40 basis points today and 20 basis points tomorrow.

The existence of implied volatilities from options of three different maturities – 1 week, 1 month and 3 months – allows us to analyze whether interventions have had both short-term and medium-term effect on volatility as expected by market participants. The results in Table 5 suggest that interventions have indeed raised the uncertainty about possible developments of the exchange rate at least at a 3-month horizon. However, the effect of intervention on expected volatility decreases with longer horizons.

3.6 What makes intervention successful?

The last issue we want to explore econometrically is what makes an intervention effective, i.e. successful. To answer this question, we apply the event-study approach: we first define an intervention event, and then we specify a criterion under which an intervention event can be

¹² Another possibility would be to use instrumental variables: either the fitted values from the reaction function for days of interventions, or lagged interventions. However, the results do not change substantially, as the sign and significance of intervention coefficients remain the same.

viewed as successful. Finally, using a logit model, we look for factors that can explain the success of intervention.

Following Humpage (1999), we define an intervention event as a single day of intervention. The event is labeled as successful if the intraday change of exchange rate – i.e. the change between the opening and closing levels of exchange rate – goes in the right direction. Thus, in our case where the CNB intervened against appreciation of the Czech koruna, the successful events are those intervention days where the exchange rate depreciated over the day.

The event-study literature considers also other criteria of success, such as the “smoothing” criterion (purchase of the foreign currency leads to smaller appreciation than in a period preceding the event). However, our choice of the event window length and the specific “direction” criterion of success (Fatum 2000) reflects three considerations: first, larger event windows would substantially decrease the number of events, as we had in 2001-2002 only 41 days of interventions. Second, comparing the exchange rate development between predefined pre-event and post-event windows would bring additional difficulties as the interventions are clustered over several subsequent days, so that the windows would overlap. Third, we presume that the appreciation pace of the CZK/EUR rate was so fast and the Czech koruna was in the intervention periods of 2001 and 2002 so strong, so that the real aim of interventions was to depreciate the domestic currency, not to smooth its appreciation path. Moreover, the monetary authority sends with successful intervention in terms of reversing the trend probably much clearer signal towards markets than when it succeeds in smoothing only.

Table 6 gives an overview of the successfulness of interventions in 2001-2002 and in both intervention periods separately:

Table 6: Successfulness of interventions

| | Interventions | | | Control sample |
|--|---------------|-------------|-------------|----------------|
| | Total # | Successes # | Successes % | Successes % |
| 1 st intervention period (October 2001 – April 2002) | 13 | 8 | 61.5 | 45.6 |
| 2 nd intervention period (July 2002 - September 2003) | 28 | 11 | 39.3 | 45.6 |
| Intervention period total | 41 | 19 | 46.3 | 45.6 |

Table 6 shows that in the first period of intervention activity only 8 out of 13 events were successful, just slightly over 60%. For the second period of “undisclosed” interventions, the results are even worse: just 11 out of 28 interventions, i.e. slightly less than 40%, were successful in depreciating the currency. Overall, the share of successful interventions amounts to 46%, so less than half of interventions were successful.

Due to the martingale nature of exchange rate, i.e. high frequency of changes of both directions, it is possible that some of the interventions may appear successful in terms of our criterion, but the success was not due to interventions. Thus, we show in Table 6 also the share of days that could be labeled “successful” in a control sample (in days of no intervention in 2001 and 2002). Comparison of the successfulness of interventions with the control sample indicates that the effect of intervention on reversing the trend is probably not statistically significant over the whole period, a result that is in line with Humpage (1999), but in contrast to Fatum (2000). Nevertheless, in the first intervention period the impact was much clearer.

Finally, we would like to know whether a specific intervention strategy makes intervention successful in terms of the direction criterion. We apply a logit model such as in (9), where y_i is the dummy variable that takes the value of 1 if the intervention event is successful and 0

otherwise, and x_i stands for a vector of explanatory variables that may influence the likelihood of success.

$$P(y_i = 1|x_i) = F(\beta x_i) = \frac{1}{1 + \exp(-\beta x_i)} \quad (9)$$

Among explanatory variables we include the amount of intervention, number of ticks (i.e. trades within a single day), the proportion of morning ticks, dummy for Monday and Friday, dummy for disclosure of interventions, a dummy for “surprise” intervention (i.e. intervention that does not directly follow another one), and the interest rate spread. Table 7 shows the results.

Table 7: Logit model of the successfulness of interventions

| | Regression I | Regression II |
|-----------------------------|--------------|---------------|
| amount of intervention | 0.017 | 0.008* |
| # ticks | 0.006 | |
| # morning ticks / # ticks | 0.263 | |
| 3-month money market spread | -0.867 | |
| undisclosed intervention | -1.339 | -0.724* |
| surprise intervention | -0.374 | |
| Monday | -1.685 | |
| Friday | 0.627 | |

Estimated via maximum likelihood; 41 observations

*=significance at 10% level; **=significance at 5% level; ***=significance at 1% level

Table 7 suggests that no particular intervention strategy made intervention more successful in terms of moving the exchange rate towards more depreciated levels. It does not seem to make any difference whether the interventions were conducted on Friday or Monday (on Friday the markets are usually quite thin), or whether the interventions follow in a row or not. Similarly, the number of trades (ticks) within one day or the proportion of trades conducted in the morning hours does not help to explain the successfulness either. Results of Regression II indicate that at the 10% level of significance the amount of intervention may have contributed to the successfulness, while conducting interventions in an undisclosed manner actually made them less effective.

Egert and Komarek (2005) apply the event-study approach on the Czech intervention data as well, but because they define an event according to the number of days of no intervention that can pass within an event, their event window is longer than one single day. For defining a successful event, they compare the development of exchange rate in the pre-event window and post-event window, and find that almost all intervention events were successful in either reversing the trend or smoothing the appreciation, regardless of how long the pre-event and post-event windows are considered. Nevertheless, they do not explore what has contributed to such successfulness of the interventions.

4. Conclusions

In this paper a review of basic econometric techniques and approaches to testing the effectiveness of foreign exchange intervention was provided, and subsequently some of the approaches applied to the data on interventions conducted by the Czech National Bank in 2001 and 2002. The traditional approaches that were discussed and applied here included the estimation of the reaction function and estimation of the impact of interventions on the exchange rate level, conditional and expected (implied) volatility. In addition, the event-study approach was explored and used to answer the question what can make interventions successful.

The results of the empirical part of the paper suggest that the CNB systematically intervened to correct the deviation of the exchange rate from the “target” value, and that interventions were also triggered by increased volatility. As regards the effectiveness of intervention, the results indicate that the interventions conducted by the Czech National Bank in 2001 and 2002 against the strengthening koruna had some small short-term impact on the exchange rate level, but almost no medium-term or longer impact. On the other hand, the analysis showed that interventions significantly contributed to increased volatility, both conditional and implied, and this holds true for longer horizons as well. Thus, the interventions might have been effective in the medium term via raising the two-sided risk in the market and thus inducing market participants to alter their expectations away from the certain appreciation trend towards a more balanced path of the exchange rate.

The event study revealed that over the whole period of interventions, just around 45% of intervention days were crowned with success in terms of depreciating the currency. However, this share of successful interventions does not significantly differ from the share of days with depreciation of the koruna from the no-intervention control sample, indicating that the interventions have probably had no significant impact. The analysis of factors that may have contributed to successful intervention showed that no particular intervention strategy increased the likelihood of success.

Naturally, the empirical results must be interpreted with caution, as the econometrics of high-frequency data cannot capture all the impacts the interventions may have had. In Gersl (2004), for example, the conclusion was reached that the interventions might have had some impact on the overall market sentiment if combined with other relevant factors, thus contributing to the reversal of the appreciation trend, even if the quantitative results do not find any medium-term effect. Nevertheless, the above discussed results based on available techniques indicates that foreign exchange intervention is probably not an effective instrument which monetary authorities have at their disposal, and that its use should be carefully weighted given its unclear effect on exchange rates.

5. References

Akinci, Ozge – Culha, Olcay Yucel – Ozlale, Umit – Sahinbeyoglu, Gulbin (2005): Causes and Effectiveness of Foreign Exchange Interventions for the Turkish Economy. Research Department Working Paper No. 05/05, Central Bank of Turkey.

Almekinders, Geert J. (1995): Foreign Exchange Intervention: Theory and Evidence. Edward Elgar, Aldershot.

Alemkinders, Geert J. – Eijffinger, Sylvester C. W. (1996): A friction model of daily Bundesbank and Federal Reserve intervention. *Journal of Banking and Finance* 20, pp. 1365-1380.

Baillie, Richard T. – Osterberg, William P. (1997): Why do central banks intervene? *Journal of International Money and Finance* Vol. 16 No. 6, pp. 909-919.

Beine, Michel – Laurent, Sebastien – Lecourt, Christelle (2003): Official central bank interventions and exchange rate volatility: Evidence from regime-switching analysis. *European Economic Review* 47, pp. 891-911.

Bonser-Neal, Catherine – Tanner, Glenn (1996): Central bank intervention and the volatility of foreign exchange rates: evidence from the options market. *Journal of International Money and Finance*, Vol. 15. No. 6, pp. 853-878.

Czech National Bank (2002): Strategy for Dealing with the Exchange Rate Effects of Capital Inflows from Privatisation of State Property and from Other Foreign Exchange Revenues of the State.

- Disyatat, Piti – Galati, Gabriele (2005): The effectiveness of foreign exchange intervention in emerging market countries: evidence from the Czech koruna. BIS Working Paper 172.
- Domac, Ilker – Mendoza, Alfonso (2002): Is there Room for Forex Interventions under Inflation Targeting Framework? Evidence from Mexico and Turkey”, Central Bank of Turkey, Discussion Paper, December.
- Dominguez, Kathryn M. (1992): The Informational Role of Official Foreign Exchange Intervention Operations: The Signalling Hypothesis. In: Exchange Rate Efficiency and the Behavior of International Asset Markets. Garland Publishing Company, New York.
- Dominguez, Kathryn M. (1998): Central bank intervention and exchange rate volatility. *Journal of International Money and Finance* Vol. 17 No. 1, pp. 161-190.
- Dominguez, Kathryn M. – Frankel, Jeffrey A. (1993a): Does Foreign Exchange Intervention Work? Institute for International Economics, Washington.
- Dominguez, Kathryn M. – Frankel, Jeffrey A. (1993b): Does Foreign-Exchange Intervention Matter? The Portfolio Effect. *American Economic Review* 83 (5).
- Edison, Hali J. (1993): The Effectiveness of Central Bank Intervention: A Survey of the Literature after 1982. Special papers in International Economics No 18, Princeton University, Princeton
- Edison, Hali J. - Cashin, Paul Anthony - Liang, Hong (2003): Foreign Exchange Intervention and the Australian Dollar: Has It Mattered? IMF Working Paper No. 03/99.
- Egert, Balazs – Komarek, Lubos (2005): Foreign Exchange Interventions in the Czech Republic: Did They Matter? CNB Working Paper, forthcoming.
- Eijffinger, Sylvester C.W. – Gruijters, Noud P.D. (1991): On the Short Term Objectives of Daily Intervention by the Deutsche Bundesbank and the Federal Reserve System in the U.S. Dollar – Deutsche Mark Exchange Market. *Kredit und Kapital* 24, pp. 50-72.
- Eijffinger, Sylvester C.W. – Gruijters, Noud P.D. (1992): On the Effectiveness of Daily Intervention by the Deutsche Bundesbank and the Federal Reserve System in the US Dollar – Deutsche Mark Exchange Market. In: Baltensperger, Ernst – Sinn, Hans-Werner (1992): Exchange-Rate Regimes and Currency Unions. St. Martin’s Press, New York, pp. 109-127.
- Fatum, Rasmus (2000): On the effectiveness of sterilized foreign exchange intervention. ECB Working Paper No. 10.
- Fatum, Rasmus – Hutchison, Michael M. (1999): Is Sterilized Foreign Exchange Intervention Effective After All? An Event Study Approach. EPRU Working Paper No. 1999-09.
- Fatum, Rasmus – Hutchison, Michael M. (2003): Effectiveness of official daily foreign exchange market intervention operations in Japan. NBER Working Paper No. 9648.
- Fischer, Andreas M. – Zurlinden, Mathias (1999): Exchange rate effects of central bank interventions: an analysis of transaction prices. *Economic Journal* 109 (October), pp. 662-676.
- Fratzscher, Marcel (2005): How successful are exchange rate communication and interventions? Evidence from time-series and event-study approaches. ECB, mimeo.
- Funabashi, Yoichi (1988): *Managing the Dollar: From the Plaza to the Louvre*. Institute for International Economics, Washington.
- Gaiotti, Evgenio – Giucca, Paola – Micossi, Stefano (1989): *Cooperation in Managing the Dollar (1985-1987): Interventions in Foreign Exchange Markets and Interest Rates*. Discussion Paper 119, Banca d’Italia, Rome.

- Galati, Gabriele – Melick, William – Micu, Marian (2005): Foreign Exchange Intervention and Expectations: the yen/dollar exchange rate. *Journal of International Money and Finance*, forthcoming.
- Gersl, Adam (2004): Foreign Exchange Intervention: The Theoretical Debate and the Czech Koruna Episode. *Finance a úvěr – The Czech Journal of Economics and Finance* 3-4/2004, pp. 94-116.
- Ghosh, Atish R. (1992): Is it signaling? Exchange intervention and the dollar-Deutschemark rate. *Journal of International Economics* 32, pp. 201-220.
- Greene, William H. (2003): *Econometric Analysis*. 5th Edition. Prentice Hall, New Jersey.
- Guimaraes, Roberto F. – Karacadag, Cem (2004): The Empirics of Foreign Exchange Intervention in Emerging Market Countries: The Cases of Mexico and Turkey. IMF Working Paper No. 04/123.
- Hillebrand, Eric – Schnabl, Gunther (2003): The Effects of Japanese Foreign Exchange Intervention GARCH Estimation and Change Point Detection. Japan Bank for International Corporation Institute Working Paper No. 6, October 2003.
- Hillebrand, Eric – Schnabl, Gunther (2004): A Structural Break in the Effects of Japanese Foreign Exchange Intervention on Yen/Dollar Exchange Rate Volatility. Mimeo
- Holub, Tomas (2004): Foreign Exchange Interventions Under Inflation Targeting: The Czech Experience, CNB Research and Policy Note 1/2004.
- Humpage, Owen F. (1999): U.S. Intervention: Assessing the Probability of Success. *Journal of Money, Credit and Banking* 31 (4), pp. 731-747.
- Humpage, Owen F. – Osterberg, William P. (1992): Intervention and the foreign exchange risk premium: an empirical investigation of daily effects. *Global Finance Journal* 3 (1), pp. 23-50.
- Hung, Juann H. (1997): Intervention Strategies and Exchange Rate Volatility: A Noise Trading Perspective. *Journal of International Money and Finance* 16 (5), pp. 779-793.
- Ito, Takatoshi (2003): Is foreign exchange intervention effective? The Japanese experiences in the 1990s. In: Mizen, Paul (2003): *Monetary History, Exchange Rates and Financial Markets*. Edward Elgar, Cheltenham, pp. 126-153.
- Ito, Takatoshi – Yabu, Tomoyoshi (2004): What promotes Japan to intervene in the forex market? A new approach to a reaction function. NBER Working Paper 10456.
- Jurgensen, Phillippe et al. (1983): Report of the Working Group on Exchange Market Intervention. Washington D.C., U.S. Department of the Treasury.
- Kaminsky, Graciela L. – Lewis, Karen K. (1996): Does foreign exchange intervention signal future monetary policy? *Journal of Monetary Economics* 37, pp. 285-312.
- Kearns, Jonathan – Rigibon, Roberto (2005): Identifying the efficacy of central bank interventions: evidence from Australia and Japan. *Journal of International Economics* 66, pp. 31-48.
- Kim, Suk-Joong – Sheen, Jeffrey (2002): The determinants of foreign exchange intervention by central banks: evidence from Australia. *Journal of International Money and Finance* Vol. 21 No. 5, pp. 619-649.
- Klein, Michael W. – Lewis, Karen K. (1991): Learning about intervention target zones. NBER Working Paper No. 3674.

- Klein, Michael – Rosengren, Eric (1991): Foreign Exchange Intervention as a Signal of Monetary Policy. *New England Economic Review* (May/June), pp. 39-50.
- Lewis, Karen K. (1995): Occasional Interventions to Target Rates. *American Economic Review* Vol. 85 No. 4
- Longworth, D. (1980): Canadian Intervention in the Foreign Exchange Market: A Note. *Review of Economics and Statistics* 62, pp. 284-87.
- Lyons, Richard K. (2001): *The Microstructure Approach to Exchange Rates*. The MIT Press, Cambridge and London
- Nagayasu, Jun (2004): The effectiveness of Japanese foreign exchange interventions during 1991-2001. *Economic Letters* 84, pp. 377-381.
- Ramaswamy, Ramana – Samiei, Hossein (2000): The Yen-Dollar Rate: Have Interventions Mattered? IMF Working Paper No. 00/95.
- Reitz, Stefan (2002): Central Bank Intervention and Exchange Rate Expectations – Evidence from Daily DM/US-Dollar Exchange Rate. *Deutsche Bundesbank Discussion Paper* 17/02.
- Sarno, Lucio – Taylor, Mark P. (2001): Official Intervention in the Foreign Exchange Market: Is It Effective and, If So, How Does It Work? *Journal of Economic Literature* XXXIX (September 2001), pp. 839-868.
- Scalia, Antonio (2004a): Liquidity and volatility of Central European currencies. Banca d'Italia, mimeo.
- Scalia, Antonio (2004b): Is foreign exchange intervention effective? Some micro-analytical evidence from Central Europe. Banca d'Italia, mimeo.

III DYNAMIC INCONSISTENCY OF MONETARY POLICY: RULES, REPUTATION, AND FLEXIBILITY*

1. Introduction

One of the most famous approaches to study of central banks' behavior is the dynamic inconsistency research program. Since 1977, a year in which the seminal paper by Kydland and Prescott (1977) was published, a considerable work based on dynamic inconsistency of discretionary monetary policy has emerged.

In this paper, I provide an overview and discussion of the most important contributions within this research program. The aim is to identify issues that relate to the institutional design of central banking. Thus, the paper includes discussion of the rules versus discretion dilemma, reputation building, flexibility versus credibility trade-off, independence of central banks and optimal contracts for central bankers, i.e. issues that attracted a lot of attention over the last two decades. I show that individual contributions in the above mentioned areas help to understand very well the challenges for the design of optimal institutional arrangement for monetary policy, but are necessarily only partial in providing satisfactory answers. However, when combined together, they offer a consistent picture as to what features should monetary institutions have.

The paper is organized as follows: in section 2 the concept of dynamic inconsistency is explained, while in section 3 it is applied to monetary policy. Section 4 discusses the results of the dynamic inconsistency model of monetary policy. Following sections review the solutions to the inflation bias, a result of discretionary monetary policy as seen from the dynamic inconsistency perspective. Section 5 discusses the role of rules in monetary policy from the perspective of constitutional economics, a research program has been attracting a lot of attention since 1970s. Section 6 the issue of reputation building by a central bank. Section 7 extends the model by introducing stochastic features, i.e. shocks to the economy, and discusses the possibilities of state-contingent rules. Section 8 reviews the proposal of Rogoff (1985) to delegate monetary policy to an independent and conservative central banker, but adds the dimension of checks and balances in the political system and their relation to monetary policy. Section 9 shortly discusses the proposal to link central banker's remuneration to inflation performance via optimal contracts, while section 10 concludes.

The issue of dynamic inconsistency has been discussed also in the Czech economic literature, for example by Čihák and Holub (1999). In comparison to their article, this chapter elaborates more deeply on the issue of rules from the constitutional economics perspective and the reputation building.

2. Game Theory Framework of Dynamic Inconsistency: A Simple Example

The general idea of the dynamic (or time-) inconsistency is simple and, as Bofinger (2001, p. 175) points out, at a first sight it does not appear to be a particularly significant phenomenon: a strategy is time-inconsistent if it is optimal at a point of time t_0 but no longer optimal at a point of time t_1 . It is clear that if the underlying circumstances have changed (because, for example, new information has arrived), the strategy optimal at t_0 will not necessarily be optimal at t_1 . However, the dynamic inconsistency becomes significant in the game theory framework if the changing circumstances are themselves reactions by other decision makers on the strategies taken (or planned to be taken) by the initial decision maker.

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Blinder (1987, p. 407) gives a simple example of dynamic inconsistency in the game theory framework that is taken from university life. Imagine a professor who wishes to encourage his students to study as hard as possible but at the same time hates marking examination papers. How does his optimal strategy look like? The best thing he can do is to announce at time t_0 (i.e. at the beginning of his course) that there will be an examination at the end of the academic term. This provides the students with necessary incentive to learn hard. However, short before examination (at time t_1) the professor cancels it and gives the certificate to all students because his two aims have been reached: students have learned (hopefully hard) and acquired the knowledge, and he does not have to spend his time with marking the examination papers.

Notice that the optimal strategy for the professor is not optimal over time, i.e. it is time-inconsistent. At time t_0 it is optimal for the professor to set and to announce the examination, but at time t_1 , after the students have learned the course stuff, to cancel the examination. The inconsistency would not cause any problems if the students were unaware of the professor's "objective function", especially his hate of marking examination papers, and could in no way find it out. In such a case, the professor could repeatedly announce and cancel the examination in each academic term and the students would be "fooled" again and again. Thus, the fact that he already twice cancelled the examination just before the announced date would not automatically mean that he would do it for the third time (because students indeed do not know what he is optimizing).

However, students are obviously not fools and if we regard them as a rational and optimizing partner in the just described game, assuming that they know the professor's objective function and hate learning, we can discuss their optimal strategy. The students' optimal strategy is evidently not to learn at all because they know that they will get the certificate from the professor without having to take an examination. Now, there is a kind of trap. The professor would like the students to acquire necessary knowledge but if he is not believed to give examination at the end of the course, i.e. if he has no credibility, the students will not learn. In such a situation, the professor cannot do better by carrying out the examination because he would only reduce his utility.

Let us discuss shortly a dynamic view of this simple example, i.e. a repeated game. It is possible that in the first round of the game the professor succeeds with his time-inconsistent strategy. However, if he tries to practice his strategy in next rounds, he will lose his credibility and rational students will tend to study less and less. The professor, recognizing the problem, can try to persuade the students that his intention to carry out the examination is "real" and irreversible, hoping to motivate students to study, but even if he himself actually intends to give examination, shortly before the examination date he has still the incentive and power - given his objectives and discretion - to cancel it again. Because students *know* this, they will not believe any of the "irreversible" announcements and will not study hard.

Where is the source of the problem? The objective function of the professor that is known to the students and the discretion he has caused the problem. What the professor is trying is to "get free lunch", using the famous Milton Friedman's phrase. If the objective function includes two variables bounded by a trade-off restriction, one cannot then simultaneously reach the maximum of both of them, hoping to break the trade-off relationship only by changing the strategy in the "right" time. Because there are rational agents beyond the trade-off relationship, they do not want to be fooled and they do not therefore allow the trade-off to be broken. Second source of the problem is the discretionary power the professor has. Even if he really intended to carry out the examination, he faces rational agents knowing his objective function and his free power to cancel the examination at time t_1 .

3. Monetary Policy Games and Dynamic Inconsistency: Assumptions of the Basic Model

Let us turn our attention now to the application of the dynamic inconsistency phenomenon in the monetary policy. There is a large field of work that deals with dynamic inconsistency of discretionary monetary policy, starting with seminal articles by Kydland and Prescott (1977), Barro and Gordon (1983a, 1983b), Barro (1986) or Rogoff (1985). The basic model that is common for most papers dealing with dynamic inconsistency can be described in a simple form by following equations:

$$y = \bar{y} + b(\pi - \pi^e), \quad b > 0 \quad (1)$$

The equation (1) is the well-known expectations-augmented short-run Phillips curve denoting the positive aggregate relationship between the deviation of the real output y from its natural level \bar{y} and unanticipated inflation, i.e. difference between actual inflation π and expected inflation π^e (the real variables are usually in logarithms). The natural level of output corresponds to the natural level of employment that would be obtained in the absence of monetary disturbances - in other words, following Friedman (1968), a level that is determined only by real forces like structure of the labor and commodity markets, costs of mobility etc. The parameter b denotes the “sensitivity” of the output on the change in surprise inflation.¹

The relationship (1) can result from two not necessarily competing views about how economy works. First, following Lucas (1972, 1973), unanticipated inflation affects output because individuals in the economy are not able to distinguish between aggregate nominal shocks and real relative shocks.² As a result, when an individual (producer) observes an increase in the price of his product, he does not know whether it reflects a change in the good’s relative price or a change in the aggregate price level. However, there is a positive probability that a part of the change is an increase in the relative price of his good, the extent being determined by the variance of (past) nominal aggregate shocks.³ An optimal response for the individual producer is therefore to increase output somewhat because the change in the relative price alters the optimal amount to produce while the change in aggregate price level not. Thus, an unexpected increase in the aggregate price level raises the overall output produced because all producers attribute a part of the price change to the change in relative prices.

A second explanation for the equation (1) comes from the existence of long-term wage contracts in conjunction with ex post determination of employment by labor demand side (Fischer 1977, Taylor 1980). Here, workers are assumed to sign nominal wage contracts prior to the setting of monetary policy. The contracted wages are based on the expected inflation. An inflation surprise reduces the real value of the contracted nominal wage, thereby inducing firms to hire more labor and produce more output.⁴ This “wage contracting” approach prevails in the literature.

¹ Some authors formulate the model in employment/unemployment – inflation terms (Barro and Gordon 1983b; Rogoff 1985; Cukierman 1992; Bofinger 2001). With a direct linkage between the employment and output through the production function the formulation in output – inflation terms is equivalent.

² A simple version of the Lucas model can be found in Romer (2001, pp. 266-276).

³ The higher the variance of nominal aggregate shocks is, i.e. the more volatile the aggregate demand is, the lower is the parameter b in the equation (1) and the more inflation surprise is necessary to affect real output (see Romer 2001, pp. 276-277).

⁴ A simplified version of the model is presented in Cukierman (1992, pp. 35-38). Cukierman points out that a decrease in real wages will lead to the rise in employment only if the employment is determined by the demand side, i.e. if the real wage is above the market clearing value (for example, because of strong labor union). Otherwise, the binding constraint would be the supply side of the labor market, inducing even a decrease in employment by a decline in real wages.

The second building block of the basic model is the social welfare function L (or society's utility function) that is formulated as a cost function, in which social costs have two components. First is the (squared) deviation of the actual real output y from the targeted output y^* , second the (again squared) deviation of the actual inflation π from the targeted inflation π^* . The parameter a denotes the relative weight placed on the inflation and output goals.⁵

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

In the basic model, the social cost function is a target function of both private sector and the policymaker (usually monetary authority, but let us call it only policymaker and suppose that this political body has all economic functions, i.e. fiscal, monetary and other policies). It is assumed that the policymaker acts as “benevolent planner”, maximizing the social welfare of the private sector. Social costs rises when output and inflation deviate from their “bliss points” y^* and π^* , irrespective whether the deviation is positive or negative. Because larger deviations are assumed to cause higher social costs, the deviations are squared.

The fact that outputs higher than y^* are valued negatively is somewhat puzzling. Why should not individuals wish the output to be as high as possible? One possible answer comes from the linkage between output and employment: the targeted level of output corresponds to the optimal level of employment that results from an optimization calculus of individuals between leisure and work. An output that is higher than optimal would then lead to more employment than preferred, decreasing the utility of individuals and thus increasing the social costs.

The inflation target does not have to be necessarily zero;⁶ however, most of the literature for simplicity assumes π^* to be zero. Higher than social optimal inflation rate increases social costs and reduces welfare due to the real costs high inflation induces, mainly the distortion of signals prices play and resulting misalignments in investment, menu costs, distortion of tax system functioning, “shoe leather costs”, redistribution effects etc. Too low inflation (or even deflation) has known negative effects on welfare as well.⁷

One of the key assumptions of the dynamic inconsistency model is that the targeted output y^* is higher than the natural output \bar{y} . The reason for this fact is not obvious. It is usually argued that distortions in the economy make natural level of output undesirably low. Barro and Gordon (1983a, p. 103) give some examples of distortions: the income taxation (i.e. non-lump-sum taxes) or unemployment compensation may make the level of private-chosen work too low. However, as Bofinger (2001, p. 180) points out, it has to be at the same time assumed that individuals do not take account of the associate increase in the supply of public goods financed from the taxes when deciding about leisure and work. Canzoneri (1985, p. 1058)

⁵ With a being unity, the same weight is put on both targets. When a is higher than one, the inflation target is given a high priority, the opposite being true for a lower than one.

⁶ For example, as Rogoff (1985) points out, the literature on “optimal rate of inflation” provides an argument for $\pi^* > 0$. If the tax system is inefficient, the government may prefer to gain revenues via seigniorage, i.e. through printing more money and hoping that real balances that are “taxed” through inflation will decline more slowly than the inflation rises (see Phelps 1973 or Romer 2001, pp. 510-514). However, there are other, more realistic arguments as well, the rigidity of nominal wages downwards and resulting problems in situations with negative shocks in certain industries or regions, or the risk of deflation being the major ones. Hence, the most inflation targeting countries target an inflation rate that is small but positive. For further discussion of setting $\pi^* > 0$ see Bernanke et al. (1999, pp. 28-30).

⁷ For the discussion of costs of inflation or deflation see for example Romer (2001, pp. 519-524), Bofinger (2001, pp. 132-148) or Bernanke et al (1999, pp. 16-19).

provides another argument for $y^* > \bar{y}$: because of trade unions, the labor supply curve including only the union members causes the real wage to be too high and natural employment (and hence natural output) too low in comparison with the level regarded as desirable by all (i.e. not only union insiders) workers.

The basic model is completed by assuming that both players of the game (policymaker and private sector) have perfect information about the target functions and that policymaker is able to determine the inflation rate π directly through its monetary policy instruments, usually money growth.⁸

4. Playing the Basic Monetary Policy Game

The policymaker decides about π by maximizing his target function, in this basic model the social welfare function, i.e. it minimizes the social cost function (2) under the constraint (1). Substituting (1) into (2), differentiating in terms of π and setting the first-order condition equal to zero yields the policymaker's optimal inflation rate π^{opt} as a function of π^e (and, of course, other parameters):

$$\pi^{opt} = \pi^* + \frac{b}{a+b^2}(y^* - \bar{y}) + \frac{b^2}{a+b^2}(\pi^e - \pi^*) \quad (3)$$

For simplicity, let us assume the targeted inflation rate π^* to be zero. In such a case, the equation (3) simplifies to the equation (4):

$$\pi^{opt} = \frac{b}{a+b^2}(y^* - \bar{y}) + \frac{b^2}{a+b^2}\pi^e \quad (4)$$

Thus, the inflation π policymaker chooses depends crucially on the inflation rate π^e expected by the other player, the private sector. Now, there are principally three possible situations, how the monetary policy game can proceed.

Situation 1: Fooling the public. Consider the case where the private sector expects the inflation to be zero (π^*), in other words, it expects the policymaker to choose the targeted inflation. This is, at a first sight, a plausible assumption (if policymaker announces her target, why should she not be believed that she is going to realize it?). However, because targeted output is higher than natural output, policymaker will actually choose a positive inflation rate according to the equation (4) and surprise the public. Why? Because the marginal social cost of slightly higher inflation is zero (differentiating the second term in (2) according to π in the situation $\pi = \pi^* = 0$) and the marginal social benefit of resulting higher output is positive (the change in social costs in the first term of (2) is negative by slightly higher inflation). Thus, the policymaker can raise the social welfare by delivering a positive rate of inflation π_1 according to the equation (5).

$$\pi_1 = \frac{b}{a+b^2}(y^* - \bar{y}) \quad (5)$$

Equations (6) and (7) show the resulting output and social costs:

$$y_1 = \bar{y} + \frac{b^2}{a+b^2}(y^* - \bar{y}) \quad (6)$$

$$L_1 = \frac{1}{2} \frac{a}{a+b^2}(y^* - \bar{y})^2 \quad (7)$$

⁸ As a result, some of the authors (Cukierman 1986, 1992) use the money growth rate instead of inflation.

In this situation, the private sector is fooled by the policymaker, who had announced the target inflation π^* (zero) to reduce the expected inflation. After the individuals have contracted their nominal wages according to expected zero inflation announced by the policymaker, she surprises them with positive inflation π_1 , and pushes the output above its natural level.

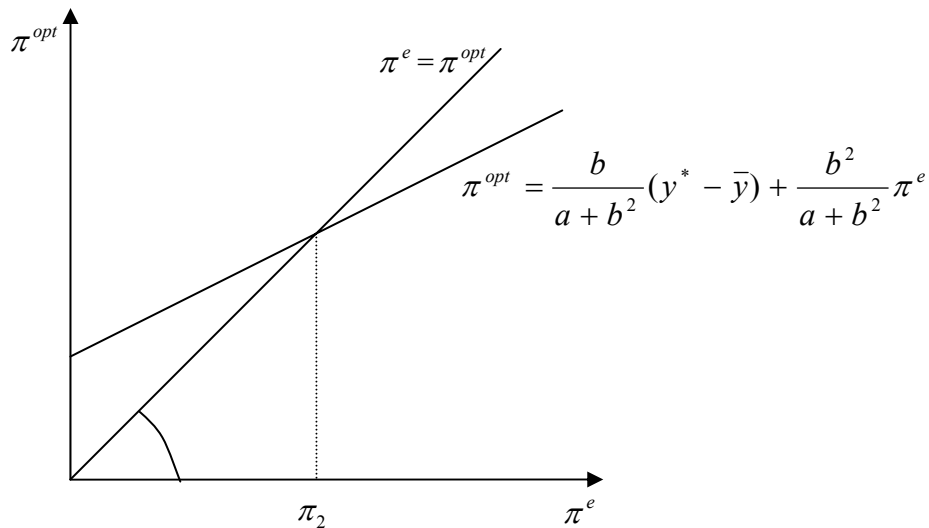
In terms of game theory framework, this situation represents a one-shot non-cooperative game where the public is not fully informed about the target function of the monetary authority. If we assume perfect information, the payoffs given by (5) - (7) must necessary remain in the policymaker's dreamland and can never happen in reality.⁹

Situation 2: Discretionary equilibrium with rational expectations. If the private agents are rational and perfectly informed, why should they let the policymaker surprise them? Hence, because of perfect information, the private individuals know that the policymaker will intend to exploit their expectations of inflation in order to raise output. As a result, they will expect such an inflation rate that is equal to the policymaker's optimal inflation rate, i.e. $\pi^e = \pi^{opt}$. Imposing $\pi^e = \pi^{opt}$ in (4) yields the equilibrium inflation rate π_2 .

$$\pi_2 = \frac{b}{a}(y^* - \bar{y}) \quad (8)$$

Figure 1 shows the reaction functions of private sector ($\pi^e = \pi^{opt}$) and of the policymaker (equation 4). The equilibrium inflation rate is depicted as an intersection of both reaction curves:

Figure 1: Reaction functions



If both players are rational, the only equilibrium rate of inflation is π_2 that is both expected and realized. According to (1), the actual output y_2 is in this case equal to the natural

⁹ As Romer (2001, p. 482, fn. 9) points out, if the policymaker was able to fool the private sector, it could do even better by announcing that inflation will equal $\pi^* - (y^* - \bar{y})/b$ (by assumption of zero target inflation thus negative inflation rate) and then setting $\pi = \pi^*$. This yields both bliss points and causes the social costs to be zero.

output \bar{y} , and the actual inflation π_2 is higher than in the situation 1, as well as the social costs L_2 :

$$L_2 = \frac{1}{2} \frac{a+b^2}{a} (y^* - \bar{y})^2 \quad (9)$$

Hence, there is an unnecessary inflation π_2 that was intended to raise the output above the natural level, but because of rational private sector, the intention was neutralized by expecting this inflation rate by the private sector. Again, in terms of game theory, this result represents a Nash discretionary equilibrium characterized by an inflation bias with the output still at its natural rate (Blackburn and Christensen 1989, p. 14). It is easy to show that this Nash equilibrium is inferior and that there is another one (discussed in situation 3) leading to higher social welfare.

Situation 3: Pre-commitment to the announced policy.

Suppose that the policymaker can pre-commit to a policy whereby he will not create surprise inflation and the private sector believes this. The announcement of zero inflation is in this situation binding and credible and the private sector will thus expect $\pi^e=0$. Because of pre-commitment, the policymaker cannot take advantage of low inflation expectations as in the situation 1 and he must realize inflation $\pi_3=0$, being effectively bounded by the pre-commitment. According to (1), the actual output remains at its natural level, $y_3=\bar{y}$. The equation (10) gives the social costs L_3 :

$$L_3 = \frac{1}{2} (y^* - \bar{y})^2 \quad (10)$$

It is easy to show that $L_1 < L_3 < L_2$. From the policymaker's point of view (and because the target function of policymaker is simultaneously the target function of the private sector, from the public point of view as well), if the best solution with the lowest social costs L_1 is due to rational expectations unattainable, the second best solution – the pre-commitment not to inflate more than private sector expects – is preferred to the discretionary solution with highest social costs L_2 . The situations 2 and 3 differ only in the realized inflation – by the pre-commitment policy the inflation is equal to zero, by the discretionary policy there is an inflation bias given by (8).

Some authors (for example Cukierman 1986, p. 7) have tried to represent the game structure as a prisoners' dilemma. However, there is one relevant difference between standard prisoners' dilemma matrix and the basic monetary policy game, the reason being in impossibility to derive the classical prisoners' dilemma payoff structure directly from the welfare function (2). The following Table 1 shows the outcome structure with payoffs resulting from the situations 1, 2 and 3 (the numbers represent payoffs <policymaker, private sector> in terms of costs):¹⁰

¹⁰ For the table, we need the payoff for the case where the public expects positive inflation π_2 , but the policymaker delivers zero inflation. Let us denote resulting social costs for this situation as L_4 and show that $L_4 = \frac{1}{2} \frac{(a+b^2)^2}{a^2} (y^* - \bar{y})^2$. It is clear that L_4 is higher than the discretionary payoff L_2 because choice of zero inflation when public expects positive π_2 does not meet the optimizing condition (4), i.e. $L_1 < L_3 < L_2 < L_4$. For simplicity, let us substitute some arbitrary values for these disutility payoffs, for example $0 < 3 < 6 < 10$.

Table 1: Payoffs of the monetary game

| | | Private sector | |
|-------------|---------------|----------------|-----------------|
| | | $\pi^e = 0$ | $\pi^e = \pi_2$ |
| Policymaker | $\pi = 0$ | 3, 3 | 10, 10 |
| | $\pi = \pi_2$ | 0, 0 | 6, 6 |

The dominant strategy from the point of view of the policymaker (without pre-commitment) is to inflate; its payoffs for $\pi = \pi_2$ are higher (costs are lower) regardless what inflation rate the public expects. On the other hand, the dominant strategy of the private sector is to expect zero inflation, $\pi^e = 0$; its payoffs are higher regardless what the policymaker chooses, too. Hence, with both players following their dominant strategies, there is a unique equilibrium with the best payoffs $\langle 0, 0 \rangle$. However, we have argued that private sector dislikes being fooled and that (without effective pre-commitment) it thus expects positive inflation rate, knowing the policymaker's dominant strategy. Then, however, the public does not follow its dominant strategy. This is a bit puzzling – why does the public dislike being fooled when only this way it can reach the best payoff?

From the just described puzzle, one has to conclude that the social welfare function L cannot be the target function of the private sector. What is missing in the welfare function is, in particular, the resistance to being fooled on the part of private agents. This is only a different formulation of the argument that is present in the later literature on dynamic inconsistency of monetary policy (Blackburn and Christensen 1989; Bofinger 2001). The function (2) cannot be the social welfare function of the private sector not only because it lacks the aversion against being fooled, but as well because there is a contradiction in the individual rational choice of optimal employment (or output). Barro and Gordon (1983b) argue that individuals do not take into account the positive external effects of public goods financed by taxes, which leads to the choice of (natural) employment level that is suboptimal. However, at the same time they are supposed to take into account these positive effects when formulating the welfare function. As Bofinger (2001, p. 186) points out, it is thus assumed that in their labor supply decisions individuals systematically ignore relevant information which they however take into account when formulating their social welfare function. This contradiction leads to the reinterpretation of function (2) as a target function of the policymaker (without any direct links to the private sector) in some later literature, representing the result of political pressures on the policymaker (Lohmann 1992).¹¹

The argument that there is an obvious contradiction in the decision of individuals does not apply if the social preference (of all individuals) of y^* over \bar{y} is based on the labor union power argument (Canzoneri 1985). If the real wages are high, employment is too low because in this case the labor demand curve is binding. The individuals may prefer to work more, so

¹¹ This approach is usually called “political approach” in the opposition to the “welfare approach” presented in the basic model here. The political approach has, however, a disadvantage in the impossibility of welfare comparison across monetary regimes with different levels of inflation and output (see Lohmann 1992, p. 274, ft. 3).

that their bliss point y^* is higher than natural output, but at the same time they may dislike the decline in real wages, caused by the surprise inflation.¹²

One possible way to overcome the just described problem is to add arbitrarily a component to the welfare function of private sector (thus divorcing it from the policymaker's target function) that represents the dislike to being fooled.¹³ For simplicity, assume that being surprised by higher than expected inflation raises the social costs (disutility) to 10 units (because the public very much dislikes to be fooled, i.e. their real wages to be inflated away). Thus, the table will be modified in the following way:

Table 2: Adjusted payoffs of the monetary game

| | | Private sector | |
|-------------|---------------|----------------|-----------------|
| | | $\pi^e = 0$ | $\pi^e = \pi_2$ |
| Policymaker | $\pi = 0$ | 3, 3 | 10, 10 |
| | $\pi = \pi_2$ | 0, 10 | 6, 6 |

In such a payoff structure, the dominant strategy of the policymaker (i.e. to inflate) does not change. However, the strategy of the private sector depends now on the strategy chosen by the policymaker. If the policymaker is expected to choose zero inflation, for the public it is better to expect zero inflation as well. If the policymaker chooses positive inflation, for the public that does not like to be fooled it is better to expect positive inflation, too. Because, in absence of some effective pre-commitment, the dominant strategy of the policymaker is to inflate, the public will expect $\pi^e = \pi_2$ as well, and the resulting discretionary Nash equilibrium with payoffs $\langle 6, 6 \rangle$ in cost units will be inferior, as in the standard prisoners' dilemma.

Now, there are two questions to answer: first, if the discretionary equilibrium is inferior, how the policymaker can pre-commit to follow the low inflation policy, leading to the best outcome for the public, and second, are there some other possibilities to reduce the inflation bias as well?

Before we proceed, it is worth mentioning the discussion that disregards the possibility of dynamic inconsistency of monetary policy. Blinder (1998) argues, for example, that no central banker would aim at reaching higher than natural output with monetary policy, as central bankers know it is foolish. Similarly, Goodhart (2002) argues that given the lags of monetary policy and because interest rate setting is a highly visible process, the implausibility of surprising the public is clear. Even if these arguments are in principle true, one still can use the basic dynamic inconsistency model for an analysis given two basic assumptions: first, the policymaker does not have to be the central banker, and governments or other politically-motivated agents might still aim at boosting the economy above the natural output. Second, even if the monetary policy is a highly visible process, there are still milder forms of how to surprise the public given the high degree of uncertainty in monetary policy (Goodhart 2002, p. 94).

¹² This seems to be confirmed, at least in part, in reality – people would like to have lower unemployment but with the same level of their current real wages.

¹³ Other possible way would be to formulate the dislike as a kind of constraint: public prefers higher than natural output, but it is not allowed for the output to be reached via surprise inflation – in such a case the social costs rise.

5. Rules as Credible Commitment: A Task for Constitutional Economics?

The problem of pre-commitment is not a trivial one. Toma (2001, p. 452) argues that the commitment technology problem is an issue in constitutional economics.¹⁴ In this section I try to apply some of the main theses from constitutional economics on the commitment problem. Before I start it is important to point out that there is a small difference between the commitment issue usually discussed in constitutional economics (sometimes in public choice theory as well, see Mueller 1996), and the commitment problem here. In the former, a little bit simplified, the problem is which rules (and how, of course) should we as members of the society impose on politicians in order to constrain their discretion and create for them incentives so that they, following their own interest, at the same time promote our common interests. In other words, policymakers are totally dependent on what individuals decide, at least in this conceptual sense (constitutional economics calls it “at the constitutional level”). In the latter, the problem is which rules should the policymaker himself choose and impose on himself, following his own interest, in order to gain credibility. The commitment can be understood as a contractual agreement between the policymaker and the private agents as well (Barro and Gordon 1983a) and the policymaker has a status of equal partner. An important difference is that in the former case, the policymaker does not want to be constrained, whereas in the latter case he does, because it is in his own interest.

Even if the policymaker knows that by pre-committing to low (zero) inflation it can lower its (and social) costs, there is still a problem of credibility. If pre-commitment is not credible, i.e. the private sector does not believe that policymaker’s hands are effectively tied, we are back in the situation 2 with inferior discretionary equilibrium. The public will expect positive inflation rate and the policymaker can only fulfill these expectations (by delivering zero inflation the social costs would be higher). Thus, the policymaker must find a way to pre-commit credibly.

The way how to pre-commit credibly to follow low (zero) inflation discussed in this section is to impose rules on the policymaker in order to constrain his discretion. As already noted above, it is in the policymaker’s interest to impose rules on himself. For example, in a deterministic world of our basic model (i.e. without any shocks), the optimal ex ante rule for the policymaker is to follow zero inflation at all times. In this regard, the dynamic inconsistency model provides a new argument for rules in the traditional debate about rules versus discretion in monetary policy (Binder 1987; Bofinger 2001).

Before I discuss rules as commitment, it will be useful for our purposes to distinguish between rules as procedures and rules as constraints. The distinction is a little bit arbitrary but it can help understand the credibility issue. Rule as a procedure is designed to provide a standard solution to recurrent choice problems. By adopting such a rule one saves resources necessary to make many similar single choices. Rules as procedures are usually formulated positively, i.e. “do”. Rule as a constraint does something else: it prevents the agent from pursuing his targeted function directly, imposing further condition that must be fulfilled when making choice. In comparison with procedures, rules as constraints are usually formulated negatively, i.e. “do not”.¹⁵

¹⁴ For questions addressed in and methods used by constitutional economics (or constitutional political economy) see for example Buchanan (1990).

¹⁵ The distinction is similar to the one between personal rules (procedures) and social rules (constraints) that can be found in some constitutional economics literature (see Vanberg 1994, pp. 19-20). It is worth noting that the usual discussion in monetary theory and policy about “monetary rules” (for example, the Taylor rule, see Taylor 1993) refers exclusively to rules as procedures.

5.1 Procedures as Binding Rules

Now, suppose that the policymaker can still directly influence inflation, but that he must do it via some monetary policy instruments (change in money supply, interest rates etc.). Let us start with rules as procedures: can procedures in monetary policy like Friedman's k -percent-rule of money growth (or similar arrangements, for example currency board including a rule that the monetary base must be fully covered by foreign exchange reserves), serve as commitment device? Imagine a time point before the one-shot monetary game begins. The policymaker pre-commits (via public announcement) that she will determine her monetary policy instrument according to some monetary rule leading to low (or zero) inflation. Should the public believe the policymaker?

The announcement of such monetary rules is for the public credible only if they are binding, i.e. there are some positive costs in form of sanction for the policymaker when reneging on the commitment during the game. It is in the policymaker's interest to be exposed to some direct positive costs when breaking the promise because only in this way she can gain credibility. However, the sanction must be imposed externally to the policymaker, i.e. the decision about imposing costs on her (after she has broken the promise) may not lie in his hands. There are principally two possible external sanction mechanisms; let us call them natural and institutional.¹⁶

The natural sanction mechanism is based on notion that there are external costs built-in "in the nature" of the situation. Thus, when breaking a rule, the agent incurs some utility loss because of subsequent impossibility to take advantage of situations that are possible only if he adheres to the rule. This concept is proposed for example by Gauthier (1986). In the monetary policy game, the natural sanction is the possible utility cost of landing in situation 2 (i.e. the disutility given by difference between L_3 and L_2). However, the question is if this natural sanction is sufficient for gaining credibility. One can argue that these costs create only one part of the whole expected costs of breaking the commitment. There are as well some possible gains of reneging on the commitment, exactly given by difference between L_2 and L_1 , if the policymaker succeeds in fooling the private sector. These gains reduce the expected costs of reneging on commitment, thus reducing the credibility.

The institutional sanction mechanism, as proposed for example by Buchanan (1975, p. 68), assumes that an external agency must be charged with the responsibility of enforcing agreed-on rules.¹⁷ Having only two parties in our basic monetary policy game, the only party external to the policymaker is the public. Now, there are two possibilities. Either the public as a whole can decide about sanction, for example via replacement of the policymaker through election., or an institution (agency) can be created, staffed by members from the private sector and charged with the task to enforce the commitment the policymaker announces and to induce, when necessary, a sanction.¹⁸ In reality, such institution is usually judiciary. The question remains if the "agency" solution is itself dynamic consistent, i.e. if the agency is credible. McCallum (1995) argues that when some agency external to the monetary authority should

¹⁶ It is hardly imaginable to design some internal sanction mechanism: can you imagine that after you have broken some self-commitment given to yourself, you voluntarily impose some additional costs on yourself?

¹⁷ In the approach presented by Buchanan (1975), the external agency enforces rules that were agreed in a contract among agents, not rules intended to introduce and follow by one party, the policymaker. However, in my approach, we can think of the monetary policy procedure rules as of rules (1) agreed-on between the policymaker and the public, i.e. introduced by the policymaker in his own interest, but at the same time in the interest of the private sector, or (2) agreed-on among individuals and then imposed on the policymaker through political process.

¹⁸ There are, of course, other possibilities, including some international arrangements that can serve as enforcing agencies.

enforce the rules of monetary policy, there is again a built-in incentive for it not to punish the policymaker when he reneges on the commitment (punishment is costly).

Institutional sanction mechanisms are expensive and if natural sanctions do not suffice, are there any other possibilities with respect to procedure rules that could raise credibility? One way for the policymaker to gain credibility without relying on external sanction mechanisms is to signal in advance the intention to adhere to the announced rules via investing some costs before workers contract their wages. For example, the policymaker could design such rules which are not simple, i.e. which need time and resources before they can even be used (think of complicated monetary models, econometric techniques etc. that must be conducted by trained economists with special software, using all relevant information). Against the usual conviction introduced by Friedman (1960) and Taylor (1993), I argue here that in order to raise credibility of pre-commitment in the monetary policy game, the policymaker should not introduce too simple procedural rules as k -percent-rule of money growth or Taylor Rule because, in absence of effective external enforcing mechanism, the policymaker does not suffer any direct loss when he changes the rule.

Again, as in our simple example from university life, “there is no free lunch”. Both external enforcing mechanism and investment in advance as means of gaining credibility of announced pre-commitment are costly. However, we are still in the simple basic one-shot game model. Let us leave the basic model for a while now and suppose additionally (and more realistically) that there is a time-lag between the use of the instrument and the effect on inflation (that is assumed to be direct and quantitatively predictable), so that in order to reach some level of inflation in the current period, the instrument must be changed before the period begins (i.e. before the workers contract their nominal wages). In such a situation, the policymaker does not have the possibility to fool the public more: when he announces to follow some procedure leading to low inflation and he must change the instruments before the public chooses its strategy, his dominant strategy is to follow low inflation policy. The dynamic inconsistency problem disappears, without the necessity to pay some additional costs to gain credibility.

5.2 Constraints as Binding Rules

The second kind of rules – rules as constraints – directly restricts the discretion of the policymaker. We have already discussed that it is in the policymaker’s interest to constrain her discretion. In addition to monetary rules as procedures there is a possibility to introduce rules explicitly forbidding those kinds of behavior that can lead to high inflation. In our basic model, the rule would be “you cannot choose inflation higher than π^* ”. In the more complicated reality where inflation is reached by monetary policy instruments, imagine for example restricting such kinds of behavior as printing money directly for the state budget or using such monetary rules that would lead to high inflation (for example, restricting k in the k -percent-rule of money growth). Such rules may take form of legislative restrictions both of special legislation for monetary policy (“central bank acts”) or special clauses written in the formal constitution. In this respect, the procedural rules can be regarded as constraint rules as well, under the assumption that they are written into the legislation or constitution.

If the policymaker pre-commits to follow low inflation by restricting by law those strategies leading to high inflation, the question remains if this kind of pre-commitment is credible. In this regard, the credibility will depend on two variables: first, how the rules will be enforced, i.e. what sort of sanction mechanism will be called into force when the policymaker breaks the rule, and second, how high are costs associated with formal change of the rules. To the former variable we can apply our discussion of natural and institutional sanctions of breaking the rules from the last section. If natural sanction is not sufficient, a need for an external agency arises that will impose sanctions on the policymaker.

To the latter variable, i.e. costs of legislative change, we can discuss and compare working properties of different institutional arrangements. In our basic model where the policymaker

possesses the whole power to change the once approved legislation or constitution, the credibility is of course low. However, in reality, there are many alternative arrangements imaginable, for example division of legislative power between two or more elected political bodies, voting rules, procedural obstacles as necessary time-lags etc. (see Mueller 1996; Moser 2000; Padovano et al. 2003).

6. Repeated Monetary Game: Credible Commitment through Reputation

Blackburn and Christensen (1989) point out that in the absence of effective formal commitment technologies there are still more informal incentive schemes that motivate the policymaker not to act opportunistically. Only by enlarging the horizon of the policymaker beyond one shot-game, there is – under certain assumptions - a built-in incentive for the policymaker to follow low inflation policy. In the introduced terminology, the policymaker informally pre-commits at the beginning of the game and her pre-commitment will be under certain assumptions believed because the natural sanction of breaking the promise considerably rises in multi-period game.

Let us consider a simple multi-period model that is based on models presented in Barro and Gordon (1983a) or Bofinger (2001, pp. 187-192). The policymaker minimizes an inter-temporal loss function L which is obtained using (2):

$$L = \sum_{t=1}^{\infty} \frac{1}{(1+r)^{t-1}} \left[\frac{1}{2} (y_t - y^*)^2 + \frac{1}{2} a \pi_t^2 \right], \quad y^* > \bar{y}, \quad a > 0, \quad r > 0 \quad (11)$$

We assume for simplicity that $\pi^* = 0$, r is the discount factor. Thus, the policymaker minimizes the present value of all future period losses. For each period there is again an output-inflation relationship given by Phillips curve (1) formulated with a time dimension:

$$y_t = \bar{y} + b(\pi_t - \pi_t^e), \quad b > 0 \quad (12)$$

In the case of rational expectations, the future values of the variables are independent of those already realized, so that the multi-period game becomes a single-period game and both partners will set their strategies in both periods independently (Barro and Gordon 1983b, p. 595).

However, in the game theory (Blackburn and Christensen 1989) as well as in reality, there are often interdependency between the current strategy and the results of the past. As in our simple example from university life, when taken dynamically, students may base their expectations of the professor's optimal strategy on their past experience. In the context of monetary policy, it is reasonable to assume that individuals take account of past inflation rate when forming their expectations. Such an expectations building means that the public may "punish" the policymaker for surprise inflation in one period by forming higher inflation expectations in the next period.

Let us assume that individuals form inflation expectations according to the following mechanism (so-called "trigger mechanism"):

$$\pi_t^e = \begin{cases} = \pi^P = 0, & \text{if } \pi_{t-1} = \pi_{t-1}^e, \\ = \pi^D = \frac{b}{a}(y^* - \bar{y}), & \text{if } \pi_{t-1} \neq \pi_{t-1}^e. \end{cases} \quad (13)$$

The term π^D refers to the discretionary equilibrium inflation in the situation 2, i.e. to π_2 , whereas π^P refers to the inflation to which the policymakers informally pre-commits at the beginning of the period (here supposed to be zero). Assuming that in the first period the expected inflation is zero, this mechanism is similar (but not equivalent!) to the "tit-for-tat

rule” (Axelrod 1984). This expectation mechanism is both plausible and advantageous because it causes the “punishment” effective only for one period.¹⁹ The policymaker has an infinite horizon, which is again both plausible and advantageous because it allows us to avoid the “chain store paradox” (Blackburn and Christensen 1989, p. 18), i.e. a situation where the policymaker, setting the non-cooperative strategy of positive inflation in the last period because of absence of punishment in non-existing next period, causes a chain of non-cooperation by backward induction of both players till the current period.

With expectations formed this way, the policymaker creates his reputation. If he keeps his promise and sets zero inflation, he has gained reputation and his announcement that he will follow zero inflation policy in the next period will be believed, i.e. he gains credibility and will be rewarded by low expected inflation.

Now, consider the choice of the policymaker’s strategy for the first period. Assuming $\pi_t^e = 0$, if the policymaker chooses positive inflation π^D instead of promised zero inflation, she surprises the public and achieves the costs of L_1 instead of L_3 (Bofinger 2001 calls this utility benefit “incentive effect of surprise inflation”, Barro and Gordon 1983a call it “temptation”). However, costs of this violation is that the public will expect positive inflation in period $t+1$ and the policymaker will have to validate it, thus discretionary equilibrium of situation 2 with costs L_2 instead of L_3 will emerge (Bofinger 2001 calls it “deterrent effect”, Barro and Gordon 1983a call it “enforcement”). Using the equations (7), (9), (10) and (11), we can obtain the absolute size both of incentive effect (14)

$$L_3 - L_1 = \frac{1}{2}(y^* - \bar{y})^2 - \frac{1}{2} \frac{a}{a+b^2} (y^* - \bar{y})^2 = \frac{1}{2} \frac{b^2}{a+b^2} (y^* - \bar{y})^2, \quad (14)$$

and deterrent effect (15)

$$\frac{L_2 - L_3}{1+r} = \frac{1}{1+r} \left[\frac{1}{2} \frac{a+b^2}{a} (y^* - \bar{y})^2 - \frac{1}{2} (y^* - \bar{y})^2 \right] = \frac{1}{2} \frac{b^2}{a(1+r)} (y^* - \bar{y})^2. \quad (15)$$

Because of its emergence in the period $t+1$, the difference between L_2 and L_3 must be discounted. The policymaker will pursue the policy of surprise inflation only if the incentive effect, i.e. current decline in costs, exceeds the deterrent effect, i.e. future rise in costs. The condition is given by (16):

$$r > \frac{b^2}{a}. \quad (16)$$

Thus, if the discount rate of the policymaker is “too high”, the probability that she will opt for surprise inflation in the first period rises. Under the assumption that the discount rate is not “too high”, it is reasonable to assume that the “cooperative solution” of situation 3 will emerge in all rounds of the game without any formal pre-commitment technologies and costly punishment arrangements. The natural punishment given by utility losses in case of renegeing on the informal commitment to follow zero inflation suffices for the cooperative strategy to be stable.

The reputation model presented here can be interpreted both as positive theory and normative theory (Cukierman 1986, p. 15). From a positive point of view, the model – assuming the trigger mechanism as a plausible description of expectations building – tries to explain the

¹⁹ Note that if in the first period the policymaker surprises the public with positive inflation, the public will expect for the next period π^D which the policymaker will validate. But, according to (13), both expected and realized inflation coincide and public will again expect zero inflation. Of course, this is somewhat unrealistic but it allows us to examine the multi-period game as a two-period game.

existence of high inflation rates. However, there is a problem: the model satisfies the conditions of rationality and equilibrium only if the discount rate of the policymaker is not too high, given the parameters a and b . If the opposite is true, he will be in temptation to surprise the public, but if private individuals are fully informed, expecting zero inflation for the first period is not rational because of high probability of being fooled. As a result, individuals will not stick with the expectations mechanism given by (13), because then they would be systematically fooled. But then, there is no equilibrium.

Another problem regarding positive explanation is the plausibility and effects of different trigger mechanisms on inflation. Bofinger (2001, p. 191) points out that, depending on the concrete trigger mechanism and other parameter, it is possible that in some periods the policymaker may even follow a costly disinflation strategy in order to gain reputation and restore credibility.

From a normative point of view, the model (or its variations) can be interpreted as a device for derivation of optimal trigger mechanism that raises welfare. Then, the trigger mechanism in (13) is no more just a plausible assumption about how individual build expectations, but an object of deliberate design. Barro and Gordon (1983a) take another approach: using a little bit different form of target function, they show that the low inflation policy (i.e. following a rule of zero inflation) is not optimal strategy for the policymaker because incentive effect is higher than deterrent effect for any $r > 0$. Thus, from the normative point of view, they derive an “optimal best-enforceable rule” π^P , i.e. such a rate of inflation, that, given the trigger mechanism in (13), if the policymaker pre-commits to, leads to equilibrium with this rate of inflation in all period. Not surprisingly, again, the higher the discount factor, the higher as well the optimal rule that turns out to be a weighted average between zero and inflation rate in discretionary equilibrium.

Blackburn and Christensen (1989, p. 18) and Waller (1995) argue that there are many possible punishment strategies (trigger mechanisms of expectations building), causing from a normative point of view a problem with multiple equilibria and a need of coordination of individuals among them. In other words, if they are more trigger mechanisms that all lead to the highest level of social welfare, how it is to happen that individuals will coordinate their actions in order to send a clear signal of punishment strategy to the policymaker and, if necessary, how would they behave in the event that they are surprised.

Let us now shortly discuss the properties of two plausible trigger mechanisms, the “real” tit-for-tat strategy of expectations building, and the trigger mechanism that punishes the policymaker for surprise inflation by forming high inflation expectations for all subsequent periods. Let us start with the latter: the trigger mechanism of expectations building (strict trigger mechanism) is then given by (17):

$$\pi_t^e = \begin{cases} = \pi^P = 0, & \text{if } \pi_{t-1} = \pi_{t-2} = \dots = \pi_1 = \pi^P = 0, \\ = \pi^D = \frac{b}{a}(y^* - \bar{y}) & \text{otherwise.} \end{cases} \quad (17)$$

Only if the policymaker starts with pre-committed inflation π^P (here assumed to be zero), regardless of what individuals expect, she will be rewarded by zero inflation expectations for the next period where she faces the same condition. But if she once realizes positive inflation π^D , she will be punished by high inflation expectations for the rest of the game.

Assuming $\pi_t^e = 0$, consider the choice of the policymaker in the period t (could be also the first period). The incentive effect of surprise inflation is loss reduction in the current period given by (18), which is the same as (14):

$$L_3 - L_1 = \frac{1}{2}(y^* - \bar{y})^2 - \frac{1}{2} \frac{a}{a+b^2} (y^* - \bar{y})^2 = \frac{1}{2} \frac{b^2}{a+b^2} (y^* - \bar{y})^2. \quad (18)$$

The deterrent effect is now given by equation (19) via discounting the higher losses in all subsequent periods, i.e.

$$\sum_{i=t+1}^{\infty} \frac{L_2 - L_3}{(1+r)^{i-1}} = \left[\frac{1}{2} \frac{a+b^2}{a} (y^* - \bar{y})^2 - \frac{1}{2} (y^* - \bar{y})^2 \right] \sum_{i=t+1}^{\infty} \frac{1}{(1+r)^{i-1}} = \frac{1}{2} \frac{b^2}{ar} (y^* - \bar{y})^2. \quad (19)$$

The deterrent effect is with the stricter punishment mechanism greater than with the trigger mechanism (13), therefore, with incentive effect being the same, the policymaker will opt for positive inflation only if

$$r > 1 + \frac{b^2}{a}. \quad (20)$$

The discount factor leading to positive inflation is now much higher than in the preceding case, thus, from the normative point of view, if the policymaker is supposed to have high discount factor, i.e. he places much less weight on future periods (for example, because he is not sure if he will be reelected or his term is limited to a very short period), the public should adopt the strict trigger mechanism. In reality, the “strictness” may vary from one-period-punishment up to the trigger mechanism presented here, the critical value of discount factor being between (16) and (20).

More interesting case is, however, the tit-for-tat trigger mechanism, given by (21).

$$\pi_t^e = \begin{cases} = \pi^P = 0, & \text{if } \pi_{t-1} = \pi^P = 0, \\ = \pi^D = \frac{b}{a}(y^* - \bar{y}), & \text{if } \pi_{t-1} \neq \pi^P = 0. \end{cases} \quad (21)$$

Here, the public will expect the rate of inflation that was realized by the policymaker in the preceding period. This is a fair strategy – if the policymaker does not renege on commitment to follow zero inflation, she can be sure to have zero inflation expectations as well in the next period. If she reneges, she will be punished by positive π_{t+1}^e . However, unlike the trigger mechanism introduced by Barro and Gordon (1983a), the credibility will not be restored in $t+2$ automatically. If the policymaker wants to regain credibility, she has to invest in her reputation by following a costly disinflation strategy, i.e. by delivering zero inflation when inflation expectations are positive.

The choice problem now is a little bit difficult because, theoretically, there are infinitely many strategies as time paths of cheating and credibility restoring, some of them with the same level of utility. Consider therefore only one simple question relevant for the policymaker that has lost his credibility and wants to regain it and hold for the rest of the game: shall he invest into the reputation and follow a disinflation strategy in time t ? With π_t^e positive, the costs of this strategy are

$$L_4 - L_2 = \frac{1}{2} \frac{(a+b^2)^2}{a^2} (y^* - \bar{y})^2 - \frac{1}{2} \frac{a+b^2}{a} (y^* - \bar{y})^2 = \frac{1}{2} \frac{(a+b^2)b^2}{a^2} (y^* - \bar{y})^2. \quad (22)$$

The benefits are lower costs in the rest of the game discounted with his discount factor r , the size being the same as of the deterrent effect in (19):

$$\sum_{i=t+1}^{\infty} \frac{L_2 - L_3}{(1+r)^{i-1}} = \left[\frac{1}{2} \frac{a+b^2}{a} (y^* - \bar{y})^2 - \frac{1}{2} (y^* - \bar{y})^2 \right] \sum_{i=t+1}^{\infty} \frac{1}{(1+r)^{i-1}} = \frac{1}{2} \frac{b^2}{ar} (y^* - \bar{y})^2. \quad (23)$$

The policymaker should invest the costs of restoring credibility and regain reputation only if benefits exceed costs. This yields the following condition (24):

$$r < \frac{a}{a + b^2}. \quad (24)$$

The condition (24) is much stricter than the condition (20) – it is even its inverse value – which can be interpreted that a fair expectations building mechanism induces the policymaker to follow a disinflation strategy and to restore credibility only if – again – she has a very low discount factor.²⁰

All reputation-building models presented here have shown that the key factor in determining whether the policymaker (the central bank) will follow low-inflation strategy is the discount factor. As this factor says how much are future period worth for the policymaker, it reflects the terms of contract of the policymaker, mainly the length, the condition under which he can stay in the office after his term has expired etc. The outcome of the models – i.e. that we should design such an institutional arrangement for monetary policy in which the discount factor will be low – can be interpreted as asking for long (or at least overlapping) period of contracts of the policymakers involved in monetary policy decision-making so that they have always in mind the long-term benefits of low inflation.

7. Output Shocks and State-Contingent Rules: credibility versus flexibility

Up to now, we have assumed that there are no output shocks. If we introduce them, there is a new role for monetary policy – to stabilize output via accommodating inflation. If a negative shock occurs and output declines, the public and the policymaker can be made better off if they allow for higher than expected inflation which partly compensates the decline in output. Rewriting (1) to include output shock z (assumed to be normally distributed with zero mean and positive and finite variance), we gain

$$y = \bar{y} + b(\pi - \pi^e) + z, \quad b > 0. \quad (25)$$

Because the model is actually defined only for the supply side, shock z represents a supply shock (Bofinger 2001, p. 194). If we again assume rational expectations and no pre-commitment, we can derive a discretionary equilibrium inflation rate π^D , which is equivalent to π_2 in deterministic model:²¹

$$\pi^D = \frac{b}{a}(y^* - \bar{y}) - \frac{b}{a + b^2}z \quad (26)$$

The equation (27) gives the output y^D when the policymaker behaves according to (26):

$$y^D = \bar{y} + \frac{a}{a + b^2}z \quad (27)$$

Here, we assume that individuals expect only the first part of (26) – inflation bias – which is the same as π_2 in the equations (8), because expected value of shock z , which is realized after the private sector sets its expectations, is zero. Thus, in times without shocks, the resulting inflation is equal the discretionary inflation bias π_2 , whereas in times with shocks the policymaker will deviate from this rate.

²⁰ The condition (24) is stricter than condition (16) only under certain additional assumptions about the relationship between a and b .

²¹ Because of stochastic nature of the equation (25), the equilibrium inflation rate is computed via derivation of expected welfare loss function, see Bofinger (2001, pp. 195-197) or Lohmann (1992).

The same discussion about pre-commitments and discretion applies here as well, however with slightly different conclusions: if the policymaker pre-commits to the zero inflation (for example, via some rule), there is an expected welfare gain in times without shocks because of absence of the inflation bias; however, at the same time, there is an expected welfare loss in times of shocks because the policymaker will not be able to accommodate them through change in inflation. As a result, there is a trade-off between rules and discretion, which some authors call credibility versus flexibility dilemma (Lohmann 1992). It can be shown that if shocks are small and relatively rare (variance of z is small), having a pre-commitment to zero inflation is preferable to having discretion (Waller 1995, p. 7; Bofinger 2001, p. 197).

Rogoff (1985) suggested that the trade-off is unnecessary if we introduce flexible rules, such as the one in (28), i.e. pre-commitments of the policymaker to follow zero inflation in times without shocks and accommodate shocks when they occur (so-called “state-contingent rules”). Thus, such a pre-commitment to the inflation according to (28) would raise welfare (but only under the assumption that being surprised in case of a shock does not induce some extra disutility as in the table 2):

$$\pi^P = -\frac{b}{a+b^2}z \quad (28)$$

Lohmann (1992) argues that such a flexible rule is, of course, ex ante optimal. The question remains if such commitment can be formally legislated and, as a consequence, whether it will be credible. If there are costs of specifying the inflation rate to be set in the event of every possible contingency, the simple zero inflation rule may be preferable.

In reality, however, we observe monetary authorities following a rule similar to (28). In fact, (28) can be reinterpreted as a variant of Taylor rule (Taylor 1993), with negative output shocks leading to lower interest rates in order to encourage inflation. Inflation targeting central banks use “escape clauses” that allow them not to hit the targeted inflation (π^*) when shocks sudden and unpredictable. Thus, it seems reasonable to suppose that there is a way how to impose a credible state-contingent rule on the policymaker.

8. Rogoff’s Conservative Central Banker

If society dislikes being fooled, prefers low inflation and higher than natural output, there seems to be no solution in the basic dynamic inconsistency model. Formal pre-commitments or reputation building may help, but they do not raise output. However, if we leave the basic model, there is one obvious solution: if policymakers are in the temptation to increase the output predominantly via inflation (because they want to gain “free lunch”) and if it lies in the natural propensity of democratically elected policymakers to do it, the public may prefer to charge the responsibility for monetary policy to a new political body (let us call it central bank) independent from the current policymaker, leaving the only possibility for the policymaker to raise output by other, more costly policies as structural or appropriate fiscal policy (this would mean, however, raising the natural output than current output).

One of the relevant questions is how this new political body – a central bank – should be institutionally designed. The first attribute is clear – it should be independent from the policymaker, because if it were dependent, serving as “another hand of the policymaker”, the problem would not be solved. The second attribute – its target function, objectives or preferences – remains for discussion. The public does not want to create “a second policymaker” with the same incentive structure, i.e. with temptation to engage in surprise inflation to raise output. Thus, some arrangement is necessary that makes the preference function of the central bank different from the policymaker’s one.

Rogoff (1985) suggested that society should delegate the monetary policy to an independent central bank and select an agent to head it who is known to place a greater weight on inflation

stabilization than the society as a whole does. In our basic deterministic model it means that such an agent would have a target loss function L'

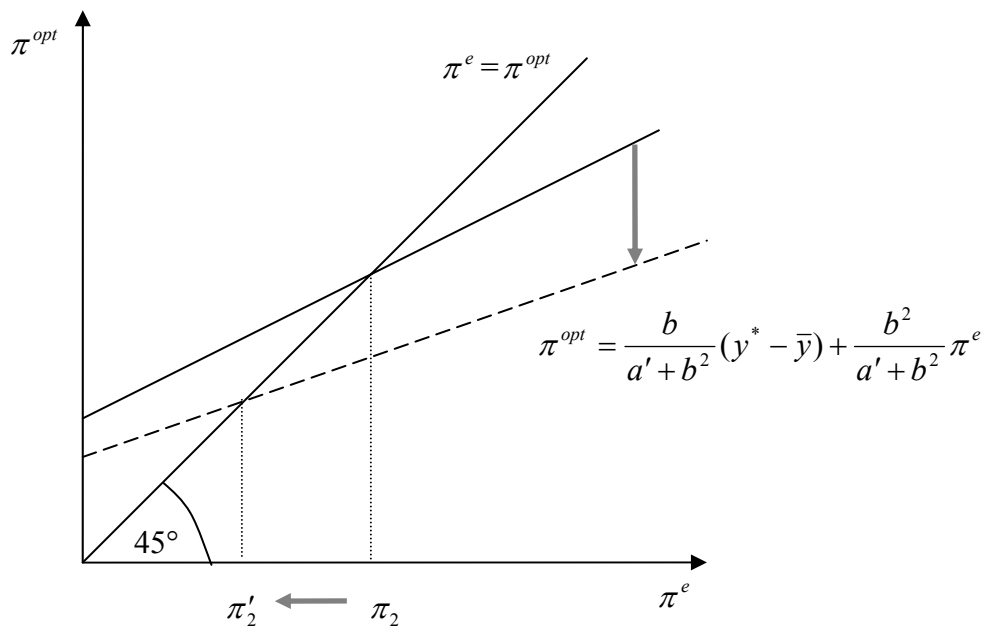
$$L' = \frac{1}{2}(y - y^*)^2 + \frac{1}{2}a'(\pi - \pi^*)^2, \quad y^* > \bar{y}, \quad a' > a. \quad (29)$$

In this case, the reaction function of the political body responsible for monetary policy (now central bank) differs from the one of the policymaker. Because $a' > a$, the reaction function given by (30)

$$\pi^{opt} = \frac{b}{a' + b^2}(y^* - \bar{y}) + \frac{b^2}{a' + b^2}\pi^e \quad (30)$$

is flatter. Dynamic inconsistency remains, but because the agent heading the central bank is more averse to inflation, the equilibrium π'_2 given by intersection of both reaction curves is lower than before (see figure 2). The higher the aversion of central bank given by a' is, the lower the current equilibrium inflation and the closer π'_2 to π^* (assumed to be zero) is, therefore the social welfare rises.

Figure 2: Conservative central banker



Delegation does not eliminate the dynamic inconsistency problem, but it decreased the inflation bias; hence, there is again the possibility to raise social welfare via pre-commitment technologies or informal incentive schemes given by repeating the monetary policy game.

An interesting question is how conservative central banker reacts on supply shocks. Rogoff (1985) and Lohmann (1992) show that the conservative central banker, with lower discretionary equilibrium inflation, does not stabilize the economy in a socially optimal fashion. The higher a , the lower average inflation given by (26), but the more variable is the output given by (27). If pre-commitment to the optimal state-contingent rule is not possible, there is a trade-off: having conservative central banker has benefits through reduced inflation, but at the cost of distorted reaction on shocks. With large negative supply shocks the public would prefer higher inflation to that one realized by the conservative central banker. Rogoff (1985) shows that, given this trade-off, there is an “optimal” degree of the central bank’s conservativeness.

Lohmann (1992) suggested a way how to escape the trade-off between flexibility and credibility. If we allow the policymaker to override the central banker's monetary policy decision if the shocks are "too large", the conservative central banker will accommodate large shocks in order to avoid being overridden. Override means costs for the central bank, for example in terms of loss of reputation, non-pecuniary benefits of power. The problem of this approach lies in the credibility of the policymaker to override the central bank only if shocks are too high. What prevents the policymaker to override the central bank's decision in any situation, for example to raise re-election chances via boosting output through relaxed monetary policy?

Treating this model in the institutional design perspective, Moser (2000) suggests that we should put the overriding mechanism under checks and balances scheme. One of the ways how to make the overriding scheme credible is to divide the power to override between two political bodies with different preferences with regard to monetary policy, both with power to veto. This may help to explain why some countries are successful in coping with time-inconsistency problem by creating an independent central bank, and why others are not.²²

9. Performance Contracts for Central Bankers

Persson and Tabellini (1994), Walsh (1995) and Waller (1995) proposed another approach to the solution of dynamic inconsistency problem. The idea is to offer the central banker a performance contract, whereby the central banker's salary is tied directly to the performance of important macroeconomic variables such as GDP and inflation rate (Waller 1995, p. 8).

Thus, the monetary policy game should rather be viewed as a principal-agent problem. The agent (monetary authority) has, however, a set of preferences that do not yield the outcome preferred by the society (principal). Walsh (1995) suggested that rather than worrying about reputation building or seeking for conservative central banker, the society should provide the monetary authority with appropriate incentives (through performance contract), so that the monetary authority, when following its own interests, maximizes at the same time the welfare of the society. The performance contract works as good as the optimal state-contingent rule.

Rewriting (2) as utility function U (rather than loss function) of the central banker and including the basic salary w and a parameter λ that reduces the basic salary when $\pi > 0$ we obtain (31):

$$U = w - \lambda\pi - \frac{1}{2}(y - y^*)^2 - \frac{1}{2}a(\pi - \pi^*)^2, \quad y^* > \bar{y}, \quad a > 0, \quad w > 0, \quad \lambda > 0 \quad (31)$$

Using the Phillips curve with output shocks given by (25), we can compute the discretionary equilibrium inflation by maximizing U and assuming that the public rationally expects that inflation rate which results from maximizing (31) by the central banker.

$$\pi^{opt} = \frac{b}{a}(y^* - \bar{y}) - \frac{b}{a+b^2}z - \frac{\lambda}{a+b^2} \quad (32)$$

By setting

$$\lambda = \frac{b(a+b^2)}{a}(y^* - \bar{y}), \quad (33)$$

²² There are, of course, some other explanations. Posen (1993) argues that there is a third factor affecting both inflation performance and central bank independence, namely political pressures. When financial sector is politically strong enough, it can move the monetary policy towards low inflation through the channel of central bank independence. However, where this "opposition" to the government does not effectively work, creating an independent central bank does not help to combat inflation.

the society gets the same result as by pre-committing the monetary authority to follow a state-contingent rule given by (28). Having λ in this appropriate size, the reduction in salary from creating an inflation surprise just offsets any benefits that would accrue from expanding output through the inflation surprise. At the same time, the ability of the central banker to stabilize economy is not distorted.

Following drawbacks of the optimal contract approach can be identified: first, if monetary authority is assumed to follow some utility function (or to follow some interests in general), the question is why the utility function should look like (31). Two answers are possible. If there is no central bank, only a policymaker (or the central bank is not independent), the wage term in (31) refers to the policymaker's pecuniary interests and the rest to her political interest (i.e. to reach small inflation and higher than natural output in order to be reelected). However, if we treat the monetary authority as independent from the government – which is mostly the case in reality – then if the wage term is introduced in order to motivate the central banker to act in the interest of the society, the question is whether the utility function should not be only a monetary reward function with incentives not to produce inflation and to stabilize output in times of shocks. The problem that will not be examined here is that central bankers may have non-pecuniary political interests as well (reappointment, prestige benefits), leading to a utility function similar to (31).

Second, in the model, the contract is agreed between principal (central bank) and agents (public), but in reality such a contract is only imaginable between some political body and central bank. The question that remains is which political body should bear the responsibility for signing the contract: if government should be the principal, we have principal-agent problem of second order, because the government is from the same point of view an agent of the public. Do we have a contract with our governments that functions well?

McCallum (1995) argues that if the principal is the government, performance contract approach does not solve the dynamic inconsistency, it merely relocates it. If the contract is to be enforced, then the government must impose a sanction on the central bank in times of high inflation – but it has an incentive not to do it (because imposing a sanction when the inflation is already high does not reduce it, i.e. does not raise the social welfare – the sanction has only a deterrent role). Here, again, credibility – now of our “second” principal, i.e. the political body - becomes important, which in turn depends on the political constitution and division of powers.

10. Conclusions

In this paper an overview of the main contributions into the dynamic inconsistency research program was provided. Models based on dynamic inconsistency provide some useful guidelines that, enriched by constitutional economics perspective in credibility building questions, may help to improve our knowledge about appropriate design of monetary institutions.

The main message of this paper is that the best way how to approach the question of an appropriate design of institutions for monetary stability is to combine several proposals that have been made so far. Rules can work only in the world of negligible external shocks and additionally require effective sanctions to be in place if the rules are broken. Clearly, the delegation solution to the inflation bias, i.e. the establishment of an independent and conservative central bank, can work optimally only if there are arrangements in place that ensure the optimal reaction to external shocks. However, these arrangements, for example overriding schemes or optimal performance contracts, create new problems and challenges, mainly the one of credibility of that political body that bears the burden of enforcing contracts and deciding to override central bank's decisions. Similarly, reputation building can work only if the conditions are safeguarded for such a long-term strategy, which in turn requires an

institutional environment that enhances the long-term perspective of policymakers in charge of monetary policy.

Necessarily, the paper provided only limited number of issues related to institutional questions of monetary policy. Nevertheless, as the contributions discussed in this paper belong to the most discussed topics in academic or practitioners' forums, I believe that a comprehensive overview looking at potential synergies of individual approaches may be beneficial.

11. References

- Axelrod, Robert (1984): *The Evolution of Cooperation*. Basic Books, New York.
- Barro, Robert J. – Gordon, David B. (1983a): Rules, Discretion and Reputation in a Model of Monetary Policy. *Journal of Monetary Economics* 12 (1), pp. 101-121.
- Barro, Robert J. – Gordon, David B. (1983b): A Positive Theory of Monetary Policy in a Natural Rate Model. *Journal of Political Economy* 91 (4), pp. 589-610.
- Barro, Robert J. (1986): Reputation in a Model of Monetary Policy with Incomplete Information. *Journal of Monetary Economics* 17 (1), pp. 3-20.
- Bernanke, Ben. S. – Laubach, Thomas – Mishkin, Frederic S. – Posen, Adam S. (1999): *Inflation Targeting: Lessons from the International Experience*. Princeton University Press, Princeton, New Jersey.
- Blackburn, Keith – Christensen, Michael (1989): Monetary Policy and Policy Credibility: Theories and Evidence. *Journal of Economic Literature* 27 (1), pp. 1-45.
- Blinder, Alan (1987): The Rules-versus-Discretion Debate in the Light of Recent Experience. *Weltwirtschaftliches Archiv* 123 (3), pp. 399-414.
- Blinder, Alan (1998): *Central Banking in Theory and Practice*. MIT Press, Massachusetts.
- Bofinger, Peter (2001): *Monetary Policy: Goals, Institutions, Strategies, and Instruments*. Oxford University Press, Oxford.
- Buchanan, James M. (1975): *The Limits of Liberty*. The University of Chicago Press, Chicago and London.
- Buchanan, James M. (1990): The Domain of Constitutional Economics. *Constitutional Political Economy* 1 (1), pp. 1-18.
- Canzoneri, Matthew B. (1985): Monetary Policy Games and the Role of Private Information. *American Economic Review* 75 (5), pp. 1056-1070.
- Cukierman, Alex (1986): Central Bank Behavior and Credibility: Some Recent Theoretical Developments. *Federal Reserve Bank of St. Louis Review* 68 (5), pp. 5-17.
- Cukierman, Alex (1992): *Central Bank Strategy, Credibility and Independence. Theory and Evidence*. The MIT Press, Cambridge, Massachusetts.
- Fischer, Stanley (1977): Long Term Contracts, Rational Expectations and Optimal Money Supply Rule. *Journal of Political Economy* 85 (1), pp. 191-206.
- Freidman, Milton (1960): *A Program for Monetary Stability*. Fordham University Press, New York
- Friedman, Milton (1968): The Role of Monetary Policy. *American Economic Review* 58 (1), pp. 1-17.
- Gauthier, David (1986): *Morals by Agreement*. Oxford University Press, Oxford.

- Goodhart, Charles A.E. (2002): The Constitutional Position of the Central Bank. In: Frideman, Milton - Goodhart, Charles A.E. (2003): Money, Inflation, and the Constitutional Position of the Central Bank. Institute of Economic Affairs, London, pp. 91-109.
- Čihák, Martin - Holub, Tomáš (1999): Co říká ekonomická teorie o nezávislosti centrální banky. *Finance a úvěr* 49 (9), pp. 543-564.
- Kydland, Finn E, - Prescott, Edward C. (1977): Rules Rather than Discretion: The Inconsistency of Optimal Plans. *Journal of Political Economy* 85 (3), pp. 473-492.
- Lohmann, Susanne (1992): Optimal Commitment in Monetary Policy: Credibility versus Flexibility. *American Economic Review* 82 (1), pp. 273-286.
- Lucas, Robert E., Jr. (1972): Expectations and the Neutrality of Money. *Journal of Economic Theory* 4 (2), pp. 103-124.
- Lucas, Robert E., Jr. (1973): Some International Evidence on Output-Inflation Tradeoffs. *American Economic Review* 63 (3), pp. 326-334.
- McCallum, Bennett T. (1995): Two Fallacies Concerning Central Bank Independence. NBER Working Paper No. 5075
- Moser, Peter (2000): The Political Economy of Democratic Institutions. The Locke Institute, Edward Elgar, Cheltenham UK.
- Mueller, Dennis C. (1996): Constitutional Democracy. Oxford University Press, New York and Oxford.
- Padovano, Fabio – Sgarra, Grazia – Fiorino, Nadia (2003): Judicial Branch, Checks and Balances and Political Accountability. *Constitutional Political Economy* 14 (1), pp. 47-70.
- Persson, Torsten – Tabellini, Guido (1994): Designing Institutions for Monetary Stability. In: Persson, Torsten – Tabellini, Guido (eds): Monetary and Fiscal Policy. Volume 1: Credibility. MIT Press, Cambridge, Massachusetts, pp. 279-310.
- Phelps, Edmund S. (1973): Inflation in the Theory of Public Finance. *Swedish Journal of Economics* 75 (1), pp. 67-82.
- Posen, Adam S. (1993): Why Central Bank Independence Does Not Cause Low Inflation: There Is No Institutional Fix For Politics. In: O'Brien, Richard (ed.): Finance and the International Economy: vol. 7. Oxford University Press, Oxford, pp. 40-65.
- Rogoff, Kenneth (1985): The Optimal Degree of Commitment to an Intermediate Monetary Target. *The Quarterly Journal of Economics* 100 (4), pp. 1169-1189.
- Romer, David (2001): Advanced Macroeconomics. Second Edition. McGraw-Hill, New York.
- Taylor, John B. (1980): Aggregate Dynamics and Staggered Contracts. *Journal of Political Economy* 88 (1), pp. 1-23.
- Taylor, John B. (1993): Discretion versus Policy Rules in Practice. Carnegie-Rochester Conference Series on Public Policy 39, pp. 195-214.
- Toma, Mark (2001): Monetary policy. In: Shughart II, William F. – Razzolini, Laura (eds): The Elgar Companion to Public Choice. Edward Elgar, Cheltenham UK.
- Vanberg, Viktor J. (1994): Rules and Choice in Economics. Routledge, London and New York.
- Waller, Christopher J. (1995): Performance Contracts for Central Bankers. *Federal Reserve Bank of St. Louis Review* 77 (5), pp. 3-14.

Walsh, Carl E. (1995): Optimal Contracts for Central Bankers. *American Economic Review* 85 (1), pp. 150-167.

IV POLITICAL PRESSURE ON CENTRAL BANKS: THE CASE OF THE CZECH NATIONAL BANK*

1. Introduction

From the institutional perspective, one of the main building blocks of the European System of Central Banks is the independence of the national central banks. Both theoretical discussion and empirical evidence showed that monetary constitution where the central bank's decision body is isolated from government when deciding about monetary policy is an effective arrangement for maintaining macroeconomic stability, one of the necessary conditions for a sustainable economic development. As a result, central banks, and not only in the European Union, are nowadays granted a large degree of independence from the political system, at least from the short-term preferences of the incumbent government.¹

Nevertheless, although formally independent from politics, central banks will always remain in center of politicians' attention. The reason is that central banks, when aiming at maintenance of price stability, influence via monetary policy instruments the entire macroeconomic development, including the GDP and wage growth, which in turn may have an impact on success of different political groups in the political competition. Thus, if there is a possibility for politicians to influence current monetary policy in favor of their interests, i.e. maximization of political support and re-election chances, they will definitely use it.

Moreover, no central bank can be fully independent from the political system, as central bank – as a public institution serving for maintaining price stability, a collective good – is a part of the political system in a wider sense. Members of the central bank's decision body are usually selected via political mechanisms, appointed by one or more political, i.e. collective bodies such as parliament, government or the president. The central bank legislation, which determines the legal environment in which central bank operates, is a part of the legal system that is formed and amended by the legislative, i.e. also by political bodies.

It is clear that the two political factors – i.e. short-term re-election interests of government on one hand, and long-term interests of all members of the society regarding rules of the game of monetary policy rather than the actual conduct of it on the other hand - should be ideally separated. Nevertheless, in practice this is difficult to accomplish. As a result, there are often ways and channels through which politicians are able to influence monetary policy of formally independent central banks.

This paper follows the public choice approach to monetary policy and applies a methodology originally developed by Havrilesky (1993) for measuring political pressure on central banks and testing whether such pressure influences monetary policy. The methodology is applied to the Czech National Bank, next to the original Federal Reserve and the Deutsche Bundesbank (Maier 2002) the third central bank to which this methodology has been applied. We aim at answering the question whether there has been political pressure exercised on the Czech National Bank, and whether the bank has fallen prey to it, accommodating the revealed preferences of those executing the pressure. Using the same methodology as Havrilesky (1993) and Maier (2002) also allows some basic comparisons of all three central banks in terms of the amount of political pressure they face and their responsiveness to it.

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¹ For the issues related to independence of central banks and the effect on macroeconomic stability see Cukierman (1992), Moser (2000) or Berger et al. (2001).

The paper is organized as follows: section 2 shortly surveys the literature on the linkages between politics and monetary policy. Section 3 introduces and discusses the Havrilesky's methodology for measuring the political pressure, while section 4 presents the results from its application to the Czech National Bank over the period 1997-2005, including some comparisons with the U.S. Federal Reserve and the Deutsche Bundesbank. Section 5 attempts to explain the pattern of pressure on the Czech National Bank. Section 6 presents the results of several econometric tests of whether political pressure exercised on the Czech central bank influenced the conduct of monetary policy. Section 7 concludes.

2. Survey of the literature

Analyses of linkages between politics and macroeconomic policy in general have quite a long tradition within economics, especially in the public choice literature.² A natural point of departure is the so-called political business cycle (PBC) hypothesis, first empirically illustrated by Kramer (1971) and Tufte (1978) and theoretically underpinned by Nordhaus (1975). The PBC can be summarized as follows: if economic conditions before elections influence voters' choices, politicians will be aware of it and attempt to make advantage of it. As a result, economic cycles will be correlated with political cycles, with boosts before elections. Empirical evidence, as surveyed for example by Alesina and Rosenthal (1995), showed that voters in fact take into account the macroeconomic situation when voting. There is also strong empirical evidence of manipulation of economic conditions by incumbent politicians, although only indirect (i.e. that economic activity exhibit a political cycle, without discussing the channels through which politicians actually influence economic activity to their political advantage). As shown by Nordhaus (1975), if voters are not rational, incumbent government may use expansionary monetary policy as a tool and fully exhaust the trade-off embodied in the short-term Philips curve in order to boost employment at the cost of later higher inflation. Nevertheless, this model assumes that government has the monetary policy fully in control. Furthermore, empirical evidence clearly rejects the simple Nordhaus' model as regards the inflation and employment pattern, but is unclear as regards the manipulation of policy instruments.³

The simple PBC hypothesis described above is usually labeled as "opportunistic" PBC, as it disregards the importance of the party that forms government. A parallel line of research called "partisan" PBC (Hibbs 1977) assumes that different parties have different preferences over the employment versus inflation (for example because different parties may have different electorates with different sensitivities to inflation and employment), so that the pattern of economic cycle depends on which party forms the government. Empirical evidence fairly supports the partisan PBC, with usually higher economic activity during left-wing governments than during right-wing governments (at least in the U.S., see Drazen 2000).⁴

Political business cycle literature predicts that governments will try to use available macroeconomic policy instruments and influence economic activity in order to gain political support, especially before elections. In this respect, control over monetary policy may play a crucial role, and some authors show that governments may indeed have strong influence on actual conduct of monetary policy despite the formal independence of central banks. Havrilesky (1993) shows that decision on the U.S. monetary policy are strongly influenced by the executive branch, while Grier (1991) argues that there is a strong congressional influence on U.S. monetary policy illustrated by the fact that the leadership of the Senate Banking

² For a survey of literature see Toma (2001), Mueller (2003), chapter 19, or Drazen (2000), chapter 7.

³ As Drazen (2000, p. 239) puts it, "the evidence for opportunistic manipulation of macroeconomic policy is stronger than for macroeconomic outcomes".

⁴ For further surveys of PBC see Mueller (2003), p. 471.

Committee is significantly correlated with monetary base growth. On the other hand, Wooley (1984) finds no systematic control of Congress over U.S. monetary policy, though occasionally Federal Reserve might have accommodated partisan preferences over inflation and unemployment by avoiding dramatic political actions during election periods. Studies collected in Mayer (1990) emphasize the influence of wide range of interest groups on U.S. monetary policy, including the financial sector, Fed-watchers, administration and congress. Posen (1993) focuses on the impact of financial sector on central banks' policies, while Toma and Toma (1986) present several studies that treat central banks from the perspective of the theory of bureaucracy, emphasizing the impact of reward structure of central bankers on the conduct of monetary policy.

Overall, most of the studies found that even independent central banks are in general responsive to political pressures, but the degree of responsiveness vary with the extent to which central banks are actually independent. The literature in this area discusses whether central banks are independent *de iure* only, or also *de facto*. Thus, the precise way of political control over central banks, including appointment procedures, the term of office etc., is the decisive factor in explaining the impact of politics on monetary policy. For example, Lohmann (1992) and Moser (2000) show theoretically, why an independent central bank accommodates politicians' preferences when facing the treat of being overridden.

3. The Havrilesky's methodology and Maier's extension

If the central bank were dependent, government could easily adjust monetary policy according to its preferences simply by implementing it by order. However, with independent central banks, politicians can only try to force the central bank to adopt their preferred policies by indirect means, i.e. by signaling the preferred monetary policy stance and threatening to use all possible levers to coerce the central bank into accommodating their wishes.

In order to be able to analyze systematically whether politicians and other interest groups exercised pressure on the central bank, and if so, how intensive the pressure was and whether the central bank succumbed to it, we need an indicator for political pressure. Such an indicator must have ideally the following properties:

- It must be able to measure the political pressure also in the period between elections. The basic PBC predicts that political pressure is usually exercised before elections, so that a proxy based on time should be sufficient. However, governments are seeking political support of the electorate also during the whole term of office, thus we need an indicator that can capture it.
- It must indicate the direction and strength of the pressure and thus the size of the conflict between the central bank's desired policy and that of the politicians.
- It should allow for measuring the pressure from other interest groups as well, not only from the government.

In his influential study on pressure on the Federal Reserve, Havrilesky (1993) developed an indicator that fulfils the above-mentioned properties. The indicator is based on the number of newspaper reports in which politicians express preferences over a more or less restrictive monetary policy. He has counted the number of articles in the Wall Street Journal in which members of the executive branch (i.e. Administration) demanded a change in monetary policy. If an article showed that a government official called for monetary ease, it was assigned a value of +1, while an article calling for monetary tightness was assigned a value of -1. The sum of all pluses and minuses constituted the so-called SAFER index, so that for example a positive value of the SAFER index over some period indicated a "net" pressure for monetary ease (because the remaining pluses and minuses canceled each other).

When analyzing the pressure on the Deutsche Bundesbank, Maier (2002) extended the Havrilesky approach in two ways.⁵ First, he took into account also signals from other interest groups, namely from the financial sector, employers, trade unions, and others including academic researchers, international institutions and other non-specified articles demanding for change in monetary policy. The motivation for including other interest groups is to enable the disaggregating the total existing pressure with respect to the origin, and to test subsequently to which interest group's pressure the central bank responded and to which not. Second, he also introduced a new variable called public support, as some literature emphasized the role of public support for the Bundesbank as one of the decisive factors historically contributing to the factual independent conduct of monetary policy aimed at price stability (Berger and de Haan 1999). In the same way as for pressure indicator, the support indicator was constructed via counting newspaper articles with supportive statement regardless of the actual monetary policy and assigning the value of +1 to them if they expressed support.⁶

It is clear that the Havrilesky and Maier's approach to measurement of political pressure that is based on newspaper articles suffers under some drawbacks. First, it assumes that newspaper reports are representative of actual signaling from interest groups, but this does not have to be the case if there are also other channels through which politicians may signal their preferences over monetary policy (such as more informal ways through bilateral meetings, telephone calls or via other media). Second, it assumes that two articles mean twice as much pressure than one article, which need not be true. Third, the number of articles dealing with monetary policy may vary, depending also on whether there is enough news from other areas (in which case there will be probably less than average number of signals) and whether someone deliberately started a discussion about monetary policy (in which case there will be more than the average number of signals). Nevertheless, despite all the possible drawbacks, the pressure indicator based on newspaper signals may still have some value added in capturing the political pressure, given the lack of other indicators.

4. Constructing the Pressure Indicator for the Czech National Bank

In what follows, we construct the pressure indicator for the Czech National Bank (CNB), the central bank of the Czech Republic, using the Maier's extended approach based on Havrilesky (1993). In the first step the newspaper was selected: Maier (2002) lists three criteria for a suitable newspaper from which to count "pressure" articles, namely

- independence (newspaper should be politically neutral in order to avoid political bias in published articles),
- availability (the newspaper should cover reasonably long time), and
- circulation (the newspaper should be widely read, especially by central bank officials, so that signals published there in fact reach the intended recipients).

It is not easy to select a newspaper that fulfils all three criteria (so that for example for Germany, Maier (2002) decided to use articles from three different German newspapers). Nevertheless, as the Czech Republic is a relatively small country, the only newspaper that systematically follows economic developments, is regularly and widely read by economists (including the central bank ones), is neutral and available since the beginning of the Czech Republic (since 1993) is the newspaper *Hospodarske noviny* ("economic newspaper"). This Czech newspaper is additionally the best candidate to serve as a natural counterpart to

⁵ The part of the book by Maier (2002) to which we are referring is based on Maier et al. (2002).

⁶ Maier (2002) also changed the sign of the value assigned to articles demanding change in monetary policy, so that articles demanding monetary ease were assigned the value of -1 and articles demanding monetary restriction +1. He also - in contrast to Havrilesky (2003) - counted articles from three different German newspapers instead of only one in order to capture the pressure as broadly as possible.

economic newspapers like the U.S. Wall Street Journal (selected by Havrilesky) or the German Handelsblatt (selected – next to two others – by Maier).⁷

The next step was to choose the period. The Czech Republic practiced from the beginning of 1993 until mid-1997 an exchange rate peg (to a basket of DEM and USD, the main trading partner's currencies) and the monetary policy was based on a combination of maintaining exchange rate stability and monetary targeting, using monetary policy instruments such as forex window and interventions, minimum reserve requirements and interest rates. The peg was abolished in May 1997 and the Czech koruna began to float, while the central bank moved inflation targeting framework as of beginning of 1998, using official interest rates as the main monetary policy instrument. Given the “dual” nature of the monetary regime between 1993 and mid-1997, the central bank was to some limited extent free to pursue its own monetary policy despite the peg and thus it was in principle possible to get into conflict with government about “right” monetary policy stance.⁸ However, given the radical change in monetary policy regime and monetary policy instruments in 1997, only the period after the abolition of the peg and the move to floating in May 1997 is probably suitable for a rigorous analysis of political pressure, thus the time span June 1997 - March 2005 was chosen (i.e. total of 94 months, almost eight full years).

In line with Maier (2002), we have counted articles either directly published by members of five different interest groups or where members of these interest groups were quoted. The following five pressure groups were identified:

- government, which includes all ministers of the current government, but also other members of the political parties forming the government (most of them members of parliament, but some of them also outside the parliament),
- financial sector, including representatives and analysts of all domestic banks and other financial institutions (insurance corporations, pension and investment funds etc.),
- employers, i.e. representatives (managers) of non-financial corporations,
- trade unions, and
- other, including all other articles demanding change in monetary policy by other than members of the four above mentioned groups (i.e. for example from the general public, journalists, political parties in opposition, international institutions, members of academia, independent researchers etc.).

All articles that dealt with the Czech National Bank were carefully reviewed and assessed. Following Maier (2002), and in contrast to Havrilesky (1993), articles demanding monetary ease were assigned the value of -1, while articles demanding monetary tightness were assigned the value of +1. This was done in order to facilitate the interpretation of the regression results in the next section. For measuring the “net” pressure, the sum of all pluses and minuses for all five interest groups and for the total was constructed at a monthly frequency, so that a negative sum indicates interest group's net pressure for monetary ease, while a positive sum the net pressure for monetary restrictiveness.

Additionally, the ratio of the sum to total number of observations for every group and for total pressure was calculated. In comparison to the sum, the ratio has some advantageous features. First, because it relates the net pressure as measured by the sum to total number of pressure signals, it shows the degree of internal integrity of the group. Hereby it is shown whether the

⁷ Articles in the electronic version of the archive of Hospodarske noviny (<http://hn.ihned.cz>) were used.

⁸ Actually, there were conflicts between the central bank and government, especially as central bank moved to restrictive stance in 1996 via increasing minimum reserve requirements, see Dědek (2000).

pressure from members of a certain interest group is going in one direction (both over time and across different members of the same group), or whether it is rather heterogeneous. Thus, for a given level of the net pressure as measured by the sum, the higher the ratio (in absolute terms), the higher homogeneity of the pressure group (both over time and over different members of the group) and the more are signals from this group going in one direction. Second, in comparison to the sum, it is independent of the time span over which the ratio is calculated. As a result, it is possible to compare the pressure as measured by the ratio across countries, even if the time coverage is different.

As the Czech economy is in contrast to the German and the U.S. one a small and open economy, it is much more sensitive to exchange rate changes. Export-oriented companies, their employees and finally also the political representatives may for example feel hit by strong exchange rate appreciation and may demand “monetary ease” by forcing the central bank to step in and to try to influence the exchange rate by other instruments than interest rates, such as by foreign exchange interventions. Thus, we extend the Havrilesky’s and Maier’s approach in that we additionally take into account articles from interest groups demanding exchange rate interventions (such that interventions aimed at weakening the Czech koruna are comparable to an interest rate decline, i.e. monetary ease, and those articles counted as -1).⁹

Finally, it must be emphasized that the Havrilesky approach cannot capture all the pressure that was exercised on the Czech National Bank, as some of the pressure was of more general nature and was only partly mirrored in the newspapers. This relates especially to the period 2000-2001 as the amendment of the act on Czech National Bank was discussed in the parliament and number of politicians (from both government and opposition parties) tried to use this opportunity to limit heavily the central bank independence.¹⁰ As seen from the published articles, the main reason behind the attempt to limit the independence was the disagreement with the then monetary policy of the CNB that was regarded by politicians as too restrictive. Thus, those articles that reasoned the call for less independence by “too restrictive policy” were counted as pressure signals, while the other articles discussing the independence issue more generally were not counted, even if they could have had some impact.

4.1 The Political Pressure from Government

In order to be able to compare all three countries for which the pressure indicator was constructed, we start with the discussion of the pressure from government (the only interest group Havrilesky (1993) took into account in his pioneering work). In any case, government is the most interesting pressure group, because it has an intrinsic motivation to exercise pressure on the central bank in order to maximize political support, as discussed above. Additionally, in contrast to the other interest groups, it may have both direct and indirect possibilities how to override central bank policy.

⁹ Actually, the proportion of articles calling for monetary ease via FX interventions against appreciating koruna is very small; only around five articles published in the “appreciation” period 2001-2002 by exporters called explicitly for interventions against the appreciating currency, whilst other articles published in this period demanded more generally “monetary ease”, without specifying whether it should be interest rate cuts or interventions.

¹⁰ The amendment that was finally passed limited the independence much less than the original suggestions seriously discussed in the parliament, but event this amendment has been later canceled by the constitutional court for not being in line with the constitution and EU law.

Table 1: Political pressure on central banks from government

| | CNB | FED | Bundesbank |
|--|---------------|----------------|-------------------|
| # signals | 41 | 287 | 85 |
| (out of all pressure signals) | 22.8% | ... | 16.1% |
| period covered | 1997:6-2005:3 | 1952:1-1991:12 | 1960:1-1998:12 |
| (number of months) | 94 | 480 | 468 |
| # signals per year | 5.2 | 7.2 | 2.2 |
| # signals for monetary ease | 41 | 192 | 78 |
| # signals for monetary restrictiveness | 0 | 95 | 7 |
| sum (net pressure; minus=ease) | -41 | -97 | -71 |
| ratio (sum / # signals, in %) | -100% | -33.8% | -83.5% |

Source: Author's calculations based on hn.ihned.cz; Havrilesky (1993); Maier (2002).

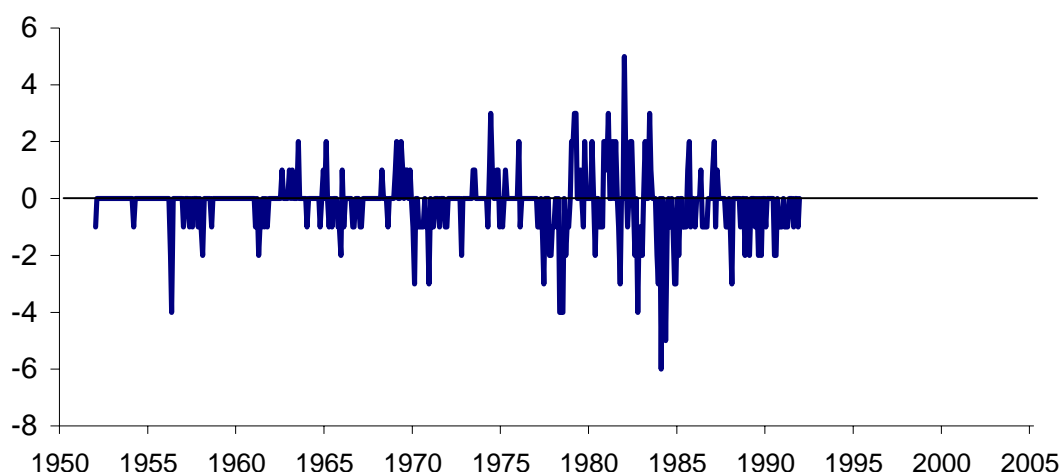
Table 1 shows that there are differences among the three countries as regards the way government puts pressure on the central bank. First, the intensity with which government asks for change in monetary policy differs. The number of signals from the government was much higher in the American case (on average around seven signals per year) than in the German case (just around two signals per year), despite the fact that pressure signals were collected from three newspapers in Germany, but just from one in the U.S. The Czech government lies in terms of the number of pressure signals between these two countries, with on average five signals per year. As regards the striking difference between the U.S. and the German case, Maier (2002, p. 80) offers two possible explanations: first, German newspapers may simply report less on monetary issues, and second, German government and also the public appreciates the Bundesbank's policies, so that there is less conflict between the government and the Bundesbank. For the Czech case, the relatively high frequency of signaling from government indicates quite a high degree of conflict between government and the CNB, which may be explained by the economic development over the analyzed time and the government's belief that CNB was responsible for possible adverse developments and that it should use its instruments to reverse it.

Second, as the number of signals for monetary ease and contraction shows, government of all three countries were on average asking for monetary ease (the net pressure is negative in all three cases). However, the Czech government has been exclusively demanding monetary ease, the German government has been asking prevalingly for monetary ease (and sometimes for monetary restriction), while the U.S. government has more frequently pushed for monetary contraction in comparison to the other two cases. Again, this can be explained by the underlying developments in economic variables such as inflation or GDP growth: while in Germany the inflation was on average rather low, the government might have forced the Bundesbank to use monetary policy instruments to support other macroeconomic objectives (higher GDP growth). This was probably not the case in the U.S., where the fight against high inflation in the 1970s and early 1980s was officially supported from the government. Similarly to the German case, the one-way pressure from the Czech government may have been caused by the combination of declining inflation, weak growth and still high central bank's interest rates (a detailed inspection is provided in the next section). Nevertheless, on average government rather push for monetary ease than the other way.

Third, the ratio indicates that in contrast to the Czech and German government, the U.S. administration is far less homogenous. In this regards, we might be interested whether there was heterogeneity rather across members, across time, or both.

Chart 1: The "net" political pressure on FED from government

("sum" of pressure signals; minus SAFER index, i.e. minus refers to demand for monetary ease)



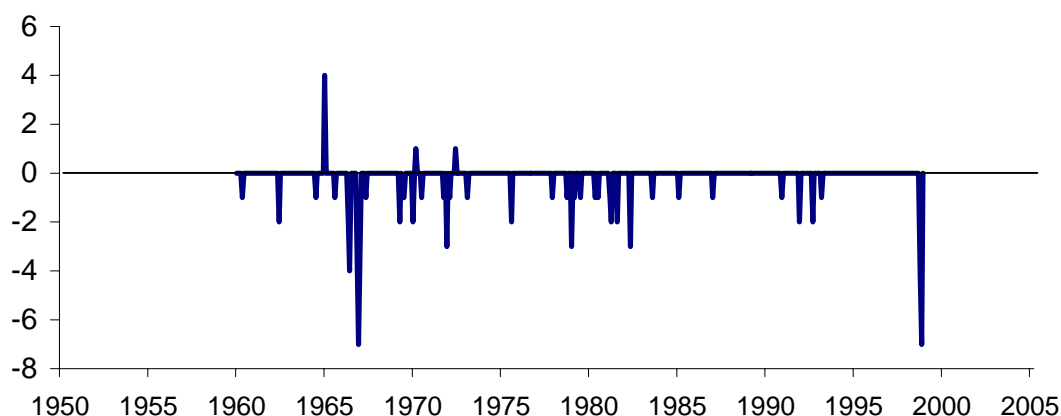
Source: Author's calculations based on Havrilesky (1993).

As the data are not available for individual members of the group “government”, we can only indirectly derive the degree of homogeneity from the time pattern of the pressure. Chart 1 shows the development of the net pressure on the Fed over time and indicates that signals of the same direction, be it for monetary ease or monetary tightness, have come in clusters in the American case. Thus, as it is rather improbable that always the same member of government signals within one time cluster, the U.S. government is probably homogenous across its members, but not necessarily across time, as it reacts with the pressure signals on economic developments in both directions.

Chart 2 shows for comparison the time pattern of the pressure from government on the Bundesbank. In line with conclusions derived from Table 1, we can now see more plastically that the “density” and frequency of signaling is indeed much lower in the German case than in the U.S. case, and that the signaling is in most cases towards monetary ease.

Chart 2: The "net" political pressure on Bundesbank from government

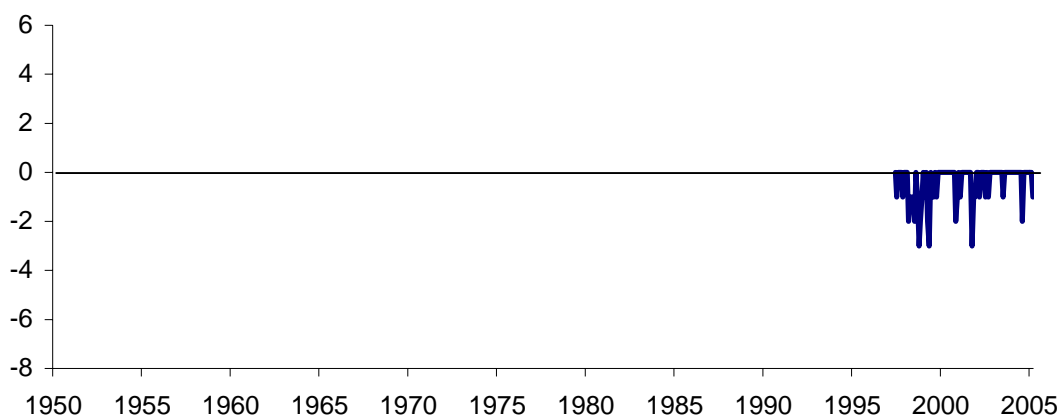
("sum" of pressure signals; minus refers to demand for monetary ease)



Source: Maier (2002), www.philipp-maier.de.

Finally, Chart 3 shows the development of the signaling from the Czech government on the CNB (in order to facilitate the comparison, the horizontal time axis is the same as in the two preceding cases).

Chart 3: The "net" political pressure on CNB from government
 ("sum" of pressure signals; minus refers to demand for monetary ease)



Source: Author's calculations based on hn.ihned.cz.

Again, Chart 3 indicates that in spite of the short time span of available data, the relative frequency of signaling from the Czech government was relatively high. At the same time, however, the "peaks" in net pressure are lower than in the German and the U.S. case, indicating that the debate in newspapers on monetary issues might be frequent, but is probably less intensive in the Czech Republic. The reason might be that the Czech government considers a lower degree of signaling within a month as sufficient for effective pressure.

Finally, Table 1 shows that government does not represent the most active player in signaling. In both the Czech and German case, the number of signals from government amounted to less than 25% of all pressure signals sent to the central bank.

4.2 Total Political Pressure on CNB and its Decomposition

Table 2 shows the total pressure on the Czech National Bank and its decomposition by interest groups, and compares it with the pressure on the Bundesbank.

Table 2: Political pressure on central banks

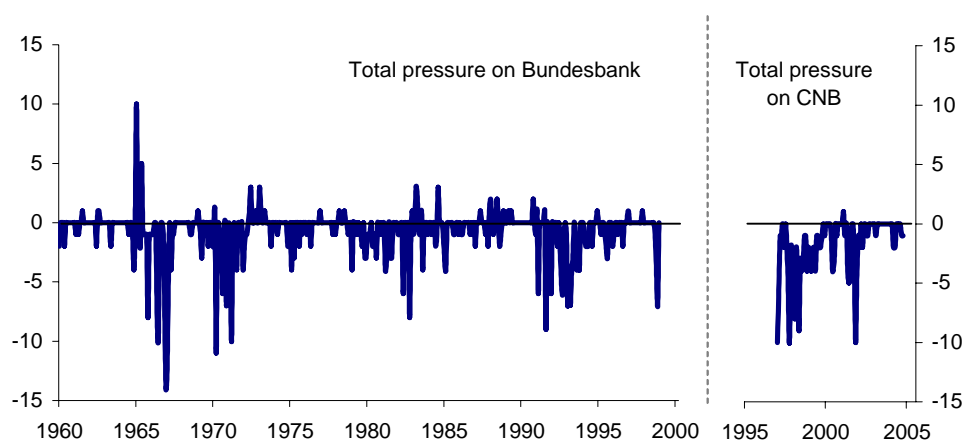
| | | CNB | Bundesbank |
|-------------------------------|--------------------------------|---------------|-------------------|
| period covered | | 1997:6-2005:3 | 1960:1-1998:12 |
| (number of months) | | 94 | 468 |
| total | # signals | 180 | 527 |
| | (out of all pressure signals) | 100.0% | 100.0% |
| | # signals per year | 23.0 | 13.5 |
| | sum (net pressure; minus=ease) | -166 | -339 |
| ratio (sum / # signals, in %) | | -92.2% | -64.3% |
| government | # signals | 41 | 85 |
| | (out of all pressure signals) | 22.8% | 16.1% |
| | # signals per year | 5.2 | 2.2 |
| | sum (net pressure; minus=ease) | -41 | -71 |
| ratio (sum / # signals, in %) | | -100.0% | -83.5% |
| financial sector | # signals | 40 | 140 |
| | (out of all pressure signals) | 22.2% | 26.6% |
| | # signals per year | 5.1 | 3.6 |
| | sum (net pressure; minus=ease) | -28 | -78 |
| ratio (sum / # signals, in %) | | -70.0% | -55.7% |
| employers | # signals | 36 | 55 |
| | (out of all pressure signals) | 20.0% | 10.4% |
| | # signals per year | 4.6 | 1.4 |
| | sum (net pressure; minus=ease) | -36 | -29 |
| ratio (sum / # signals, in %) | | -100.0% | -52.7% |
| trade unions | # signals | 6 | 69 |
| | (out of all pressure signals) | 3.3% | 13.1% |
| | # signals per year | 0.8 | 1.8 |
| | sum (net pressure; minus=ease) | -6 | -69 |
| ratio (sum / # signals, in %) | | -100.0% | -100.0% |
| other | # signals | 57 | 178 |
| | (out of all pressure signals) | 31.7% | 33.8% |
| | # signals per year | 7.3 | 4.6 |
| | sum (net pressure; minus=ease) | -55 | -92 |
| ratio (sum / # signals, in %) | | -96.5% | -51.7% |

Source: Author's calculations based on hn.ihned.cz; Maier (2002).

The table reveals several interesting features about the pattern of the pressure. First, the frequency of total pressure signals was on average higher in the Czech case (23 signals per year) than in the German case (13 signals per year). This confirms also the combined Chart 4.

Chart 4: The total "net" political pressure on Bundesbank and CNB

("sum" of pressure signals; minus refers to demand for monetary ease)



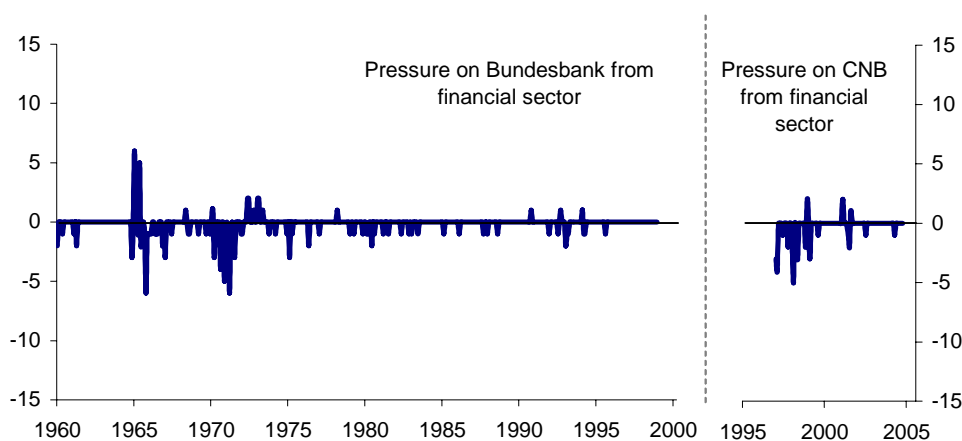
Source: Author's calculations based on hn.ihned.cz; Maier (2002), www.philipp-maier.de.

The “density” of pressure signals to CNB is comparable only to periods with frequent pressure signals in the German case, as for example with late 1960s or with early 1990s. Similarly, as in the case of pressure from government, the pressure peaks are lower on CNB than on Bundesbank, but since early 1980s, the peaks in pressure on both central banks are comparable.

Second, in both countries, the total pressure was rather towards monetary ease than restriction, but as the ratio shows, the inclination to push for monetary ease was much more prevalent in the Czech case. Looking at Chart 4, this may be explained by a too short time span, which is additionally characterized by declining inflation, so that there was simply no occasion to force the central bank to fight with rising inflation.

Third, the position of financial sector in both countries is comparable: the frequency of signaling was rather high, in both countries financial sector demanded on average rather monetary ease, slightly more in the Czech case than in the German case, given the higher ratio of pressure on CNB. Chart 5 also illustrates this.

Chart 5: The "net" political pressure on Bundesbank and CNB from financial sector
 ("sum" of pressure signals; minus refers to demand for monetary ease)



Source: Author's calculations based on hn.ihned.cz; Maier (2002), www.philipp-maier.de.

Nevertheless, from a theoretical point of view, it is surprising that financial sector pushed on average more for monetary ease, as some authors (Posen 1993) argue that financial sector represents the natural opposition against inflation and against government's attempts to force the central bank to loose monetary policy.¹¹ For the Czech case, this may be mainly explained by two factors. First, bank analysts, actually next to academic members the only ones with professional knowledge of monetary issues, when regularly assessing the CNB policy, frequently added their own opinions about how the “optimal” disinflation strategy should look like. Usually, they were expressing the dislike about the too restrictive monetary policy. Second, bank officials often expressed concerns about the adverse impact of the too restrictive policy on the financial conditions of their debtors, and thus on their ability to repay existing debt. However, financial sector remains the sector with the highest number of signals towards monetary tightness, at least in the Czech Republic.

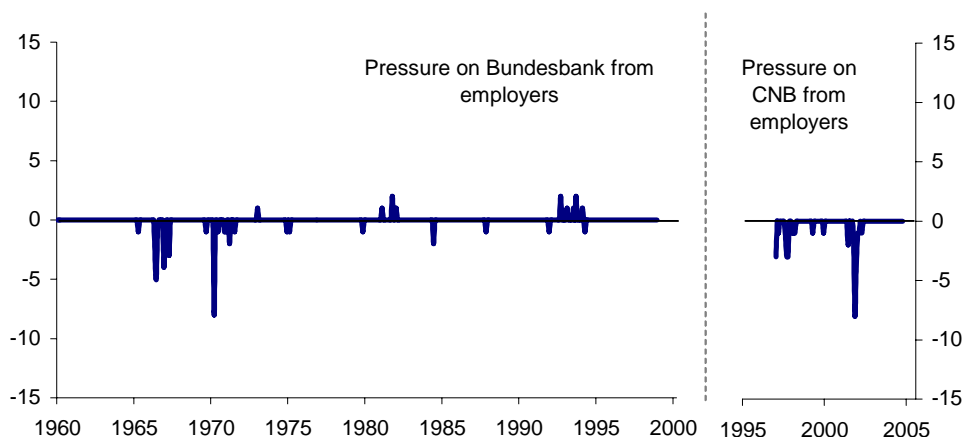
Fourth, the frequency of signaling from employers is much higher in the Czech Republic (on average around five signals per year, as compared to between one and two in Germany). Moreover, they exclusively demanded monetary ease in the Czech Republic when compared to Germany. The reason for both higher frequency of signaling and the direction of pressure is

¹¹ Alternative view, however, argues that ongoing monetary ease, i.e. decline in short-term interest rates, is at least from the short-term perspective profitable for the financial sector, as banks transform short-term deposits into long-term loans, and the portfolios that include bonds rise in value.

probably the orientation of most Czech companies towards export, and related sensitivity to exchange rate movements. Representatives of export-oriented companies frequently asked the central bank to “do” something with too appreciated domestic currency, effectively asking the central bank for easing the monetary conditions (i.e. the combination of interest rates and exchange rate) they faced. This contrasts with the German case. Maier (2002) disaggregated the employers in Germany into two subgroups, the export-oriented producers, and the firms producing mainly for the domestic market, and showed that the export-oriented firms prevalingly asked for monetary ease, while the domestic-oriented firms for monetary contraction, fearing the consequences of higher inflation more than the export-oriented ones.¹²

Chart 6: The "net" political pressure on Bundesbank and CNB from employers

("sum" of pressure signals; minus refers to demand for monetary ease)

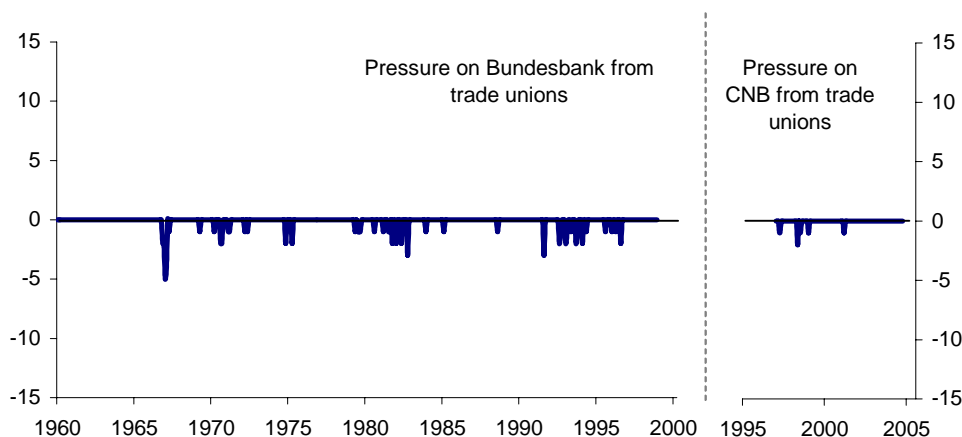


Source: Author's calculations based on hn.ihned.cz; Maier (2002), www.philipp-maier.de.

Fifth, trade unions in both countries always asked for monetary ease (Chart 7).

Chart 7: The "net" political pressure on Bundesbank and CNB from trade unions

("sum" of pressure signals; minus refers to demand for monetary ease)



Source: Author's calculations based on hn.ihned.cz; Maier (2002), www.philipp-maier.de.

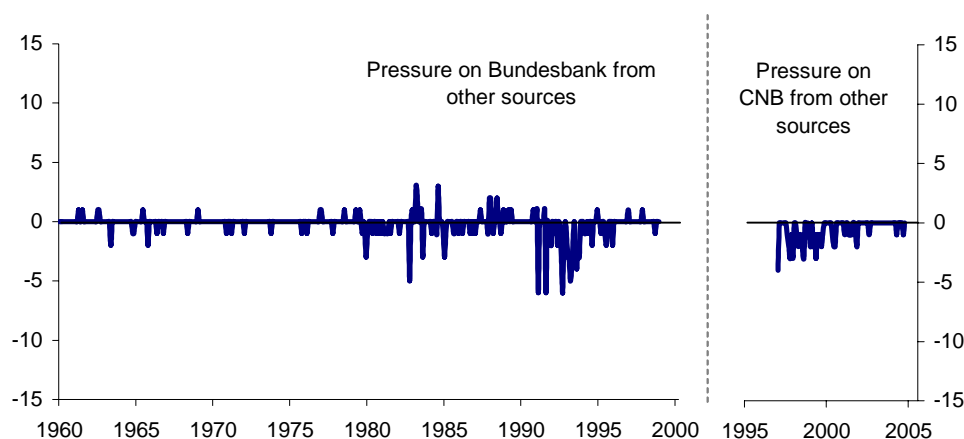
Nevertheless, the frequency of signals is quite low in the Czech case (just about one signal per year, compared to around 2 per year in Germany), and also the share of signals from trade unions in the total number of signals is much lower in the Czech case, pointing to low activity of labor union members in signaling. The main reason might be the political constellation in

¹² Out of 55 signals from German employers, 32 (i.e. around 60%) were export-oriented firms. The domestic-oriented producers were additionally the only group with small but positive ratio (4.3%), demanding on average rather monetary tightness than ease (see Maier 2002, p. 84).

the Czech Republic where between 1998 and 2005 the government was formed by social democrats (in 1998-2002 alone, 2002-2005 in a coalition), a natural ally of labor unions. Thus, the union members probably did not have to express their preferences for a change in monetary policy so frequently, as they were in line with the government's pressure direction and probably considered it as sufficient.

Finally, other groups, including journalists, members of academia, politicians from non-government parties, international institution representatives, and the general public, were very active in the Czech case. The high share of signals in total signals (more than 30%) and high frequency of signaling (about seven signals per year) make this "residual" group the most active group of all. The reason may be the heterogeneous composition of the group, and the much easier access of journalists to newspapers (the journalists of *Hospodarske noviny* have naturally their regular article where they frequently commented, assessed and hereby also put pressure on the central bank). Interestingly, the direction of pressure was much more homogeneous in the Czech case (ratio of -96.5%), indicating that even the general perception of the then monetary policy was probably similar across the whole spectrum of pressure groups.

Chart 8: The "net" political pressure on Bundesbank and CNB from other sources
("sum" of pressure signals; minus refers to demand for monetary ease)



Source: Author's calculations based on hn.ihned.cz; Maier (2002), www.philipp-maier.de.

4.3 The Role of Support for Monetary Policy

Following Maier (2002), an indicator for measuring political support for the Czech National Bank was constructed. As he argues, political support may contribute to the factual independence of central banks: if the central bank faces political pressure for a change of monetary policy, but at the same time enjoys support for its current monetary policy, the pressure may be partly eliminated and the central bank may continue in pursuing its "optimal", on economic fundamentals based policy.

The support indicator was constructed similarly to the pressure indicator, by counting articles expressing support for current monetary policy, regardless of the actual monetary policy stance. Those articles were counted as +1. The same pressure groups were identified.

Table 3 shows the results in comparison with the support for the Deutsche Bundesbank. If not differentiating between pressure groups, the frequency of support signals is slightly higher in the Czech case (around 11 support signals per year, as compared to 8 signals for Bundesbank). This may be explained by higher frequency of expressing support from the financial sector and from others, including the general public. Thus, the CNB enjoyed relatively high public support, even slightly higher than in Germany where this factor is usually counted as one of the main factors contributing to successful monetary policy. On the

other hand, the CNB enjoyed quite low and infrequent support from government when compared to the Bundesbank, relatively low support from employers, and even no support from trade unions.

The ratio of number of support signals to the number of pressure signals shows the degree of homogeneity within groups. The ratio is comparable between both countries when computed from the total figures (between 50% and 60%), but it reveals several interesting features for the individual pressure groups. First, we would expect that if members of a pressure groups share common interests, they would probably signal towards the central bank in a homogenous way. This appears not to be confirmed by the data, as for most pressure groups the ratio is relatively high. The ratio around 100% indicates that there is an intensive debate within the group, as approximately the same number of signals is sent demanding change in monetary policy as the number supporting the current monetary policy. The ratio much higher would indicate that the group is rather supporting the central bank, while a very low ratio indicates that the group is rather putting pressure on a change in monetary policy.

Table 3: Political support for central banks

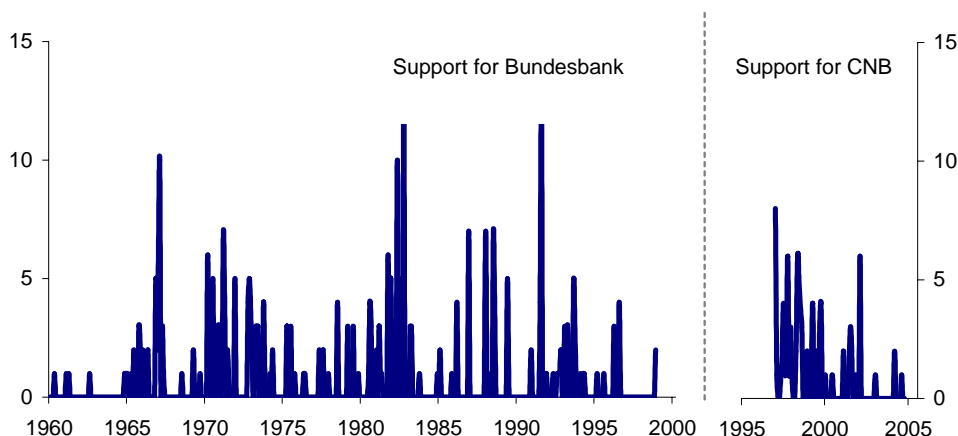
| | | CNB | Bundesbank |
|----------------------|------------------------------|---------------|-------------------|
| period covered | | 1997:6-2005:3 | 1960:1-1998:12 |
| (number of months) | | 94 | 468 |
| total | # support signals | 90 | 311 |
| | (out of all support signals) | 100.0% | 100.0% |
| | # support signals per year | 11.5 | 8.0 |
| | ratio # support / # pressure | 50.0% | 59.0% |
| government | # support signals | 8 | 90 |
| | (out of all support signals) | 8.9% | 28.9% |
| | # support signals per year | 1.0 | 2.3 |
| | ratio # support / # pressure | 19.5% | 105.9% |
| finan. sector | # support signals | 36 | 111 |
| | (out of all support signals) | 40.0% | 35.7% |
| | # support signals per year | 4.6 | 2.8 |
| | ratio # support / # pressure | 90.0% | 79.3% |
| employers | # support signals | 4 | 59 |
| | (out of all support signals) | 4.4% | 19.0% |
| | # support signals per year | 0.5 | 1.5 |
| | ratio # support / # pressure | 11.1% | 107.3% |
| trade unions | # support signals | 0 | 6 |
| | (out of all support signals) | 0.0% | 1.9% |
| | # support signals per year | 0.0 | 0.2 |
| | ratio # support / # pressure | 0.0% | 8.7% |
| other | # support signals | 42 | 45 |
| | (out of all support signals) | 46.7% | 14.5% |
| | # support signals per year | 5.4 | 1.2 |
| | ratio # support / # pressure | 73.7% | 25.3% |

Source: Author's calculations based on hn.ihned.cz; Maier (2002), www.philipp-maier.de.

Table 3 indicates that the ratio of support to pressure is higher than 100% in the case of German government, so that German government supported the Bundesbank rather than demanded change in the policy. This is a bit surprising, as it does not correspond to the traditional models of conflict between government and the central bank, as described in the theoretical literature. However, the low support of the CNB from the Czech government, indicated by the low ratio, again supports the theoretical literature. The highest support relative to pressure received the CNB from the financial sector (ratio of 90%) and from other, unspecified groups (74%).

For further illustration, Chart 9 shows the time pattern of the support for both the Bundesbank and the CNB. The chart confirms the conclusions of Table 3, especially those of the relatively high density of support signals. In addition, Chart 9 also indicates that the peaks in support were in general higher in the case of Bundesbank, which may stem from the higher number of newspapers from which the signals were counted in the German case. All in all, however, the support for the Czech National Bank seems to be quite significant and at least comparable to the support for the Bundesbank.

Chart 9: The total political support for Bundesbank and CNB
(number of support signals)



Source: Author's calculations based on hn.ihned.cz; Maier (2002), www.philipp-maier.de.

A detailed inspection of Chart 9 and its comparison with Chart 4 suggests that there might be a relationship between pressure and support, as the periods with high pressure appear to correspond with periods with high support. More in general, discussions of monetary policy issues in the newspapers seem to come in clusters, probably starting with an introductory contribution that triggers further articles, both pressure and supportive ones.

In order to test the above hypothesis formally in the case of the CNB, we first construct a variable *abs_pressure* that equals the absolute value of the total net pressure. The correlation of monthly values between *abs_pressure* and *support_total* is quite high (0.55). Subsequently, we apply the Granger causality test to the monthly series of both variables.¹³

Table 4: Pairwise Granger Causality Tests

Sample: 1997:06 2005:03; monthly data; Lags: 4.

| Null Hypothesis: | Obs | F-Stat. | Prob. |
|---|-----|---------|-------|
| SUPPORT_TOTAL does not Granger Cause ABS_PRESSURE | 90 | 0.82 | 0.52 |
| ABS_PRESSURE does not Granger Cause SUPPORT_TOTAL | | 3.60 | 0.01 |

Table 4 shows that the correlation runs from pressure to support, i.e. articles demanding change in monetary policy triggered public support for existing monetary policy, a result that is in line with the findings on the Bundesbank (Maier 2002, p. 105).¹⁴

5. Explaining the Political Pressure on the Czech National Bank

We have already mentioned several times the reasons for a specific pattern or direction of pressure on monetary policy from different interest groups. As was shown in the preceding

¹³ We also tried to perform the analysis using the daily data. The problem is, however, that daily data contain too many zeros, as on many days there was no pressure or support. This causes the Granger causality to run both ways if applied at the daily frequency of data.

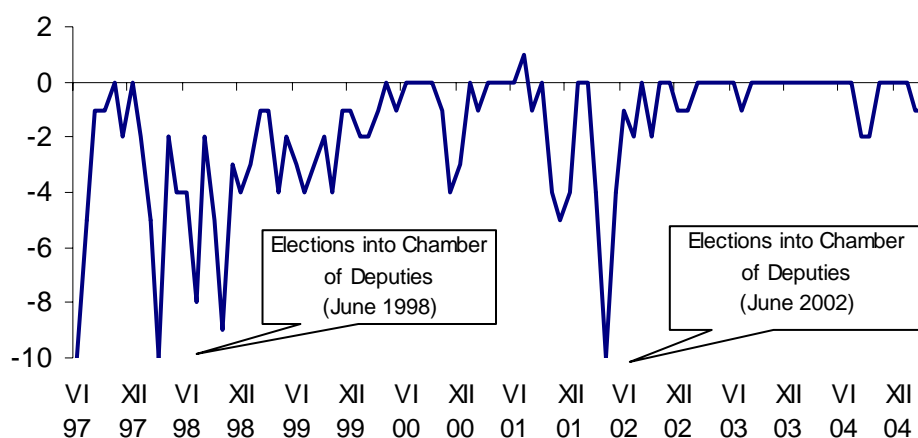
¹⁴ Applying different lags does not change the result of the one-way direction of influence.

section, support always emerged after pressure signals had emerged. But what caused the pressure to arise?

As we have seen, the pressure from all pressure groups on the CNB was rather towards monetary ease. Thus, the pressure groups regarded on average the monetary policy stance as too restrictive and harmful for their interests. In this section we explain – first in a rather anecdotic way, then also formally – when and why the monetary policy stance was considered as too restrictive by individual interest groups and how it triggered the pressure.

Chart 10 shows the time pattern of the total net pressure on the CNB and the two elections into the Chamber of Deputies of the Czech parliament that took place in 1998 and 2002. Three periods can be identified in which the pressure was significant: mid-1997, then the whole year 1998 (and partly also the year 1999), and finally the period between mid-2001 and mid-2002. In order to explain the pressure in these three periods, we have to mention three structural factors that may have contributed to the monetary policy that have been labeled as “too restrictive” by many pressure groups. Note also that the peaks in the pressure occurred in months immediately preceding the elections, indicating that the timing of pressure was not independent from the political cycle.

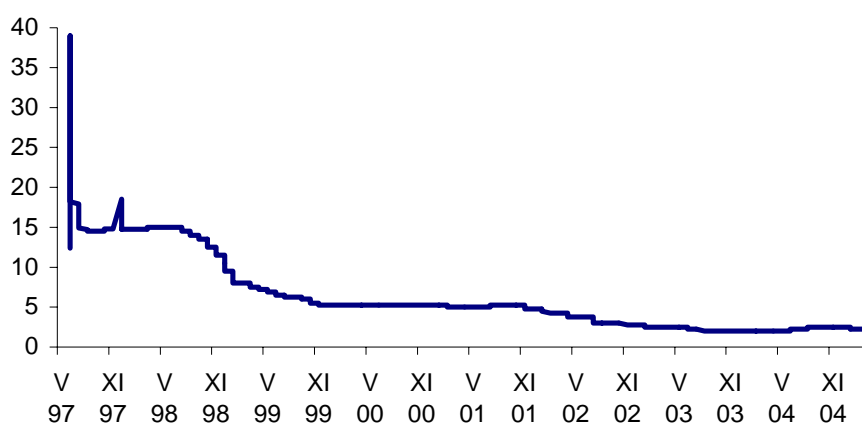
Chart 10: The total "net" political pressure on the Czech National Bank
 (pressure as measured by the "sum" of pressure signals; minus refers to demand for monetary ease)



Source: Author's calculations based on hn.ihned.cz.

First, the move from the exchange rate peg to floating in May 1997 was actually forced by a small exchange rate crisis. In early 1997, markets started to doubt about the sustainability of the peg and speculated against the CZK, expecting an official devaluation, given several macroeconomic problems including rising inflation and high current account deficit of the Czech economy. Next to the move to floating, the CNB fought against the speculation by raising official interest rates to very high levels, triggering the pressure from producers, as their financing costs (interest rates applied to loans) increased substantially. The burden that domestic producers had to bear triggered also the pressure from government, as it feared the adverse effect of such a monetary restriction on the economy.

Chart 11: Development of the 2W repo rate of the CNB
(in %; the 2W repo rate is the main official rate of the CNB)

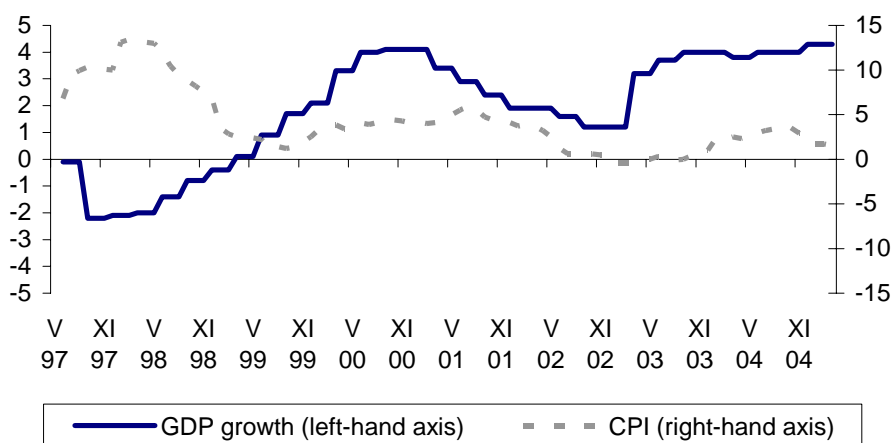


Source: CNB.

As Chart 11 shows, the CNB eventually started in the second half of 1997 and during 1998 to decrease the interest rates again, as the exchange rate stabilized (at a slightly depreciated level). Nevertheless, the speed with which the CNB has been decreasing the interest rates was a subject of conflict between the CNB and government: the CNB feared the negative effects of depreciated exchange rate on inflation and additionally it was not sure whether the market confidence in the reached level of exchange rate had been re-established. Thus, it decreased the interest rates rather slowly and in many small steps, effectively smoothing the movements in money market interest rates. On the other hand, government regarded the speed as too low, and pointed out that the high level of interest rates had devastating effects on the GDP growth, being ready to tolerate a slightly higher rate of inflation. Thus, the conflict was a typical representation of a conflict about the optimal point on the short-term Phillips curve.

Together with employers and government, financial sector expressed its concerns about the impact of the restriction on the health of the corporate sector, the main source of earnings for banks given the low indebtedness of households. Labor unions, in line with other groups, pushed for monetary ease, fearing the increase in unemployment given the effect of monetary restriction on the real economy. As Chart 12 shows, the GDP growth indeed declined, became negative in 1998 and early 1999, while the inflation indeed increase at the end of 1998 and in early 1999.

Chart 12: Development of the GDP growth and inflation
(in %; GDP growth y-o-y, quarterly data; CPI y-o-y, monthly data)



Source: Czech Statistical Office, CNB.

Second, with loosing the fixed exchange rate as a nominal anchor of monetary policy, the CNB was in search of a new monetary regime, that was found in the inflation targeting. However, given the relatively high inflation in the period of introduction of the inflation targeting in the Czech Republic (end-1997 and early 1998), the CNB used the inflation targeting as a disinflation strategy. The aim was to bring inflation levels closer to the European levels of inflation, contributing to the nominal convergence, one of the prerequisites for the future adoption of the euro after the EU accession. Again, the speed of disinflation became a conflict issue between the government and the CNB, given the negative GDP growth between end.1997 and early 1999 and very low inflation in 1999, leading even to discussions about limiting the central bank independence in 1999 and 2000.

Third, and finally, the very open Czech economy is sensitive to exchange rate movements. The development in exchange rate became an issue in 2001-2002, as the strong appreciation caused predominantly by expected privatization revenues in euros and the need of government to change the euros in the FX market to CZK started to decrease the price competitiveness of the Czech export-oriented companies. This triggered the pressure from the employers “to do something with the exchange rate”, either by FX interventions or by cutting the official interest rates. This has of course indirectly triggered also the government reaction, as the government feared the adverse effects of problems in export-oriented industry on unemployment and the political popularity and support. Chart 13 shows the development in the exchange rate against the euro, the currency of the main trading partners of the Czech producers, illustrating the extent of the appreciation in 2001-2002.

Chart 13: Development of the CZK/EUR exchange rate

(pre-1999 levels calculated using CZK/DEM rate and the official irrevocable parity DEM/EUR)



Source: Bloomberg.

For a more formal analysis of the pressure on the CNB, we estimate a “pressure” reaction function of the pressure groups as a whole (total), linking the emergence and intensity of political pressure to developments in economic variables, as we have seen that the developments in the exchange rate, inflation and GDP were probably the main triggers of pressure.¹⁵

The following reaction function was estimated:

$$pressure_total_t = c + a_1 gdp_gap_{t-1} + a_2 \Delta er_czkeur_t + a_3 \Delta er_czkeur_{t-1} + a_4 \Delta cpi_{t-1} + \varepsilon_t \quad (1)$$

¹⁵ Of course, individual pressure groups probably react differently or at least with different sensitivity to changes in macroeconomic variables.

The main hypothesis behind the equation (1) is that the pressure for monetary ease emerges if the GDP gap is negative (a_1 positive), if the exchange rate appreciates (a_2 and a_3 positive) and also if the inflation has a declining trend (a_4 positive).¹⁶ Table 5 shows the results.

Table 5: Regression results

Dependent Variable: PRESSURE_TOTAL

Sample(adjusted): 1997:08 2005:03; monthly data

Method: Least Squares

Included observations: 92 after adjusting endpoints

| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
|--------------------|-------------|------------|--------------------|-------|
| C | -0.77 | 0.19 | -3.97 | 0.00 |
| GDP_GAP(-1) | 0.58 | 0.08 | 7.25 | 0.00 |
| D_ER_CZKEUR | 2.15 | 0.37 | 5.78 | 0.00 |
| D_ER_CZKEUR(-1) | 0.69 | 0.35 | 1.95 | 0.05 |
| D_CPI(-1) | 0.60 | 0.24 | 2.44 | 0.02 |
| Adjusted R-squared | 0.49 | | Durbin-Watson stat | 1.44 |

All coefficients were positive and significant, as we have assumed. Thus, we can conclude that pressure groups are sensitive to developments in macroeconomic variables and that they generate pressure if they feel to be severely hit by macroeconomic developments that have effect on their income or survival prospects, both on economic and political markets.¹⁷

6. Estimating the effect of political pressure on monetary policy

The preceding sections introduced an indicator for political pressure on the CNB and discussed the pattern of pressure across pressure groups and time. However, we are mainly interested in whether political pressure had a significant impact on the CNB's monetary policy. We attempt to answer this question in two dimensions: first, we ask whether political pressure had impact on the direction of the monetary policy (restrictiveness versus ease), second, we ask whether pressure had impact on the uncertainty central bank faces when deciding on interest rate changes.

First, we conduct a simple Granger causality test in order to see whether pressure Granger caused changes in monetary policy. Table 6 shows that total net pressure had significant impact on changes in the official interest rate of the CNB, the 2W repo rate.

Table 6: Pairwise Granger Causality Tests

Sample: 1997:06 2005:03; monthly data; Lags: 4.

| Null Hypothesis: | Obs | F-Statistic | Probability |
|--|-----|-------------|-------------|
| PRESSURE_TOTAL does not Granger Cause D_CNB_REPO_EOP | 89 | 3.93454 | 0.00575 |
| D_CNB_REPO_EOP does not Granger Cause PRESSURE_TOTAL | | 0.52157 | 0.72012 |

We also estimated an equation relating the change in CNB repo rate to the pressure (see Equation 2):

$$\Delta cnb_repo_eop_t = a_1 \Delta cnb_repo_eop_{t-1} + a_2 pressure_total_t + \varepsilon_t \quad (2)$$

The main hypothesis behind including the lagged change in the repo rate is that it stands for the smoothing strategy of the CNB, so that if the central bank decides to change interest rates,

¹⁶ All the variables were checked to be stationary. The lag structure of the individual economic variables was set according to the significance and Akaike information criterion. For the GDP gap we use a proxy variable namely the "GDP growth gap" that is set to the difference between interpolated monthly values of the original quarterly GDP growth series and the growth of the potential output that was set to 3% (i.e. it is not the traditional GDP gap computed from levels, as this would require some estimation of initial GDP gap). The estimations were done in EViews 4.1.

¹⁷ In the period 1997-2005, the CNB operated under two governors: Mr. Tosovsky (till end-2000) and Mr. Tuma (after end-2000). The Chow test indicates that there was no structural break in the pattern of pressure from interest groups between these two sub-periods.

it makes it in small steps over several months in order to prevent abrupt changes in the money market rates. Similarly to the Granger causality test, the regression results shown in Table 7 indicate that the CNB reacted on political pressure.¹⁸

Table 7: Regression results

Dependent Variable: D_CNB_REPO_EOP
Sample(adjusted): 1997:08 2005:03; monthly data Method: Least Squares
Included observations: 92 after adjusting endpoints

| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
|--------------------|-------------|--------------------|-------------|-------|
| D_CNB_REPO_EOP(-1) | 0.32 | 0.06 | 5.19 | 0.00 |
| PRESSURE_TOTAL | 0.05 | 0.01 | 4.45 | 0.00 |
| Adjusted R-squared | 0.32 | Durbin-Watson stat | 1.53 | |

Nevertheless, to conclude that the CNB succumbed to the political pressure and accommodated the wishes of the pressure groups would disregard the possibility that the CNB conducted an independent monetary policy based on economic fundamentals that, by accident or deliberately, was in line with the pressure. In other words, the estimation results in Table 7 could be spurious due to the existence of third factors that have impact on both pressure and official interest rates. Thus, we estimate a full-fledged reaction function of the CNB, including both economic variables and the pressure variable.

Within the inflation-targeting framework, a central bank adjusts official interest rates according to the forecasts of inflation and output gap, respectively. In an open economy, exchange rate plays additional key role. We also add the lagged change in the interest rates in order to take into account the “smoothing” strategy. We assume that the current values of inflation and output gap are strongly correlated with the expected values, given the frictions in the economy, so that we use the current values.¹⁹ As exchange rate is difficult to forecast, we use the current value. Thus, we estimate a reaction function in the following form.²⁰

$$\Delta pribor_3m_eop_t = a_1 \Delta pribor_3m_eop_{t-1} + a_2 \Delta cpi_t + a_3 gdp_gap_t + a_4 \Delta er_czkeur_eop_t + \varepsilon_t \quad (3)$$

Table 8 shows the regression results; all the coefficients are significant, the GDP gap on the 10% level of significance, the other variables on the 5% level.

Table 8: Regression results

Dependent Variable: D_PRIBOR_3M_EOP
Sample(adjusted): 1997:08 2005:03; monthly data Method: Least Squares
Included observations: 92 after adjusting endpoints

| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
|---------------------|-------------|--------------------|-------------|-------|
| D_PRIBOR_3M_EOP(-1) | 0.20 | 0.07 | 2.69 | 0.01 |
| D_CPI | 0.18 | 0.07 | 2.49 | 0.01 |
| GDP_GAP | 0.04 | 0.02 | 1.84 | 0.07 |
| D_ER_CZKEUR_EOP | 0.19 | 0.07 | 2.56 | 0.01 |
| Adjusted R-squared | 0.17 | Durbin-Watson stat | 2.01 | |

Adding the pressure variable makes the *gdp_gap* variable and the *er_czkeur_eop* variable insignificant, and the pressure becomes significant (see Table 9). This may be caused by the co-linearity between these two economic variables and the pressure variable, as discussed in

¹⁸ Monthly data were used. The analysis was also done using 3M money market rates, but the results hardly change.

¹⁹ Again, for GDP gap we use the GDP growth gap proxy. Alternatively, current values may be used as proxies for forecasted values, as the current values of GDP and also inflation are usually not know in the current month of the decision about interest rates.

²⁰ We use 3M money market rates, as these better reflect also the near-term development in the official interest rates, in order to compensate for the bias given the use of current variables.

the preceding section. As a result, we cannot conclude that the pressure is a significant variable in explaining the change in interest rates.

Table 9: Regression results

| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
|---------------------|-------------|--------------------|-------------|-------|
| D_PRIBOR_3M_EOP(-1) | 0.17 | 0.07 | 2.34 | 0.02 |
| D_CPI | 0.14 | 0.07 | 1.87 | 0.06 |
| GDP_GAP | 0.01 | 0.03 | 0.33 | 0.74 |
| D_ER_CZKEUR_EOP | 0.12 | 0.08 | 1.52 | 0.13 |
| PRESSURE_TOTAL | 0.05 | 0.02 | 2.02 | 0.05 |
| Adjusted R-squared | 0.20 | Durbin-Watson stat | | 2.03 |

Thus, at the final stage, we apply a slightly modified approach: in order to get rid of the collinearity, we decompose the pressure variable into a part that is explained by economic fundamentals and a part that remains unexplained, and use only the unexplained part of the pressure (“adjusted pressure”). For such decomposition, we can make use of the regression results in Table 5 and use residuals from the estimation of equation (1). Table 10 shows the results.

Table 10: Regression results

| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
|---------------------|-------------|--------------------|-------------|-------|
| D_PRIBOR_3M_EOP(-1) | 0.19 | 0.07 | 2.61 | 0.01 |
| D_CPI | 0.16 | 0.07 | 2.15 | 0.03 |
| GDP_GAP | 0.04 | 0.02 | 1.98 | 0.05 |
| D_ER_CZKEUR_EOP | 0.17 | 0.07 | 2.26 | 0.03 |
| ADJUST_PRESSURE | 0.05 | 0.03 | 1.55 | 0.13 |
| Adjusted R-squared | 0.18 | Durbin-Watson stat | | 2.07 |

The adjusted pressure variable appears insignificant, while the fundamentals remain significant in explaining the changes in interest rates. Thus, as a result, the pressure is correlated with the changes in official interest rates, but after controlling for economic variables on basis of which the central bank usually decides about interest rates, the pressure becomes insignificant. This indicates that the Czech National Bank, as regards the impact of pressure groups on the direction of monetary policy, did not blindly accommodate preferences of the pressure groups, but preserved its factual independence and continued to conduct monetary policy based on economic fundamentals.²¹

However, as to the second issue we are interested in, namely that of the impact of political pressure on uncertainty that is obviously inherent in policymaking, we have to check whether there was a significant link between pressure and a proxy that would stand for uncertainty. The logic of the channel is following: if political pressure is not strong enough to induce a change in monetary policy stance, it may be sufficient to make policymakers uncertain as to whether selected change in monetary policy based on economic fundamentals is appropriate. Clearly, decision making in monetary policy is always marked by inherent uncertainty, as most of the actions taken by the central bank rely on forecasts and estimates of relevant fundamental variables. Pressure groups may take advantage of it and attempt to make the

²¹ Again, we conducted the Chow test to see whether the reaction of interest rates differed between the sub-periods till end-2000 (Tosovsky’s period) and after end-2000 (Tuma’s period). The test did not indicate a structural break.

policymakers more uncertain, thus preventing the change to occur (or lowering the probability that it will occur), if they cannot reverse the direction.

We measure the uncertainty with which Czech National Bank decided about changes in official interest rates via the degree of consensus among Bank Board members when taking decisions about changes in monetary policy. Since beginning of 1998, the Czech National Bank, when publishing the minutes from the Bank Board meeting where changes in official interest rates were decided upon, reveals also how many members voted for or against the proposal that was eventually accepted (the individual names are not mentioned). Thus, we define a proxy for uncertainty as a binary variable that takes zero if the decision was unanimous (i.e. certain decision) and one if the decision was taken only with majority (i.e. uncertain decision), and we call it “uncertainty-in-decision index”. The logic is that if there is uncertainty as to the appropriate monetary policy change, the probability that individual Bank Board members will have different opinions about appropriate reaction rises.

We construct a series of the index on a monthly basis. The decisions in the sample include all possible decisions, i.e. increasing rates, decreasing them, or not changing them. In those months in which there were more Bank Board meetings with monetary policy decisions we apply a pro-uncertainty approach: if at least in one of the meetings the decision was not taken unanimously, we assign the value of one (i.e. uncertain decision). Chart 14 shows the index in comparison with the total political pressure on the CNB.

Chart 14: The "uncertainty-in-decision index" versus total political pressure on CNB

(pressure as measured by the "sum" of pressure signals, minus refers to demand for monetary ease; uncertainty-in-decision index zero if decision unanimous, otherwise one)

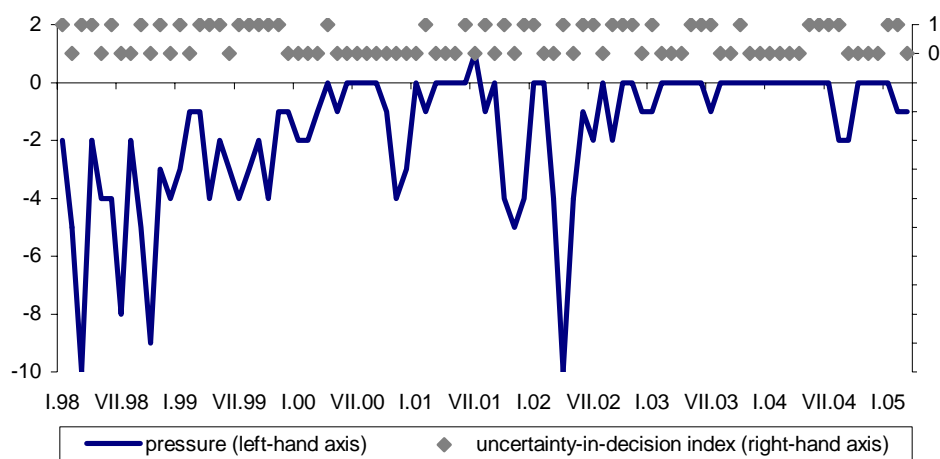


Chart 14 does not reveal any simple pattern in the relationship between uncertainty index and political pressure. From the visual inspection we could conclude that in several periods the pressure might have induced some uncertainty (the “critical” years 1998 and 2002), but in other periods the pressure does not seem to have been linked with uncertainty in decision making (the year 2003).

In order to test formally whether pressure had significant impact on uncertainty we apply a probit model, asking whether the existence of pressure (as measured by the absolute value of pressure *abs_pressure*) can explain the probability that the decision (as measured by the *decision_index*) will be uncertain (i.e. not unanimous). Table 11 presents the results.

Table 11: Regression results

| Variable | Coefficient | Std. Error | z-Statistic | Prob. |
|--------------|-------------|------------|-------------|-------|
| ABS_PRESSURE | 0.02 | 0.05 | 0.42 | 0.68 |

Dependent Variable: DECISION_INDEX
 Method: ML - Binary Probit
 Sample: 1998:01 2005:03; monthly data
 Included observations: 87

Table 11 indicates that no systematic impact of political pressure on the probability that the decision about monetary policy will not be unanimous can be detected. Thus, we may conclude that the Czech National Bank, next to being resilient to pressure signals asking for monetary easy, also proved to cope with uncertainty inherent in monetary policy without a systematic influence from pressure groups.

7. Conclusions

Independent central banks usually face political pressure from different pressure groups, starting with government and going through financial sector, employers, labor unions up to the general public as a whole. In this paper, we have attempted to measure and explain the political pressure on the Czech National Bank, the central bank of the Czech Republic, using the methodology introduced by Havrilesky (1993) for measuring the pressure on the U.S. Federal Reserve and further extended by Maier (2002) when applied to the Deutsche Bundesbank. The direction, intensity and the time pattern of the pressure was discussed, compared with the pattern of pressure on both Fed and Bundesbank, and explained. Additionally, the role of public support for the monetary policy was discussed, and the effect of political pressure on monetary policy of the CNB estimated.

The main conclusion is that the Czech National Bank faced considerable political pressure towards monetary ease in the period 1997-2005, comparable to the pressure on the Fed and even slightly higher than the pressure on the Bundesbank, but did not succumb to the pressure, sticking to monetary policy based on economic fundamentals. Political pressure did not have any systematic impact on both the direction of the monetary policy and the uncertainty under which policymakers decided. Thus, the formal (or de iure) independence of the CNB proved to be factual (or de facto) as well.

However, further analysis of the relationship between political pressure and monetary policy is needed. First, it is necessary to provide several robustness checks of the specification of the model of reaction function, employing a bit more fine methods of econometric analysis such as the event study. Second, should the relationship prove to be significant (or should we arrive at the conclusion that it is not possible to reject the hypothesis of no relationship), it would be necessary to discuss in detail the channels through which the pressure might work.

8. References

- Alesina, A. - Rosenthal, H. (1995): *Partisan Politics, Divided Government, and the Economy*. Cambridge University Press, University.
- Berger, Helge – de Haan, Jakob (1999): A State within the State? An event study on the Bundesbank. *Scottish Journal of Political Economy* 46 (1), pp. 17-39.
- Berger, Helge - de Haan, Jakob and Eijffinger, Sylvester C.W. (2001): Central Bank Independence: An Update of Theory and Evidence. *Journal of Economic Surveys* 15 (1), pp. 3-40.
- Cukierman, Alex (1992): *Central Bank Strategy, Credibility and Independence. Theory and Evidence*. The MIT Press, Cambridge, Massachusetts.
- Dědek, Oldřich (2000): Příčiny a průběh měnových turbulencí v České republice v roce 1997. *Politická ekonomie* 6.
- Drazen, Allan (2000): *Political Economy in Macroeconomics*. Princeton University Press, New Jersey.
- Grier, Kevin B. (1991): Congressional influence on U.S. monetary policy: an empirical test. *Journal of Monetary Economics* 28, pp. 201-220.

- Havrilesky, Thomas (1993): *The Pressures on American Monetary Policy*. Kluwer Academic Publishers, Boston.
- Hibbs, D. (1977): *Political Parties and Macroeconomic Policy*. *American Political Science Review* 71, pp. 1467-87.
- Kramer, G. (1971): *Short-term fluctuations in U.S. voting behavior, 1896-1964*. *American Political Science Review* 65, pp. 131-143.
- Lohmann, Susanne (1992): *Optimal Commitment in Monetary Policy: Credibility versus Flexibility*. *American Economic Review* 82 (1), pp. 273-286.
- Maier, Philipp (2002): *Political Pressure, Rhetoric and Monetary Policy: Lessons for the European Central Bank*. Edward Elgar, Cheltenham.
- Maier, Philipp – Sturm, Jan-Egbert, de Haan, Jakob (2002): *Political Pressure on the Bundesbank: An Empirical Investigation Using the Havrilesky Approach*. *Journal of Macroeconomics* 24(1), pp. 103-123.
- Mayer, Thomas (ed.) (1990): *The political economy of American monetary policy*. Cambridge University Press, Cambridge.
- Moser, Peter (2000): *The Political Economy of Democratic Institutions*. The Locke Institute, Edward Elgar, Cheltenham.
- Mueller, Dennis C. (2003): *Public Choice III*. Cambridge University Press, Cambridge.
- Nordhaus, W. (1975): *The Political Business Cycle*. *Review of Economic Studies* 42, pp. 169-190.
- Posen, Adam S. (1993): *Why Central Bank Independence Does Not Cause Low Inflation: There Is No Institutional Fix For Politics*. In: O'Brien, Richard (ed.): *Finance and the International Economy: vol. 7*. Oxford University Press, Oxford, pp. 40-65.
- Toma, Eugenia F. – Toma, Mark (1986): *Central Bankers, Bureaucratic Incentives, and Monetary Policy*. Kluwer Academic Publishers, Dordrecht.
- Toma, Mark (2001): *Monetary policy*. In: Shughart II, William F. – Razzolini, Laura (eds): *The Elgar Companion to Public Choice*. Edward Elgar, Cheltenham, 2001.
- Tufte, E. (1978): *Political Control of the Economy*. Princeton University Press, Princeton.
- Wooley, John T. (1984): *Monetary Politics. The Federal Reserve and Politics of Monetary Policy*. Cambridge University Press, Cambridge.

V CENTRAL BANK INDEPENDENCE FROM THE CONSTITUTIONAL ECONOMICS PERSPECTIVE

1. Introduction

Central banks and their policies were always subject to excited academic discussions. One of the most discussed topics is the issue of optimal monetary constitution, i.e. institutional arrangement a society should set up for control over monetary policy (Friedman 1962). Within this area, the question of central bank independence has attracted a lot of attention, especially over the last two decades, both in theory and practice. These discussions eventually resulted in most central banks being today granted a relatively large degree of independence from politics.

Control over money is an activity that is nowadays done on the level of collective choice rather than private choice, in the sense of Buchanan and Tullock (1962). As a result, the policymaker in charge of monetary policy, namely the central bank, definitely belongs to the political system in a broader sense, having links of different nature with the state and its legislative, judicial and executive branches. Thus, seeking for an optimal monetary constitution is actually equivalent to seeking for an optimal political constitution in the realm of monetary policy, a task where constitutional political economy (constitutional economics) may come on the scene.

In this paper, we apply a constitutional economics perspective to the issue of optimal monetary constitution, including the question of an “optimal” degree of central bank independence. Our argumentation directs to three areas:

First, we argue that existing literature on central bank independence fails to distinguish between two levels on which the central bank may be considered independent. We illustrate the importance of such a distinction by a seeming conflict between the request for a dependent central bank in Germany after 1945, which was raised by German *ordo-liberalists* represented by Walter Eucken, and the large degree of independence that was actually granted to the central bank and that is nowadays considered to be in accordance with a modern *ordoliberal* theory.

Second, we argue that existing literature treats the independence in a too simplistic way, easily speaking of more or less independence as if the independence were a continuous variable. In line with Lippi (1999), we argue that there are several distinct dimensions of central bank independence, with different consequences when combined in different ways.

Third, the lack of distinction between the two levels also marks the debate on democratic accountability of independent central banks, i.e. on the way in which the democratic control over an independent central bank is exercised. In line with Amtenbrink (1999), we treat democratic accountability as an inherent complement to independence. In this perspective, the “optimal” monetary constitution including elements of both independence and accountability areas will consist of a mix of different links between a central bank and other political, both elected and non-elected, bodies that may differ over time and across countries, depending on historical, political, cultural and economic conditions.

The paper is organized as follows: in section 2, we introduce the two basic concepts of the constitutional political economy, while in section 3 we apply them to the issue of central bank independence in general. Section 4 describes the theoretical perspective of German *ordo-liberalism* and F.A. von Hayek concerning monetary policy and central bank independence and reviews the discussion about the establishment of the Deutsche Bundesbank after 1945. Section 5 discusses the concepts of control over money proposed by James Buchanan. Section

6 focuses on different elements of monetary constitution using both theoretical and empirical literature and discuss what could be called an “optimal” monetary constitution from the perspective of constitutional economics. Section 7 concludes.

There is a considerable research done on the topic of central bank independence and this study does not aim at reviewing the overwhelming number of existing studies. The discussion emerged also in the Czech economic literature, especially when discussing the structure of the ECB (Šmídková and Tůma 1999).

2. Constitutional Economics Perspective

This section highlights two major concepts of constitutional economics that will be subsequently used: the distinction between two levels of choice, and the contractarian approach to normative questions.

Constitutional political economy, as founded by Buchanan (1975, 1990a), distinguishes between two levels on which choices are made: constitutional level and sub-constitutional level. Constitutional choices are choices among alternative constraints, while sub-constitutional choices are choices among alternative strategies within constraints (Vanberg 1994, p. 178). Clearly, questions related to monetary constitution, i.e. the institutional arrangements through which public control over money is exercised, must be analyzed on the constitutional level, as we are interested in the choice among alternative set of rules. Nevertheless, the sub-constitutional analysis of possible outcomes within a pre-defined set of rules, i.e. within constraints, provides an important informational input and relevant arguments for constitutional choice, because it reveals the expected consequences of the choice of a certain set of constraints.

If the issue of an appropriate monetary constitution is to be analyzed on the constitutional level, we need a criterion that can be applied to alternative monetary constitutions as to the degree of desirability or appropriateness of a given institutional arrangement. In contrast to most literature on institutional issues in monetary policy, where a sort of social welfare function is used for normative assessment, constitutional economics applies what have been called contractarian approach (Brennan and Buchanan 1985; Vanberg 1994). This approach incorporates both methodological and normative individualism as well as the agreement of citizens as the ultimate criterion to collective choices. Methodological individualism means that the starting point for any normative assessment must be the individual and his values. Conceptually, individuals voluntarily enter a kind of social contract that defines the rules under which the respective persons can engage in organized collective decisions and actions, provided that these rules afford mutual benefits for all individuals concerned.

The contractarian vision does not necessarily deny the use of macroeconomic variables as inflation and output in the analysis of monetary constitutions. Indeed, if individuals in a society can agree to common preferences over the desirable degree of price stability, output growth, and the trade-off between these two should they arrive into conflict, macroeconomic variables may represent a useful analytical instrument. However, limiting ourselves to such variables requires speculating about people’s common preferences. A constitutional economics’ perspective offers much broader range of possibilities within the normative analysis in that it emphasizes the relevance of rules and procedures, mainly within the political area, that channel individual preferences into a collective choice over alternative institutional arrangements. To the extent to which the political procedures transmit only consensual, constitutional preferences, i.e. preferences over institutional arrangements that could be agreed upon unanimously by members of a community, the constitutional paradigm may serve as an appropriate approach to normative analysis.

Despite its rather philosophical background, constitutional economics’ perspective has been already applied to issues related to currency and monetary constitution. Next to the work

published by James Buchanan himself since 1960s (see section 5), several articles were published over the last decade in this area. For example, Spinelli and Masciandaro (1993) focused on monetary constitutionalism in Italy, and similarly did ten years later Quaglia (2003) when discussing the constitutionalization of macroeconomic policy making from the perspective of European monetary integration. Hefeker (1995) discussed pros and cons of monetary integration versus currency competition, while Selgin and White (2005) built up further on the idea of currency competition, comparing dollarization and privatization of currency. Bernholz (2001) discussed the issue of optimal monetary constitution, providing empirical evidence for the relevance of monetary constitution for explaining past hyperinflations.

3. Central bank independence: constitutional versus sub-constitutional level

In spite of the current fashion for central bank independence, central banks remain tied to political system, as they are charged with the responsibility for a particular kind of public good, namely for maintaining the stability of the value of currency, or in other words maintaining the price stability in the long run perspective.¹ Number of studies have showed that price instability, including both high levels and high variability of inflation, have harmful effects on the functioning of the market economy and hereby on real variables such as economic growth (Alesina and Summers 1993; Fischer 1993). High or volatile inflation increases inflation uncertainty and via increased risk premium also the long-term interest rates, and obstructs the signaling function of the price mechanism, preventing the use of resources in their most effective ways (for a survey of costs of inflation see Romer 2001). In addition, some studies have proved that there is a positive link between the level of inflation and its volatility (Chowdhury 1991). Thus, anything that may help to maintain inflation in a reasonably low range probably lies in the interest of all members in the society.

The fact that central banks perform a public function and are thus tied to the political system of a country has one important consequence. On the constitutional level where all members of a community unanimously decide which activities will remain in the realm of private choice and which in the realm of collective choice, and subsequently set up “rules of the game” for the activities within the collective choice (Buchanan and Tullock 1962), the central bank is dependent on politics in a broad sense. Theoretically, a central bank is conceptually fully dependent on preferences of the individuals in that sense that the institutional framework, within which the central bank will operate, is fully in hands of individuals consensually deciding about appropriate monetary constitution on the constitutional level.

Of course, the notion of unanimous agreement on a specific social contract is just a theoretical construct. In reality, constitutional contract including the monetary constitution is usually not agreed upon or changed unanimously given the enormous transaction costs this would entail. Constitutional contract, the basic “rules of the game”, is agreed upon and changed via politics, through specific political institutions, rules and procedures designed for this purpose.² Furthermore, the idea of an “unanimous agreement” could be interpreted as a legitimate “guiding line” for scientific research. Scientific results, which are oriented on the citizens’ interests, may have a much better change to be implemented into the political reality the “metaphysical truths”.

As there is, at least conceptually, full dependence of the central bank on politics on the constitutional level, it pointless to speak about a “degree of constitutional dependence or

¹ Although, Buchanan (1962) argues that a better criterion for monetary policy would be predictability of the price level rather than its stability.

² It is usually the parliament which is responsible for the law governing the role and functions of a central bank. Similarly to our notion, Goodhart (1995) argues that a central bank cannot be absolutely independent, as it is always tied to parliament, but that it can be “autonomous” from government.

independence”. However, the actual position of the monetary constitution within the legal framework of a jurisprudence and specific institutions, rules and procedures in politics that serve to change monetary constitution may have considerable impact on the performance of the central bank and its strategies and activities it chooses on the sub-constitutional level, besides the obvious impact of the monetary constitution itself.

Moving to the sub-constitutional level, i.e. to the level where the “game is played”, monetary constitutions may differ as to the degree of independence from politics granted to the central bank. It is at this level where we, as citizens of a community, may prefer the central bank to enjoy high degree of independence in order to get better results in terms of macroeconomic outcomes. Here, on the sub-constitutional level, politics is meant in a narrow sense, as the “day-to-day” politics, i.e. the arena where different political opinions about desirable amount, structure and way of producing and financing the public goods meet, compete and eventually some of them are realized. Politics on the sub-constitutional level is framed by political institutions, rules and procedures through which individuals with different preferences channel their – often conflicting - sub-constitutional interests with respect to public affairs.

Several theoretical arguments have been put forward for granting the central banks a relatively large degree of independence from the day-to-day politics of elected representatives.³ The first one relates to the possible existence of a political business cycle of Nordhaus (1975). As he has shown, elected politicians regardless of political orientation are motivated to use all available means to maximize their reelection chances. If monetary policy has real effects, temporarily increasing employment and real growth via inflation surprise, politicians will force the central bank to relaxed monetary policy before elections. Due to their short-term political horizon, they do not take into account the adverse effects of such policies on inflation in the medium and long run. As a result, inflation will be on average higher, thus any means that raise central banks’ independence and hereby insulate them from pre-election political pressures will decrease inflation.

Second, the partisan political business cycle theory proposed by Hibbs (1986) and Alesina (1988) predicts that if elected politicians are “ideological” and represent constituencies with different preferences over inflation and unemployment, inflation and output will change always after elections, depending on the party in power. If the central bank is not independent from political pressures, partisan policy increases both inflation volatility and inflation level, because of the uncertainty regarding future election outcomes and thus future inflations. Both political cycle theories assume that there is a possibility to exploit the short-term Phillips curve.

Third, if there are no limits on government spending, government may run deficit financing of state expenses (for example, again, for short-term political reasons). Sargent and Wallace (1981) have shown that if the central bank is not dominant, it will be forced to finance government debt by creating money, contributing hereby to inflation. Most of the world hyperinflations were caused via central bank financing the government debt (Bernholz 2001). Thus, granting independence to the central bank, so that it cannot be forced to finance government, both directly via credit or indirectly via buying government bonds, helps to contain inflation.

Fourth, and the most frequently used argument, although actually only elaborating further on the first and the second one, is based on the dynamic inconsistency models of optimal monetary policy (Barro and Gordon 1983). If a policymaker in charge of monetary policy follows a kind of objective function containing both inflation and output, and if the targeted output is higher than natural output (for example due to political motives, be it general or

³ For an elaborated survey of central bank independence literature see Eijffinger and Haan (1996).

partisan), it is optimal to “surprise” the public with inflation, hereby raising the output above its natural level. However, as the public rationally expects it, it adjusts its inflation expectations upwards so that the policymaker is left with the only sub-optimal option to confirm the higher inflation, without any effect on real output. The only result is an inflation bias. One of the solutions to elimination of the inflation bias is delegating the power over monetary policy to independent agency, a central bank, with different preferences over inflation and output, putting more emphasis on low inflation (Rogoff 1985).⁴

Next to the theoretical arguments in support of central bank independence, there is also empirical evidence that countries with more independent central banks, with independence measured via a set of several criteria, experience on average lower rates of inflation (Alesina 1988; Grilli, Masciandaro and Tabellini 1991; Cukierman 1992; Alesina and Summers 1993). Here, the frequently cited example of the German Bundesbank also falls within (Debelle and Fischer 1994). Thus, without referring to any theories in behind of the results, central bank independence seems to bring significant improvements in terms of better macroeconomic management and macroeconomic outcomes.⁵

To summarize, both theoretical arguments and empirical evidence suggest that it might be desirable to grant a large degree of independence from politics to central banks on the sub-constitutional level. The main reason is that politically motivated politicians would otherwise be tempted to use monetary policy for short-term political goals at the cost of inflation. This having in mind, two questions may be raised: first, politics serves to transmit individual preferences, usually via electing representatives of different constituencies. Does a desirable large degree of independence from politics mean that we should detach the central bank totally from individual preferences of citizens on the sub-constitutional level? In other words, should the monetary constitution – otherwise providing for independence of the central bank – still reserve some space for citizens’ intervention? Second, if the answer to the first question is affirmative, what institutional mechanism could safeguard the transmitting of the citizens’ interests on the sub-constitutional level?

We argue that, after all, there is still some role left for citizens’ interests “within the game”, and that the monetary constitution should take account of it. Even if the monetary constitution gives the central bank a strong mandate for maintaining price stability and insulates it from political pressures to deviate from this mandate in pre-election periods, several issues are difficult to write into the monetary constitution *ex ante*. In contrast to the long-term goal of price stability, these relate to short-term and medium-term effects of monetary policy and include practical definition of price stability, optimal reaction to shocks, the degree of “aggressiveness” of the central bank’s policy and the issue of macroeconomic policy coordination.

The theoretical notion of price stability needs some empirical counterpart at which central bank could aim. Today, most practitioners and theoreticians agree that monetary policy should aim at reaching low, but positive inflation. Too high inflation hampers economic growth (Ghosh and Phillips 1998), but zero inflation may prevent adjustments of relative prices if the economy is characterized by nominal rigidities (Akerlof, Dickens a Perry 1996). However, the “optimal” level of the “inflation target” may vary over time and across countries, depending on the stage of development, macroeconomic characteristics, international conditions, and of course, preferences of citizens taking account of consequences of different levels of inflation target. Khan a Senhadji (2001) show, for example, that for

⁴ Different solutions to dynamic inconsistency are reviewed in Blackburn and Christensen (1989), Cukierman (1992) or Eijffinger and Haan (1996).

⁵ Some authors call it “free lunch” (Grilli, Masciandaro and Tabellini 1991; Debelle and Fischer 1994). Alesina and Gatti (1995) provided *ex post* theoretical underpinnings to this argument.

developed countries the level of inflation that hampers economic growth is much lower than for countries that are catching-up. Determining the “optimal”, targeted level of inflation should thus lie in realm of collective decision by citizens of a society.

The second issue in monetary policy that should be decided in line with individuals’ preferences is how the central bank should react to shocks that have impact on both inflation and output (Debelle and Fischer 1994). As Rogoff (1985) and Lohmann (1992) show, an independent central banker with much more emphasis on inflation than the society (i.e. high or even unlimited inflation aversion) does not “optimally” respond to shocks and legislating a state-contingent rule for monetary policy into monetary constitution might not be possible *ex ante*. Central banks were often blamed for “insensitivity” to negative monetary policy impact on output growth when fighting inflation. The recent move to monetary policy based on new Keynesian models (Bofinger 2001), which may reflect the functioning of real economies better than monetarist models, slightly moderated the conflict, as most central banks today rely on the so-called “divine coincidence” (Blanchard 2003), i.e. the assumption that stabilizing inflation is equivalent to stabilizing output around its natural level. Thus, in a case of a negative shock that would decrease actual output below the natural one, the central bank would ease its monetary policy and help both the output to recover back to its natural level and the inflation to rise from low levels due to low inflationary pressures back to the targeted level. However, for negative supply shocks that cause the output to decline below its natural level and inflation to rise, the conflict remains (Goodhart 2002) and citizens’ preferences with respect to this trade-off should be reflected, taking into account all possible information about consequences of the chosen solution.⁶

The third issue where citizens’ voice is needed comes from an extension of the previous argument by a time perspective. In a case of a shock, the central bank may know the direction of its next move (monetary ease versus tightness), but there is also the question of how fast and aggressive should the monetary authority react. In practice, as central banks use as a policy instrument short-term interest rates, the question is to what extent should the central bank smoothen them (i.e. changing them more frequently, but always only by small amounts). A too aggressive reaction might have adverse effect on the financial sector, as increased volatility in interest rates may seriously harm financial intermediation, increase risk premium and harden the financial conditions and prospects for those in need of finance. Moreover, in case of imperfect knowledge about the transmission mechanism of monetary policy, too aggressive reactions may actually do more harm, raising volatility of both output and inflation (Sack and Wieland 1999). On the other hand, a too mild reaction may prolong the period within which both output and inflation return to their natural and targeted values, respectively. In any case, the “optimal” aggressiveness of the central bank’s reaction to shocks, as assessed by the individuals, may differ across countries and over time, depending on the structure of the economy and the financial sector, and current preferences over inflation and output.⁷

Fourth, the issue of coordination of monetary policy with other macroeconomic policies, especially with fiscal policy, may deserve citizens’ involvement as well. In a case of a shock, both policies may contribute to accommodation of the shock, but the results depend on whether these policies are coordinated and how does the fiscal constitution look like (Buti, Veld and Roeger 2001). Fiscal policy usually lies in hands of elected politicians representing

⁶ Thus, the central bank in countries where output variability is very low, i.e. shocks to output are probably negligible, tend to be more independent in terms of less links with politics, see Berger, Haan and Eijffinger (2001, p. 25).

⁷ Debelle and Fischer (1994) state that countries with greater central bank independence may have lower mean inflation, but tend to have greater output losses during recessions. They show that the US have more stable output and less stable inflation as compared to Germany, and argue that the US could have had more stable inflation if its central bank had been more devoted to fighting inflation.

citizens' interests with respect to fiscal issues, thus the claim for co-ordination may be interpreted as a claim for reflection of citizens' interests regarding the optimal joint reaction of both macroeconomic policies to shocks.

Answering the question of involvement of citizens in one way or another in monetary policy on the sub-constitutional level affirmatively, we now turn to the question of how to safeguard that citizens' preferences over the issues discussed above will be reflected. As mentioned earlier, politics on the sub-constitutional level serves the purpose of transmitting individual preferences into collective decisions. Thus, politics and political institutions such as elected political bodies seem to be an ideal candidate for this purpose. However, at the same time it is exactly politics and elected political institutions that must be prevented from interfering with the central bank's monetary policy.

Two possible solutions to this conflict may be suggested: first, monetary constitution must provide for a separation of these two links between politics and elected representatives on one side and the central bank on the other side, of which the "legitimate" link should be present, while the "illegitimate" one limited. Second, other ways of ensuring the citizens' involvement must be designed, including the use of non-elected elements in politics in a broad sense.

To conclude our argumentation of independence, we argue that on the constitutional level central banks are conceptually fully dependent on citizens' constitutional preferences, but this dependence may have different impact on central bank's performance depending on the type of political institutions that serve to change monetary constitution. On the sub-constitutional level, monetary constitution must provide for a large degree of independence from politics in those areas where politically motivated politicians could be tempted to misuse monetary policy for stimulating the economy for short-term political gains. At the same time, however, on the same level, the monetary constitution should provide for some dependence on citizens' preferences regarding the specific goals and short-term effects of monetary policy.

The issue of how is citizen's control over monetary policy safeguarded if the central bank is made independent is often discussed under the term "democratic accountability" (Amténbrink 1999). Democratic accountability can be defined in general as "a mechanism, existing between holders of delegated power and those who have the formal power to replace them" (Amténbrink 1999, p. 28). Clearly, in democracy, citizens are those that ultimately hold the formal power, thus elements of democratic accountability include all the arrangements that serve to delegate power from the people to their representatives in the state such as elections or checks and balances within a political system. The degree of democratic accountability varies with the degree of direct involvement of citizens: democratic accountability of the directly elected legislative is higher than of the government that is appointed by parliament, thus controlled by citizens only indirectly. From this simple perspective, independent bodies such as the central bank have lower democratic accountability, as they fall outside the scope of direct influence of the electorate.

Again, the concept of democratic accountability suffers under the lack of distinction between two levels on which we can assess institutional structures. Central banks are under democratic control on the constitutional level, i.e. at least indirectly, as their charter is a part of the legal system (or even constitution) that is subject to possible changes by the legislative.⁸ Thus, elements of accountability on this level include on the one hand elements designed also for other constitutional bodies (i.e. rules that serve to change constitutional law) and elements that enhance the assessment of working properties of monetary constitution in place (such as ex post reporting requirements and clear target of monetary policy against which the performance may be evaluated). On the sub-constitutional level, the "lack" of democratic

⁸ Amténbrink (1999, p. 35) follows similar chain of arguments when criticizing the notion of democratic deficit of independent central banks.

accountability of an independent central bank may be even desired in terms of better working properties of such an institutional arrangement. As discussed above, some elements of citizens' involvement even on the sub-constitutional level may be worth implementing, but most mechanisms of democratic accountability will refer to the constitutional level.

Thus, an optimal monetary constitution will feature a specific combination of appropriate institutional arrangements that take into account all areas of relationship between a central bank and politics, and their possible mutual interdependencies. The next sections discuss "older" approaches to monetary constitutions based on theoretical concepts so far developed within constitutional economics and compatible theories such as the German ordoliberalism, concepts of F.A. von Hayek and James Buchanan. Section 6 discusses this multidimensional problem in detail, suggesting several concrete elements that might be of use to employ in today's monetary constitutions.

4. The German ordoliberalism and F.A. von Hayek on optimal monetary constitution

As mentioned above, the German Bundesbank is today recognized as an example for a highly institutionalized degree of central bank independence. It is also believed that this institutional structure has largely contributed to the stability of the German currency. Moreover, the Bundesbank Act served as an example of how an independent central bank should be structured and was used by a number of transition countries in early 1990s, such as the Czechoslovakia in 1990. However, the influence of the theoretical fathers of the "German economic miracle" seems to be ambiguous. Having a stake in the economic policy of the early times of the Federal Republic of Germany, the ordoliberal thinkers of the Freiburg School of Economics, and especially Walter Eucken, cannot be called "advocates" of central bank independence.

It seems reasonable to present first the ordoliberal proposals for an ideal monetary constitution. Although the proposals do not claim for an explicit provision of an independent central bank, they disclose implications that are brought forward in the discussion on central bank independence today. The main message of this section is following: despite no clear evidence that ordoliberals would opt for or against central bank independence, when discussing monetary constitution they always had in mind two conflicting objectives that must be reached via monetary constitution. On the one hand, monetary policy should be insulated against possible misuse for political considerations; on the other hand, however, there should still be some influence of government, i.e. representatives of citizens, in monetary policy to accomplish basic accordance of all economic policies of the state.

Walter Eucken, founder and head of the Freiburg School, defined the objective of the ordoliberal quest for an appropriate institutional implementation of a monetary constitution by posing the "great question of economic policy how a monetary order of a greater stability can be integrated into the economic constitution" (Eucken 1952/1990, p. 259). The ordoliberals however left their quest for a precise proposal of an ideal and sound monetary constitution largely unfinished, mainly due to sudden deaths of Eucken (1891-1950), Miksch (1901-1950) and Gestrich (1895-1943) more than half a decade before the establishment of the Bundesbank. Thus, only Friedrich Lutz remained as a single member of the co-founders of the Freiburg School, continuing in the ordoliberal discussion about an ideal proposal in the post-war era of ordoliberalism.

The above mentioned ordoliberals elaborated four individual proposals of an ideal monetary constitution in the 1930s and 1940s which have to be respected as individual attempts of realizing the primacy of a stable value of money, an essential constitutive principle for establishing Eucken's "envisaged economic system" of free enterprise (Eucken 1952/1990, p. 130).

As Eucken (1949, p. 76) argued, “the industrialized economy needs monetary stability as a prerequisite for implementing a well functioning steering mechanism”. However, as he notes further, “the industrialized economy is characterized by an inherence of monetary instability”. The reason for the immanent monetary instability emerges in his view from an insufficiently designed monetary order (Folz 1970). Eucken (1950) characterizes modern monetary economy as dominated by the “third monetary system”, emerging interdependently along with the economic development of the 19th century and causing the inherent instability. Thus, because monetary stability can be in Eucken’s view safeguarded only by a well-shaped monetary and economic order, and because the emerged third monetary system as a dominant feature of a modern economy does not lead to monetary stability, the system must be replaced.

Eucken (1950, p.163) distinguish between three monetary systems. Within the first monetary system, money is created by the use of a certain commodity as money (Eucken 1950, p.165). The defining feature of this system is the “money-commodity link”, i.e. individuals can decide whether they want to gain utility from the use of the monetary character or from the commodity character of the underlying material used as money whereas the physical appearance of the commodity remains untouched. The second monetary system is characterized by money that comes “into existence as a return for the provision of a good or service” that means by a reimbursement of a commodity, or as a bill of exchange (Eucken 1950, p. 167). Concerning gold or any other material, the second system is similar to the first one due to the individual’s unconstrained possibility to exchange the notes or sight deposits into the underlying commodity. The major difference is of an institutional character, thus by the existence of a financial intermediary that converts gold into notes and deposits. Therefore this system is alike the gold currency.

As far as the emitted notes or deposits are based on confidence rather than on a realized service or underlying asset or commodity, “provisions” in the sense of bills of exchange are closely related to the third monetary system. In this third type, money is created by credit extension of the central bank or commercial banks, respectively, bearing no substantial “internal” value (Eucken 1950, p. 169). A long-term money supply extension is likely to occur in this monetary system because it is based on the behavior of the lender that reacts to the overall demand for money (Eucken 1952/1990, p. 258). Although appreciating liquidity-enhancing aspect of such a system, especially during the phases of the European industrialization, Eucken rejects the third system due to the risks of cumulative contractions and extensions resulting in monetary crises like the Depression or the German hyperinflation (Eucken 1949, p. 77).

Underlining these negative impacts, Eucken highlights the role of the central bank in this regard after the collapse of the Gold Standard. Due to the abolition of the disciplining gold mechanism, governments have had been motivated to act “arbitrarily” with the central bank money supply, as Eucken (1925) criticized already earlier, evoking an unrestricted expansion of paper currency supply and thereby accelerating the inflationary processes of the third monetary system over again (Eucken 1925, p. 2). Furthermore, it is crucial for him that the loss of the automatically triggered conduction of monetary policy within third monetary system allows the central bank unrestricted discretionary powers.

To sum up, Eucken’s major objective is to roll back the money supply by commercial banks created by credit extension or contraction respectively as well as to discipline central bank money creation to prevent an excessive issue of notes. Eucken’s proposal is based on the commodity reserve currency elaborated by Benjamin Graham in 1937 (Eucken 1952/1990, p. 264). This concept is based on the implementation of agencies trading certificates akin options of commodity bundles that include consumer goods and raw materials. The price of each standardized bundle is determined by the weighted unit prices of the underlying products and materials. An increasing price level leads to a sale of certificates by the agency, resulting

in an expansion of the supply of consumer goods and raw materials in an economy and simultaneously in a contraction of the money supply. In the case of decreasing prices, certificates are bought by the agency, the commodity supply decreases and money is released by the agencies.

Eucken appreciates Graham's conception due to the analogue mechanism the commodity reserve currency has in common with the gold currency emphasizing the advantage that the value of the emerging money is linked "to the value of many commodities" rather than on the "value of one commodity" (Eucken 1952/1990, p. 262). Apart from that, the commodity reserve currency fulfils Eucken's ideal conception of an automatic adjustment of the money supply that depends on the movement of prices (Eucken 1925, p. 12) rather than on particular discretionary or "political decisions" (Eucken 1952/1990). This is a crucial point in Eucken's argumentation. Control over money should not be subject to political manipulation, but should be supportive for sound economic development.

In addition, Eucken integrates a central bank to Graham's concept that has the sole right to emit bank notes and coins but restricting any discretionary operations by setting up a functional link between the agencies and the central bank (Eucken 1952/1990, p. 263). In order to achieve this requirement, Eucken seeks to tie the central bank to the automatic working mechanism of the agencies' operations resulting in an overall adjustment of the central bank monetary supply in accordance to the movements of commodity prices. Enforcing this objective for commercial banks too, to prevent a demand-driven credit expansion in the case of increasing commodity prices, Eucken makes the arrangement in his proposal to limit their ability to create deposit money by a 100-percent minimum reserve ratio. Implementing this precaution stemming from the Chicago-Plan and Lutz's proposal by the way, the central bank is able to control the supply of commercial bank money where as itself is tight to the mechanism of the commodity reserve currency. Hereby Eucken achieves the subordinate aim of rolling back the supply of money, based on the third monetary system, besides the realization of implementing a value of money stabilizing mechanism disclaiming any discretionary operations for the central bank.

Gestrich (1944/1957) made an alternative proposal for an ideal monetary constitution. He emphasizes that the central bank should have a "wide range of discretionary competences" in order to be able to handle the problems of modern monetary economy (Gestrich 1944/1957, p.108). However, without specifying how the board of the central bank would be appointed, Gestrich is aware of the discretionary magnitude of power he attributes to this institution. Eucken (1952/1990, p. 259) criticized the assigned range of discretionary power to the central bank, rejecting Gestrich's proposal as insufficiently designed, bringing the risk of the abuse of the monopoly in favor of governmental interests. This is in line with the ordoliberal message highlighted in the beginning of the section: monetary constitution must be robust enough to prevent narrow political interests take control monetary policy.

Lutz (1936/1962) also criticized the properties of the third monetary system. He considered the market form of competition as not applicable for the money creation process, preferring a monopoly in his proposal that ensures an "appropriate monetary policy" of "superordinate aspects" (Lutz 1936/1962, p. 32). He argued that the central bank should be the only exclusive institution to control the monetary growth, and commercial banks should be limited in their power to issue money. In order to achieve that objective, he favored the 100%-reserve ratio to be applied to commercial banks. As a matter of fact, Lutz' proposal leads to a reconstruction of financial institutes, dividing commercial banks in two separated divisions: one division is concerned with current accounts and its operations, i.e. giro business based on central bank currency, the other division deals with the extension of credits i.e. lending business based on equity and central bank deposits. The central bank intervenes in this business by adjusting the discount rate and by open market operations in "cooperation" with "ministry of finance", as Lutz outlines.

Thus, what Lutz wanted to accomplish was to have a monetary order where the central bank could exercise full control over money, but at the same time, this control should be somehow linked to citizens' preferences via political system (the mentioned role of ministry of finance). However, Eucken (1952/1990, p. 260) criticized this proposal, arguing that it lacks an automatic working mechanism in favor of an institution retaining discretionary elements that can easily be abused to finance "fiscal policy of governments". Thus, Eucken was aware of the risk of a monetary constitution where political representatives would have too much power over monetary policy.

Miksch (1949a, p. 322) disbelieves the assumption that the market form of competition is not applicable for money creation. Therefore, Miksch opposes the dominating assessment of the Freiburg School, arguing that a central bank arrangement, i.e. a monopolistic monetary order, is unlikely to defend the interest of all individuals against particular interest of political parties, government or other interest groups (Miksch 1949a, p.322). Thus, he rejects any monopolistic solution of the ordoliberal quest, but opts for a competitive monetary constitution. The role of the central bank is downgraded to "technical modalities of coinage" (Miksch 1949b, p. 155). The "metric monopoly", as he names this institution, controls the quality of the coins, whereas the money creation itself is determined by the individual choice of the citizens using the currency. Hence, Miksch (1949b, p. 155) wants to reintegrate the first monetary system in his proposal, leaving the credit supply to commercial banks that are forced to emit solely acceptance credits and credits based on saving accounts to prevent a runaway credit business like in the repudiated third monetary system (Miksch 1949a, pp. 319-320). Other elements of this institutional solution include the 100% reserve ratio as well as a rejection of the fiduciary issue of notes by the central bank. His proposal for an ideal monetary constitution is today respected as a "forerunner of a free-banking system", though receiving little attention within the Freiburg School, probably to his sudden death the year after his proposal (Terres 1999, p. 10).

Again, the motives for the competition in currency are based on the notion that monopolistic arrangement is much easier to misuse for political reasons. The same reason was also mentioned by Hayek (1976), who revived the vision of a competitive monetary order in the mid 1970s with his concept of the "denationalization of money" (Hayek 1976).⁹ Although being historically not a member of the Freiburg School, he can be assigned to this theoretical tradition of looking for an ideal economic order (Vanberg 1988). His basic idea is to abolish the duty to accept central bank notes, allowing private commercial banks to emit money and thereby setting up the conception of currency competition. Hayek's motivation is to withdraw the state from abusing his power over the money creation process due to his notion that "all governments of history have used their exclusive power to issue money in order to defraud and plunder the people" (Hayek 1976, p. 16). The abolishment of the monopoly in the creation of money and allowing commercial banks to issue their own currency leads to competition as a discovery process towards stable currencies. Therefore, Hayek's proposal is directed on the realization of the overriding ordoliberal principle of ensuring a stable value of money.

Comparing Hayek's and Miksch's proposals, one can conclude that although being separated by thirty years, both challenging concepts reject discretionary or rule-based interferences in the market process by a single institution like a central bank, thus favoring competing money-issuing institutes that discipline the participating central bank and the government to emit stable money. However, one major difference is that Miksch prefers gold-covered competitive

⁹ Of course, in his earlier works written during 1930s, similarly to Eucken, Hayek discussed the commodity-based currency and the Graham's proposal of 100%-reserve ratio.

currencies, while Hayek relies on the competition and its disciplining influence on the actors under a denationalized monetary constitution.

A systematic overview of the ordoliberal proposals for an ideal monetary constitution can be presented in the following Table 1.

Table 1: Ordoliberal proposals for monetary constitution

| | Eucken | Gestrich | Lutz | Miksch | Hayek |
|---------------------------------------|---|-----------------|-------------------------------|--|---|
| Market form | Monopoly | Monopoly | Monopoly | Competition | Competition |
| Actor of the creation of money | Central bank tied to operations of agencies | Central bank | Central bank | Metric monopoly, and commercial banks as money suppliers Individuals as demanders | Central bank and commercial banks as suppliers Individuals as demanders |
| Manner of intervention | Automatically triggered due to commodity reserve currency 100% Reserve | Discretionary | Discretionary 100% Reserve | No intervention but gold cover 100% Reserve | No intervention Due to currency competition as discovery process for stable money Nearly 100% Reserve |
| Main objective | Primacy of a stable value of money | | | | |

It is largely assumed that the monopolistic oriented proposals of the Freiburg School of Economics and Eucken’s fundamental principle of monetary stability was or is the main theoretical basis for the post-war monetary constitution implemented in the West Germany, featuring the strong anti-inflationary and independent Bundesbank. Bibow (2004) corrects this perception, depriving the historical link between the Freiburg School and their influence on the establishment of the German Bundesbank. Bibow (2004, p. 1) claims that ordoliberalism has had no impact on the emerging monetary constitution in Germany as it had on the economic constitution of the Federal Republic of Germany after the second World War. In this regard, Bibow (2004, p. 30) argues that the relatively large degree of independence as a specific feature of the German monetary constitution after 1945 does not lend itself to ordoliberal legacy and that it rather can be attributed to “allies’ policy”. The ordoliberal proposals indeed do not bear a claim for an independent central bank. Although the institutional arrangement for a central bank itself is an essential feature of the monopolistic monetary constitutions represented by Eucken, Gestrich and Lutz, none of them described its institutional set-up in detail, retaining substantial information on its position within the political system for the government.

Recognizing the circumstance that the ordoliberals never articulated a joint proposal for a monetary constitution, Bibow’s “no-impact theory” holds in a historical dimension concerning the surprisingly high degree of independence of the central bank anchored in the emerging monetary constitution in Germany. Bibow (2004, p. 15) stresses his point of view by referring to an unpublished report by Walter Eucken from the year 1946 titled “On the nationalization of the central bank”, in which the founder of the Freiburg School of Economics presents his ideas on how a “central bank could be integrated into a system of state control”. In this unpublished report, Eucken rejects the idea of the central bank independence. He emphasizes the need to coordinate monetary and fiscal policy because of the risk to “jeopardize” other government’s policies if the central bank conducted a monetary policy “in opposition to the general economic policy of the state” (Eucken 1946 cited in Bibow 2004, p. 16). Refusing “an all too independent central bank”, Eucken prefers an

institution exposed to “precisely state control, which would make it impossible to conduct its own economic policy against the state” (Bibow 2004, p. 16). Therefore, Bibow’s arguments that central bank independence does not lend itself historically to ordoliberal determination in the case of the German Bundesbank is backed by Eucken’s report and based on the fact that the members of the Freiburg School left the specific intuitional design of a central bank undefined to their successors.

Peter Bernholz’ (1989, p. 28) claims that “a minimal position exists, however, which would have been accepted probably by all German neo-liberals: an independent central bank obliged by law to preserve stable currency”. However, this is not supported by Bibow (2004, p. 19) due to the different theoretical contents of the ordoliberal proposals. Bernholz’ motivation is to try to overcome the basic problem that the ordoliberals’ struggle for a unique monetary constitution ended up unsorted. Based on the fact that since 1946 Eucken, Miksch and other colleagues like Otto Veit were involved in the implementation process of a federal independent central bank system, Bernholz (1989) claims this circumstance as an evidence that they could have agreed on the institutional shape of the Bundesbank. Following that conceptual interpretation, central bank independence might have been a central feature in the design of a sound monetary constitution many ordoliberals could have agreed on. Therefore, Bernholz (1989, p. 29) finds it “not surprising that such a minimal solution emerged after the war in the Federal Republic of Germany”.

However, despite the historical evidence that Eucken opposed the central bank to be independent, the argument made by Bernholz (1989) should not be subject to unconditional rejection because of the reason that central bank independence actually conceptually fits into the ordoliberal monopolistic monetary constitution. Although focusing on something akin currency competition as an ideal monetary constitution in general, one has to mention that Miksch (1949c) also argued in favor of an independent central bank. Analyzing central bank independence, Miksch (1949c) highlights the basic need for such an institutional feature with the Bundesbank, just one year after the monetary reform in the three occupied zones of West Germany (Miksch 1949c, p. 517). Although risking an institutional “dualism” that tends to evoke serious fractions between the government and an independent central bank just like Eucken argues in his unpublished report, Miksch (1949c, p. 518) differs from Eucken in his judgement on central bank independence.

Miksch (1949c, p. 519) argues that the independence of central bank towards government might help the bank to realize and maintain stability in the value of money, an assignment he characterizes as “one of the principle tasks of human society”. Nonetheless, Miksch (1949c) also wants the central bank to cooperate with the government, but solely as far as it is compatible with the realization of monetary stability. In this regard, he compares the necessary independence of the central bank to fulfill these objectives with the independence of a judge in that way that both are bounded to their corresponding rules and laws, revealing his preference for rule-based central bank independence in this regard (Miksch 1949, p. 519). This supports the argument by Bernholz (1989) that central bank independence is in a conceptual harmony with an ideal ordoliberal monetary constitution. Later, Bernholz (2003) underlines his point of view with the empirical evidence that independent central banks tend to conduct a monetary policy that meets the criterion of monetary stability better than dependent central banks.

In addition, Bibow’s argument that Eucken did not want the Bundesbank to be independent does not actually pose any trouble, as we are focusing on optimal monetary constitution that could have elements of both dependence and independence on politics. The proposals made by ordoliberals actually stressed the need to have this ambivalent link to political representatives. Thus, what Eucken was stressing was related to the elements of dependence, and should the citizens want the central bank to co-ordinate its policies with government, there are institutional possibilities how to ensure it. At the same time, however, the need to

make the central bank free from political pressures to make it able to concentrate on maintaining price stability would require granting a certain degree of independence, an issue Eucken had not discussed in his unpublished note. Nevertheless, as described above, Eucken explicitly mentioned the necessity to insulate central bank from narrow political interests.

To sum up, central bank independence is not a feature ordoliberalism explicitly demanded or concentrated on, but is a desirable conceptual element that is in line with the ordoliberal theory. It is quite ambiguous due to the plurality of proposals to identify an ideal monetary constitution out of the perspective of the Freiburg School of Economics. However, the ordoliberal successors tend to prefer a monopolistic monetary constitution including an independent central bank (Issing 1997; Issing 1993; Bernholz 1989; Bernholz 2003).

5. James Buchanan on optimal monetary constitution

Constitutional economics carries on the ordoliberal legacy in conceiving the economic and monetary order as a subject of choice of rules and their corresponding constitutions respectively. Although being historically unlinked, there is some methodological analogy between ordoliberalism and constitutional economics, as stressed by Vanberg (1988, p. 28). Therefore, constitutional economics can be seen as a modern follower of the ordoliberal tradition for reviving the quest for suitable institutional arrangements that evoke individual mutual gains from participating in the occurring game under the chosen rules.

Concerning an ideal monetary constitution, James M. Buchanan as the founder of constitutional economics has made the basic assumption that any monetary framework should “produce predictability in the value of money” as a criterion for constitutional efficiency (Buchanan 1962, p. 402; Buchanan 2004, p. 15). His fundamental objective towards an ideal monetary constitution is somehow equivalent to Eucken’s primacy of a stable value of money (Eucken 1952/1990, p. 255). However, Buchanan’s definition tolerates a smooth inflation rate that should be foreseeable for the individual participants on the money market. Hence, out of a broader perspective, ordoliberalism and constitutional economics tend to focus on the same criterion for an ideal monetary constitution, namely monetary stability.

Apart from the “predictability of the value of money” prerequisite, the quest for an ideal monetary framework has to comply with the constitutional concept of the legitimation of rules and constitutions. Referring to the contractarian approach presented above, an ideal monetary constitution has to meet the constitutional interests of the individuals who are exposed to the arising monetary rules. Accordingly, any monetary constitution has to be legitimated by the collective consent on the major objective and their institutional arrangements it evokes in its environment. Recalling the overriding prerequisite, there has been an evolutionary process in constitutional economics concerning preferred monetary orders that are understood to realize the predictability criterion in an adequate way:

In the early 1980s, Brennan and Buchanan (1981) proposed four different institutional arrangements or “regimes” of monetary orders to achieve the major objective of monetary stability. The first regime accounts for a free currency competition between private institutions without a participating central bank. The second regime is made up by currency competition based on the Hayekian concept of the “denationalization of money” including a national central bank or more if foreign currencies were allowed to enter the money circuit. The third regime respects Friedman’s proposal for a rule-based monetary policy by central bank, leaving the commodity reserve currency as a fourth regime. The last regime was positively assessed by Buchanan, Hayek and Eucken, as it considerably limits the central bank’s discretion and thus also the possibility to misuse the power over monetary policy.

In one of his recent contributions, Buchanan (1990b) presented himself as an advocate of a constitutional monetary structure “that closely resembles the competing-currency scheme, advanced by F.A. Hayek” (Buchanan 1990b, p. 111). Referring to the European Economic

and Monetary Union (EMU) in this respect, Buchanan discloses his preference for a competitive monetary structure. The central point in his argumentation is based on the Hayek's argument of "disciplinary pressures" from currency competition that lead to the emission of stable money (Buchanan 1990b, p. 112). At the Cato Institute's Annual Monetary Conference in 2003, Buchanan further re-emphasized this point of view, arguing that the European Union missed "the great opportunity to set up something akin Hayek's competition currency regime" (Buchanan 2004, p. 14).

However, Buchanan's revealed preference for competition in currency does not exclude the possibility of having monopolistic monetary constitution. Referring to the European Central Bank, Buchanan (2004) acknowledges its "independent and external determination" i.e. the principal focus on price stability and "constitutional efficiency", i.e. institutional arrangement that reflects constitutional interests of citizens for "predictability" in the value of money.

To sum up, constitutional economics does not clearly state how an optimal monetary constitution should look like. In principle, it could be both competitive and monopolistic currency regime, depending on the preference of citizens when choosing the rules. However, when opting for monopolistic monetary regime, one has to admit that independent central banks tend to have better institutional prerequisites than dependent ones to maintain stability of the currency.

6. Monetary constitution: between independence and dependence on politics

The preceding sections provided enough arguments for having independent central bank that, at the same time, remains tied to the political system. Both the ordoliberal tradition and more recent contributions on optimal monetary constitution stressed the need to have a monetary order that would be supportive of economic development and sound economic policies and simultaneously immune against political pressures. In this section, we discuss individual elements in monetary constitutions that serve to link central banks and politics in the above-mentioned perspective. The best way to start the analysis is to review the basic definitions and dimensions of independence and democratic accountability, as discussed in the theoretical and empirical literature.

6.1 Overview of literature

As Eijffinger and Haan (1996) summarize, most authors provide no clear definition of central bank independence. Friedman (1962) defines an independent central bank as "an independent branch of government coordinate with the legislative, executive and judicial branches, and with its actions subject to interpretation by the judiciary". In his perspective, an independent central bank is established through a constitutional provision that is subject to change only by constitutional amendment. As such, the central bank would not be subject to direct control by either executive or legislative.

However, when speaking about independence, what most authors mean is that the central bank is independent from elected policymakers in at least one of the three basic areas: in personnel matters, financial matters, and policy formulation and execution. Personnel independence refers to the role of elected policymakers in appointment procedures. Financial independence relates to the financial relationship between government and the central bank and includes two main dimensions: the role of elected politicians in provision regarding the central bank budget (budget independence) and the possibility of government to get direct or indirect loan financing from the central bank.

As regards the independence in policy, Debelle and Fischer (1994) distinguish between goal independence and instrument independence. A central bank with goal independence could itself decide on final goal of monetary policy and on how to solve the trade-off between price and output stability in cases of shocks, adjusting its policy accordingly. Instrument

independence means that the central bank is free to choose its instruments by which it seeks to reach its goals.

Alesina (1988), who argues in favor of isolating the central bank from direct political pressure from the current executive, points out that it is not easy to define and measure central bank independence. According to him, the degree of independence is affected by at least four factors:

- (a) the institutional and formal relationships between the central bank and the executive (such as who and how often appoints central bankers, the presence of government officials in the board of the central bank, requirements of government's approval of specific policies),
- (b) informal relationships and contacts between central bankers and members of the executive,
- (c) budgetary and financial relationships between the central bank and the executive, and
- (d) macroeconomic relationships, such as the existence of rules forcing the central bank to accommodate fiscal policy.

Grilli, Masciandaro and Tabellini (1991, p. 367), in their seminal paper on measuring central bank independence, identify independence with "autonomy to pursue the goal of low inflation", arguing that "any institutional feature that enhances the central bank capacity to pursue this goal will increase central bank independence". They also distinguish between two types of independence: political independence, which they identify with the capacity to choose the final goal of monetary policy, and economic independence, which in their view is the capacity to choose the instruments with which to pursue the goals. This distinction is similar to goal versus instrument independence of DeBelle and Fischer (1994), but it slightly differs as Grilli, Masciandaro and Tabellini (1991) further specify the content of both political and economic independence.

As they write, political independence, i.e. the ability to choose a final goal of monetary policy, is determined (and thus can be measured) by three aspects:

- (a) the procedure for appointing the members of the central bank governing bodies,
- (b) the relationship between these bodies and the government, including legal provisions for resolving a possible conflict between them,
- (c) the formal responsibilities of the central bank (i.e. whether it has monetary stability among its goals).¹⁰

On the other hand, economic independence is described by

- (e) the influence of the government in determining how much to borrow from the central bank,
- (f) the nature of the monetary instruments under the control of the central bank.

Similarly to Alesina (1988) and Grilli, Masciandaro and Tabellini (1991), Cukierman (1992), when designing his indicators of central bank independence, identifies four main dimensions of independence:¹¹

- (a) appointment, dismissal, and term of office of the chief executive officer of the bank,

¹⁰ These three aspects, slightly revised, form the policy independence of Eijffinger and Schaling (1993).

¹¹ See also Cukierman et al. (1992)

- (b) resolution of conflicts between the executive branch and the central bank and the degree of participation of the central bank in formulation of monetary policy and in the budgetary process,
- (c) final objectives of the central bank as stated in its charter,
- (d) legal restrictions on the ability of the public sector to borrow from the central bank.

Additionally, Cukierman (1992) also mentions other issues that influence the central bank independence and thus its ability to pursue price stability: monetary policy instruments, intermediate targets and indicators, quality of central bank's research department, the degree of development of financial markets, other roles of the central bank (banking supervision, advisor to government), exchange rate system (fixed, fixed with a band or flexible), the marketability of government securities and relative size of government as a borrower on capital markets.

Some theoretical literature mainly that based on the dynamic inconsistency model (Rogoff 1985; Lohmann 1992; Debelle and Fischer 1994) identifies central bank independence with the relative weight on inflation in the central bank's loss function, i.e. its inflation aversion or conservatism. This leads them to the conclusion that there is an optimal degree of independence (i.e. conservatism), as a too conservative central bank would not react optimally to shocks. In line with Berger, Haan and Eijffinger (2001), we argue that independence and conservatism should not be mixed up: a perfectly independent central bank in the usual sense (i.e. able to make decisions independently of government) can still optimally react to shocks, provided that institutional arrangements create incentives for the central bank to do so.

Interestingly, the literature focusing on democratic accountability of independent central banks discusses similar elements of monetary constitution as the literature on independence. Amtenbrink (1999) reviews the literature and identifies eight main areas in which democratic accountability of central banks can be evaluated: legal basis, objectives of monetary policy, relationship with the executive branch of government, appointment procedures, override mechanisms, relationship with the legislative, transparency, and budgetary accountability. These criteria partially overlap with criteria on central bank independence, indicating that in every area the resulting institutional arrangement will probably lie somewhere between dependence and independence.

The theoretical and empirical literature on central bank independence provides a starting point for our discussion of elements that are of use in monetary constitutions, but it must be treated carefully as it does not take the constitutional economics perspective, arguing either in favor of more independence or against it. As mentioned before, however, we argue that the aim of the monetary constitution is not to grant as much as possible independence, but to design carefully the institutional arrangements so that the central bank is isolated from political pressures when pursuing the goal of price stability, but at the same time reflects citizens' preferences if necessary. If we look at the literature on central bank independence from this perspective, we find surprisingly little to this point of view.

On one hand, one strand of literature directly or indirectly argues for as much as possible independence (Grilli, Masciandaro and Tabellini 1991; Cukierman 1992), having in mind the benefits of independence in terms of better chances to attain low inflation. This strand of literature does not deny that central banks ultimately remain in the political realm, so that their claim for independence is in our terminology only to be exercised on the sub-constitutional level. Nevertheless, they totally neglect the discussion about how to take into account citizens' preferences over several serious trade-offs that may occur in the daily practice of monetary policy.

The other strand of literature, in contrast, argues that it is not possible to delegate monetary policy to an independent institution (Friedman 1962), because this would mean that the

control of money would be concentrated in a body that is free from any kind of direct effective political control. This strand of literature does not even explicitly recognize that central banks remain under political control on the constitutional level, as monetary constitution may be changed by constitutional means if elected representatives of citizens deem it appropriate. Further, it takes into account the possible negative influence of elected politicians that would control the bank, as they could put pressure on the bank and force it to exercise policy in their short-term political interests, but offers only one solution, namely that of imposing rigid rules for monetary policy.

The constitutional economics brings a synthesizing perspective to the recent debate. We have to analyze carefully the consequences and working properties of different institutional frameworks of monetary policy, opting for that one that would offer us as citizens of a community the most favorable expected benefits in terms of macroeconomic management. In following, we discuss several institutional arrangements in monetary constitution that we consider the most important.

6.2 Level of legislation of monetary constitution

At what political level should the monetary constitution be legislated? Surprisingly, the level on which the central bank's charter is legislated seldom enters the indices measuring central bank independence. However, we believe that the level – or more precisely the ease with which the charter can be changed - is a crucial factor in determining the factual independence of central bank and the conduct of monetary policy.

We argue that a written monetary constitution should be legislated as a constitutional law, for example as a part of the political constitution or at least at the same level. The reason is that only then the credibility of monetary constitution is safeguarded, regardless of its precise content. If it were ease for the executive to change the law on the central bank with some simple majority, the central bank would not be effectively insulated from political pressures, as government could always threat to change the law if it does not agree with the central bank policy. Constitutional law often requires a qualified majority or consent of (at least) two political bodies of different composition, so that only those changes have chance to come through that are in interest of a large number of players with different preferences.¹²

Legislating monetary constitution as a constitutional law is an effective solution to the problem of the optimal relationship between central banks and politics. On one hand, it prevents the executive to change the law easily, thus granting a considerable independence to the central bank from daily politics. On the other hand, it may serve to transmit legitimate preferences over some trade-offs regarding short-term effects of monetary policy. As Alesina (1989, p. 65) argues, “it is very difficult, if not impossible, completely to eliminate indirect and informal political pressure over central bankers”.¹³ We argue that this elimination is even not desirable. If the pressure is strong enough to change constitutional law, the probability that the preferences for the change are legitimate is high, and thus they should be implemented.

Moser (2000) argues that countries with a legislative system that comprises at least two veto players with different preferences have higher costs of withdrawing the independence and are thereby more credible in supplying a legally independent central bank.¹⁴ Similarly, Bernholz

¹² However, Grier (1991) shows how the legislature used threats to change Federal Reserve's status in order to induce desired change in monetary policy despite the lack of consensus across political spectrum.

¹³ Similarly, Moser (2000) argues that almost any central bank is in fact dependent on the legislators who can change the law.

¹⁴ See also Keefer and Stasavage (1998) who provide both thorough discussion and empirical evidence of the role of checks and balances in the political system, e.g. multiple veto players, in the credibility of delegation of

(2001, p. 8) argues that “without separation of powers, for instance in an autocracy, there can, however, be no credible commitment to a stable monetary constitution”. Thus, the more difficult it is for a political group to change the constitution alone, without any other group’s consent, the higher credibility of what is legislated at the constitutional level, including the monetary constitution.

We can use Moser’s argument to argue the other way round. Politicians often use threats to change monetary constitution if they are unsatisfied with current monetary policy (for example, in their views “too restrictive” policy). However, only if there is a consensus across the political spectrum that the central bank’s policy is not appropriate, the threat to change the monetary constitution becomes real. In such a situation, the central bank will actually adjust its policy accordingly, so that the change to law will not be necessary. The threat functions as an effective means of transmitting preferences individuals to central bank policy.

6.3 Policy objectives

The issue of monetary policy objectives can be discussed at three basic levels. At the first level, we may ask whether the central bank’s charter should include policy objective(s). Clearly, more arguments will probably be in favor of having explicit policy objectives. The main one, as mentioned by Amtenbrink (1999, p. 44), is that the lack of a statutory objective results in the difficulty in giving a fair judgment of the performance of the bank.

At the second level, as monetary policy can influence at least to some extent not only the price stability, but also employment and output growth, the issue of whether the statute should include single or multiple objectives must be clarified. Moreover, in the case of multiple objectives, the question of their mutual relationship arises: should they all stand on equal footing, or should there be a hierarchical order?

The existence of multiple objectives would imply that the central bank could choose which one it is going to follow if the objectives are in conflict, a choice that should be in principle made in accordance with citizens’ preferences. It is questionable whether the central bank should have such goal independence. Debelle and Fischer (1994) argue that both theoretical considerations and empirical evidence suggest that the central banks should not have it. Moreover, the consensus today is that the central bank can actually influence in the medium run only inflation, and that price stability is a precondition to sustainable economic growth. Hence, most central banks are granted a clear mandate to maintain price stability, thus a single objective, rather than a set of multiple objectives.¹⁵ Choice of single objective also simplifies the monitoring of central bank performance and limits the discretion of central bank to switch deliberately (or under pressure) between different objectives at different occasions. From our perspective, having a single objective allows the central bank to be better isolated from political pressures. For example, Ilieva et al. (2003) argue that central banks with a single objective are more likely to be less subservient to central governments than central banks with a plurality of vague objectives.¹⁶

monetary policy. Cukierman (1994) makes a similar point, emphasizing that the more political costly it is for politicians to override central bank’s decision, the higher independence.

¹⁵ Cukierman (1992) states that whether the statute of a central bank defines price stability as the primary policy goal can be considered as a proxy for the “conservative bias”.

¹⁶ Berger, Haan and Eijffinger (2001) show that most of legal indicators for central bank independence give a central bank a higher score if price stability is the primary objective of the central bank, even if it implies less goal independence. In contrast, Posen (1993, p. 44) argues that “the explicit inclusion of price stability as “the” goal in a central bank’s charter cannot be shown to explain any cross-national differences in inflation or growth variability either”, and is thus an unimportant element in optimal monetary constitutions.

The hierarchical ordering of objectives, starting with price stability in the top, is to be preferred over multiple objectives with equal importance, but the insulation from political pressures is in such case less safeguarded than in the case with one single objective only, as politicians could misuse the uncertainty related to whether the primary objective was already achieved or not.

At the third level, the issue of definition of price stability must be clarified. Setting the quantitative monetary target is one of the issues where citizens should be in principle involved even on the sub-constitutional level. Amtenbrink (1999) discusses three basic arrangements: discretion of the central bank to set a quantitative target, target approach where the target is set by political bodies different from the central bank, and contract approach where the quantitative target is set in a contract between the central bank and other political bodies. All three arrangements may be found in practice and seem to work: the European Central Bank or the Czech National Bank have discretion in setting the quantitative target, while Bank of England does not. The contract approach can be found in New Zealand.

If the central bank has discretion to define what should be considered as price stability, i.e. to set the inflation target, it has goal independence in a narrow sense, despite having just a single objective in its charter. In principle, such an arrangement does not have to be necessarily in conflict with the principle of citizens' involvement, as other mechanisms could force the bank to set such an inflation target that is in line with citizens' preferences. For example, if the central bank is too conservative and sets a too low inflation target, it may trigger opposition that may eventually lead to revisions of its status in the legislative, an intervention that central banks would clearly like to avoid. Moreover, other mechanisms may allow political bodies to put pressure on the central bank if it sets a target not enjoying large degree of support across the political spectrum, such as the appointment or dismissal procedures or overriding schemes. However, it is important that these mechanisms cannot be misused for short-term political goals. Thus, as Mangano (1998) states it, the resulting central banker's conservatism is the endogenous result of a whole set of incentives he faces.

Within the target approach, political bodies set the inflation target (or an intermediate monetary target such as the monetary growth). In order to insulate the central bank from political pressures, it is necessary that the power to set inflation target be with political institutions that represent overall citizens' preferences rather than particular short-term political interests. Thus, the body in charge should not probably be the government or single institution, but consent of two or more political bodies that represent different constituents should be required. For example, two legislative bodies where representatives are elected via different systems can be considered, or in a federalist structure, the consent of representatives of different regions and representatives of parties in the legislative elected across the regions could be demanded.

The contract approach is actually an interesting combination of the two preceding cases. The quantitative target is set by consent of the central bank and a political body (for example government). This has three main advantages: first, involvement of the central bank that has statutory objective to maintain price stability serves as a safeguard that government will not be able to put through too relaxed monetary policy. Second, the professional knowledge accumulated in the central bank may provide a solid base for setting a realistic target. Third, government or other political body represents at least part of citizens' preferences, so that the central bank would probably opt for reaching a consensus with the political body in order to minimize possible opposition. However, to prevent government from using it for political goals, the contract arrangement must be supplemented by additional provisions that would specify what happens if the consent about the target is not reached. In such a case, the target approach involving two other political bodies could step in.

6.4 Instrument independence

The famous “rules versus discretion” debate is much older than the dynamic inconsistency research program.¹⁷ Already Simons (1936) discussed an optimal monetary constitution as to whether the central bank should have discretion or should be bound by a rule, and this issue was largely discussed in the 1960s, especially following the Friedman’s proposal of legislating the “constant-rate-of-growth-of-the-money-supply rule” (Friedman 1962). In terms of central bank independence terminology, putting a central bank under some rigid rule means limiting instrument independence in the sense of Debelle and Fischer (1994). They emphasize that the message of Barro and Gordon (1983) regarding how to solve the inflationary bias stemming from dynamic inconsistency of optimal monetary policy is to implement a rigid rule, effectively eliminating central bank’s instrument independence. As Cukierman (1992, p. 445) argues, “price stability may be achieved either by granting sufficient independence to the central bank or by adhering to a rule”. Rigid rules such as fixed exchange rate regime limit the discretion of a central bank, so that it is even not meaningful to speak about independence.

Debelle and Fischer (1994) show empirically that instrument independence is negatively related to inflation performance. Thus, is it desirable to limit instrument independence? From the perspective that we follow here, namely of finding optimal link between politics and the central bank, legislating a rule such as constant growth of money or fixed exchange rate does not itself provide solution to the problem of dual role of politics in monetary policy. On the one hand, if monetary policy is bound by a rule, the scope for politicians’ intervention is clearly limited. On the other hand, however, the flexibility of monetary policy as to unexpected shocks is eliminated, and hereby the possibility of members of the society to influence the reaction to an external shock.

An important issue is who would set the rules, i.e. whether the rules would be included and legislated in the monetary constitution or not. Alesina (1989, p. 65) shortly elaborates on a possible institutional arrangement, effectively suggesting that not the executive, but the legislature would be able to set up with qualified majority “the general rules governing monetary policy”. In such a setting, the executive, which has usually only a simple majority, could not abrogate the rules. What Alesina (1989) actually asks for is that the monetary constitution, which would be agreed and legislated on the constitutional level, should also include provisions regarding the “monetary regime”, i.e. the set of means designed to reach a given goal.

Alesina (1989) does not presume that the optimal rule should be some kind of a fixed rule. As he writes, “the optimal rule may, in fact, leave some role for stabilization policy by specifying under what circumstances which policy action ought to be taken” (p. 65). He is also against too simple rules: as “simple rules may perform rather poorly under exceptional circumstances, one may want to leave a certain degree of discretionality in policymaking to avoid the risk of being institutionally locked into a monetary rule which becomes highly inefficient in a particularly exceptional time” (p. 65).

In line with Alesina (1989), we argue that simple rigid rules should not form a part of an optimal monetary constitution. Rigid rules may be regarded as a substitute to the appropriately designed independent central bank, not a part of it, and only in the short run.¹⁸ Rigid rules may help to stabilize the economy and to gain credibility for own monetary policy, but they should be used only temporarily. As the experience of many countries with fixed exchange rate, including European and Asian countries, but also Mexico or Argentina,

¹⁷ For an overview of the rules versus discretion debate, see Blinder (1987) or Bofinger (2001).

¹⁸ However, Bernhard et al. (2002) show that in many countries fixed exchange rate regime co-existed with central bank independence.

has shown, to peg the currency to an anchor currency without the clear aim of future monetary integration will sooner or later lead to a currency crisis with real costs. Similarly, monetary growth rate rules work only within the environment of stable money demand, a condition that may soon cease to exist, as it did in the past, and further reliance on such rules may cause more harm than good. If the trade-off is between bad and politically sensitive discretion and rigid rules, then rules may be a welcome solution. But we argue that there are mechanisms how to reach a working discretion via appropriate institutional design.

Should monetary constitution include at least some “flexible” rules, as demanded by Alesina (1989)? Today, many central banks use a sort of Taylor rule within their macroeconomic models, a “formula” that expresses the central bank’s reaction function. It is hard to imagine how such a rule could be legislated, as the specific reaction depends on many uncertain, by the central bank estimated variables (such as output gap or inflation expectations). In addition, the reaction function is usually undergoing some changes over time to reflect changes in the economy’s structure. Moreover, such a rule would not help to solve the problem of the dual link between central bank and politics: politicians would simply change their rhetoric and put pressure on the setting and interpretation of the inputs into the formula.

6.5 Role of non-elected representatives (financial sector)

As Cukierman (1992, p. 450) argues, price stability is more valuable in countries with relatively large financial market, as costs of high inflation are proportional to the size of the financial sector. Thus, financial sector is said to be one of the main consistently inflation-averse players within an economy also on the sub-constitutional level, and it may be asked whether we could somehow use this aversion when designing monetary constitution.

In his seminal article, Posen (1993) claims that granting central banks independence from short-term political pressure will lead to lower inflation only if there is a coalition of interests for strong anti-inflationary monetary policy. Posen (1993, p. 42) argues that “the relative power of this coalition, and not the institutional structure of policy-making explains the portion of cross-national inflation differences normally ascribed to the independence of central banks”. According to him, the role of this coalition is played by the financial sector, and he constructs a measure of what he calls “effective financial opposition to inflation” (FOI), showing that this indicator predicts both the central bank independence and inflation and stands behind the usually detected correlation between these two.

As he correctly notices, the effective opposition to inflation has two dimensions that must be conceptually separated: the preference for low inflation itself and the effectiveness of transmitting this preference to real outcomes. Clearly, the financial sector’s aversion to inflation rests on the negative effects of inflation on the profits it makes from long-term lending business. This means that a financial sector where banks and loans play a major role will be much more averse to inflation). As regards the effectiveness, Posen (1993, p. 49) argues that “the ability of the financial sector to influence the government’s willingness to fight inflation is largely dependent upon the polity’s willingness to defer to expertise... the financial sector gains access to elected officials by being their main outside source of information and advice about monetary policy”. He lists two factors that influence the effectiveness of financial opposition to inflation: party fractionalization and federalism. In a country where the party system is fractionalized, the logrolling activities are more probable and thus issues such as monetary policy may be bargained off against other issues and diminish the financial sector’s influence. On the other hand, in a federal system of government, the federal government usually concentrates on nation-wide issues such as monetary policy, and places a premium on those groups, such as the financial sector, that can offer a unified front across regions.

Posen (1993, p. 46) argues that the changing relative strength of interests and not the institution’s structure is the source of policy decisions. However, we argue that, first, interests

and institutions are two sides of a coin, and second, that we have to differentiate two levels on which interests influence policy decisions. As to the first issue, institutions determine to what extent interests will be implemented in practical policy. For example, the level on which the monetary constitutions are legislated – an issue that can be regarded as an issue of monetary constitution in general – definitely influences the possibility to implement politicians' interests.

To the second one, on the constitutional level, the advisory function of the financial sector may be an effective means of forming legitimate preferences over the overall degree of anti-inflationary aversion that a society should implement, as financial sector's experience and professional knowledge provides an important informational input into qualified decisions by members of the society. On the sub-constitutional level, however, the influence of the financial sector over government would not always be the ideal means for daily practice of monetary policy. Financial sector represents only one part of existing interests in the society, and its strong aversion to inflation may lead to such solutions of the short-term trade-offs in monetary policy mentioned earlier which are not optimal from a point of view of all citizens.

Nevertheless, we may use Posen's (1993) arguments in a slightly modified way. As financial intermediaries are harmed by inflation, it may be effective to use their natural opposition to inflation in the design of a monetary constitution that would safeguard price stability, if it were accompanied by an institutional arrangement that would allow for some flexibility as regards optimal reaction to shocks. In such a setting, the role of the financial sector needs not to be limited to advisory function to government. On the contrary, a more active role of the financial sector's representative in the daily practice of monetary policy may be considered, for example via their direct involvement in monetary policy-making.

6.6 Appointment procedures and terms of office

Appointment, re-appointment and dismissal procedures and terms of office of central bank's chief executive officers (bank board members) belong to the most important features of any monetary constitution as regards the extent to which central bank will eventually be insulated from short-term political pressures. As Lohmann (1998, p. 401) writes, "politicians may use their powers of appointment to ensure that central bank appointees share their electoral and party-political goals".

In principle, there are five main issues within this area. First, what body should be in charge of appointing, reappointing and eventually dismissal of the board members? Obviously, if the appointment responsibility is with one political body only, the insulation from political pressure is higher if the body does not fully share the interests of government. Such a condition might fulfill for example one chamber of parliament where the government party does not have majority. If government has simple majority in the chamber and the chamber should be the one deciding on board members, a qualified majority may be required for appointing central bank officials.

However, better insulation can be reached by introducing checks and balances and dividing the appointment power among more (at least two) political bodies with different political interests. For example, Lohmann (1998) claims that the factual independence of the German Bundesbank was in the past partly safeguarded by the division of power to appoint members of the Bundesbank Council between the federal government and the regional state governments. As Federal and Land elections are staggered, electoral incentives of federal and Land appointees do not necessarily coincide, thus the appointment power of federal government was not sufficient to influence monetary policy, for example before federal elections. Next to arrangements using the federal structure of the political system, the checks and balances in appointment may also make use of different election systems to different chambers of parliament or the president office, and of different terms and times of election to different political bodies etc. At the same time, all these arrangements allow to transmit

preferences over the short-term impact of monetary policy, but only if there is a consensus across the political spectrum.

Cukierman (1992, pp. 394-395) claims that the lower the involvement of the executive or the legislative branches in appointments of the central bank board members, the higher independence. However, from our dual-link perspective, if a smart checks-and-balances scheme is introduced, the bank may be independent from short-term pressures, but at the same time reflect citizens' preferences in situations where they should be reflected.

Second, should there be any preconditions for the qualification of the candidates? Such preconditions may help to use in-built preferences of the candidates. One possibility would be for example to have a part of the board be appointed from the representatives of the financial sector, hereby using their natural opposition to inflation. On the other side of the spectrum, in order to reflect citizens' preferences within the game, representatives of political bodies (for example from government) may be eligible to become board members.

Third, should the term of office be renewable? The answer to this question from our perspective depends also on the other features in the area of appointment. As Amtenbrink (1999) argues, it make sense to have renewable terms because the body (or bodies) in charge of the appointments comes into a position where it can pass a judgment on the performance of the board members by either re-appointing or replacing them. On the other hand, the possibility of reappointment can make those board members interested in a continuance of their career in the bank vulnerable to potential pressures by the body in charge of re-appointment. Thus, if the power to appoint/reappoint is with a single political body with short-term political pressures, the non-renewable term of office may be preferable, whereas where checks-and-balances in appointment procedures exist, the reappointment possibility may serve as an important trigger for better performance of the central bank.

Fourth, how long should be the official tenure? Cukierman (1992) appreciates the long (14 years) and overlapping nature of terms of individual board members as a smart device to limit the president's ability to influence the central bank policy in the US. In order to limit the short-term orientation of central bank officials that could try to maximize their re-appointment chances, the tenures should be rather longer and should not overlap with those of the appointing bodies. In contrast, Amtenbrink (1999) claims that short tenures may enhance the accountability of the central bank vis-à-vis the appointing body by giving the latter a chance to review the performance of the appointees in regular and short intervals. However, as the impact of monetary policy on inflation and real economy is usually visible only in the medium-term, the tenures should be rather longer also from the perspective of accountability.

Official length of tenure does not have to coincide with the factual length observed in reality, as the latter will probably depend also on other features of the monetary constitution. When measuring the factual independence of central banks, Cukierman (1992) introduces a new proxy, namely the turnover rate of governors. As he argues, if the actual tenure of governor is shorter than that of the executive branch, the central bank is susceptible to pressures from the executive and is discouraged to implement longer-term policies (see also Haan and Kooi 2000).

Finally, should special conditions exist under which the bank board members may be dismissed? Such conditions may serve as an additional safeguard against political pressures if the checks and balances in the appointment power are not sufficient or fail to work properly. However, specifying such conditions more in detail is difficult, as monetary policy operates with high degree of uncertainty, thus binding the dismissal for example with failure to reach the inflation target would not be the best option given the many other factors that may have prevented the central bank to hit the target.

6.7 Conflict resolution

The last area of elements of monetary constitution that serve to link central banks and politics relates to arrangements for mitigation of policy conflicts. Clearly, within the game, there might be situations in which political bodies disagree with the monetary policy stance adopted by the central bank. However, from the perspective adopted here, only those disagreements that reflect the conflict in interests between the central bank on one hand and the consensual view of citizens on the other hand may be solved in favor of political bodies, while the rest should be left in favor of the central bank. Many of the above mentioned elements may actually serve this purpose: the possibility to rewrite monetary constitution by the legislative or to re-appoint or dismiss central bank officials if there is overall disagreement with their policies serve as mechanisms for solving conflicts. However, a question remains whether some other, more direct arrangements should be allowed for where possible conflicts would be discussed and solved?

Lohmann (1992) and Moser (2000) describe the so-called “overriding scheme” that allows for example the government to override policy decisions of the central bank. Should such an overriding scheme be allowed for? There is a high probability that the body in charge will misuse such an overriding scheme for its short-term political motives if there are no checks and balances in such scheme. Thus, as Moser (2000) shows, overriding should be possible only if it lies in hands of two veto players with different preferences.

In any case, there are also other, more “soft” schemes for policy conflicts discussion and resolution. Goodhart (2002) describes the “exchange-of-letters” arrangement in the UK in which the central bank must explain in a public letter to government (Chancellor) why an eventual dismiss of inflation target happened and the strategy it will aim at in order to bring the inflation back towards target, including the effects on output. As he writes, “so, very cleverly, the current regime of inflation targeting in the UK has an inbuilt mechanism for restoring the decision-making process to the political arena whenever the short-term trade-offs look to become really difficult and potentially contentious” (Goodhart 2002, p. 102).

7. Conclusions

In this paper, the central bank independence was discussed from the constitutional economics perspective. We have argued that when speaking about central bank independence, it is necessary to distinguish between constitutional level, on which the monetary constitution as agreed upon by citizens of the society, and sub-constitutional level on which the monetary game is played. Clearly, the central bank is fully dependent on the constitutional level, as the monetary constitution might be changed via constitutional politics, while on the sub-constitutional level the link between politics and central bank may be intentionally reduced.

Most authors argue that the central bank should be independent from politics. However, we have argued that to some degree political representatives should be able to influence some of the activities of the central bank even on the sub-constitutional level. Thus, what we should be looking for is not maximum central bank independence imaginable, but an optimal monetary constitution that would safeguard the “dual” link between central bank and politics. On the one hand, the central bank should be insulated from politically motivated short-term pressures. On the other hand, the legitimate interests of citizens, as represented in the political markets, should be allowed to influence the central bank even on the sub-constitutional level, especially as to the final quantitative goal of monetary policy and the reaction to some shocks.

From the perspective of this ambivalent link with politics, we have first reviewed the basic concepts regarding monetary constitution proposed by the main authors in the constitutional economics or other compatible research programs, such as the German *ordo-liberalism* or Hayek’s work. Subsequently, we have discussed several elements of monetary constitution

that can safeguard this specific dual link between central banks and politics, such as strong checks and balances in appointment procedures or overriding schemes.

All in all, we believe that the current claims for central bank independence must be interpreted with caution: in any case, central bank stay in the political system in a wider sense, providing us with a collective good of price stability. Monetary constitution should aim at an optimal balance between independence and dependence on politics, reflecting the common interests of members of a society.

8. References

Akerlof, G., Dickens, W., Perry, G. (1996): The macroeconomics of low inflation. *Brookings Papers on Economic Activity*, 1, 1-59.

Alesina, Alberto (1988): *Macroeconomics and Politics*. NBER Macroeconomics Annual, Cambridge University Press, Cambridge.

Alesina, Alberto (1989): Politics and Business Cycles in Industrial Democracies. *Economic Policy* 8, pp. 55-98.

Alesina, Alberto – Summers, Lawrence H. (1993): Central Bank Independence and Macroeconomic Performance: Some Comparative Evidence. *Journal of Money, Credit and Banking* Vol. 25 No. 2 (May 1993).

Alesina, Alberto – Gatti, Roberta (1995): Independent Central Banks: Low Inflation at No Cost? *American Economic Review* Vol. 85 No. 2 (May 1995), pp. 196-200.

Amtenbrink, F. (1999): *The Democratic Accountability of Central Banks*. London, Hart Publishing.

Barenboim, Peter (2001): *Problems of Banking Reform and Independence of the Bank of Russia*. Nikitski Club, Rablaw, Moscow

Barro, Robert J. – Gordon, David B. (1983): Rules, Discretion and Reputation in a Model of Monetary Policy. *Journal of Monetary Economics* 12 (1), pp. 101-121.

Beblavy, Miroslav (2003): Central Bankers and Central Bank Independence. *Scottish Journal of Political Economy* Vol. 50 No. 1, pp. 61-68.

Berger, Helge – Haan, Jakob de – Eijffinger, Sylvester C.W. (2001): Central Bank Independence: An Update of Theory and Evidence. *Journal of Economic Surveys* Vol. 15 No. 1, pp. 3-40.

Bernhard, William - Broz, J. Lawrence – Clark, William Roberts (2002): The Political Economy of Monetary Institutions. *International Organization* Vol. 56, Issue 4, Autumn 2002, pp. 693–723.

Bernholz, Peter (1989): Der deutsche Neoliberalismus und das Problem einer stabilen Währungsverfassung. In: Walter-Eucken-Institut (ed.): *Geldwertstabilität und Währungsordnung*. Mohr, Tübingen, pp. 1-36.

Bernholz, Peter (2001): Monetary Constitution, Political-Economic Regime, and Long-Term Inflation. *Constitutional Political Economy* Vol. 12 No. 1, pp. 3-12.

Bernholz, Peter (2003): Währungsordnung und Inflationsneigung: Die Bedeutung unterschiedlicher Währungsordnungen angesichts politisch bedingter Inflationsneigung. In: Vanberg, Viktor (ed.): *Währungsordnung und Inflation*. Mohr, Tübingen, pp. 61- 79.

Bibow, Jörg (2004a): Reflections on the current fashion for central bank independence. *Cambridge Journal of Economics* Vol. 28 Issue 4, pp. 549-577.

- Bibow, Jörg (2004b): Investigating the Intellectual Origins of Euroland's Macroeconomic Policy Regime: Central Banking Institutions and Traditions in West Germany After the War. The Levy Economics Institute of Bard College Working Paper No. 406.
- Blackburn, Keith – Christensen, Michael (1989): Monetary Policy and Policy Credibility: Theories and Evidence. *Journal of Economic Literature* 27 (1), pp. 1-45.
- Blanchard, Oliver (2003): Comments on Inflation targeting in transition economies; Experience and prospects, by Jiri Jonas and Frederic Mishkin. Mimeo, April 2003.
- Blinder, Alan (1987): The Rules-versus-Discretion Debate in the Light of Recent Experience. *Weltwirtschaftliches Archiv* 123 (3), pp. 399-414.
- Bofinger, Peter (2001): *Monetary Policy: Goals, Institutions, Strategies, and Instruments*. Oxford University Press, Oxford.
- Brennan, Geoffrey – Buchanan, James M. (1980): *The Power to Tax: Analytical Foundations of the Fiscal Constitution*. Cambridge University Press, Cambridge.
- Brennan, Geoffrey - Buchanan, James M. (1981): *Monopoly in Money and Inflation*. Institute of Economic Affairs, London.
- Brennan, Geoffrey – Buchanan, James M. (1985): *Reason of rules: constitutional political economy*. Cambridge University Press, Cambridge.
- Buchanan, James M. (1958): *Public Principles of Public Debt*. Richard D. Irwin, Homewood, Ill.
- Buchanan, James M. (1962): Predictability: the criterion of monetary constitutions. In: Eager, Leland B. (ed.) (1962): *In search of a monetary constitution*. Harvard University Press, Cambridge.
- Buchanan, James M. (1975): *The Limits of Liberty*. The University of Chicago Press, Chicago and London.
- Buchanan, James M. (1990a): The Domain of Constitutional Economics. *Constitutional Political Economy* 1 (1), pp. 1-18.
- Buchanan, James M. (1990b): Europe's Constitutional Opportunity. In: *Europe's Constitutional Future*. The Institute of Economic Affairs, London.
- Buchanan, James M. (2004): Constitutional Efficiency and the European Central Bank. *Cato Journal*, Vol 24, No 1-2, pp. 13- 19.
- Buti, Marco – Veld, Jan in't – Roeger, Werner (2001): Monetary and Fiscal Policy Interactions Under a Stability Pact. In: *Fiscal Rules*. Banca d'Italia, 2001.
- Buchanan, James M. – Tullock, Gordon (1962): *The Calculus of Consent: Logical Foundations of Constitutional Democracy*. The University of Michigan Press, Ann Arbor.
- Buchanan, James M. – Wagner, Richard M. (1977): *Democracy in Deficit*. New York, Academic Press.
- Canzoneri, Matthew B. (1985): Monetary Policy Games and the Role of Private Information. *American Economic Review* 75 (5), pp. 1056-1070.
- Chowdhury, Abdur R. (1991): The relationship between the inflation rate and its variability: the issues reconsidered. *Applied Economics* Vol. 23 Issue 6, pp. 993-1003.
- Cukierman, Alex (1992): *Central Bank Strategy, Credibility and Independence. Theory and Evidence*. The MIT Press, Cambridge, Massachusetts.

- Cukierman, Alex (1994): Commitment through Delegation, Political Influence and Central Bank Independence. In: Beaufort Wijnholds, J.A.H. – Eijffinger, S.C.W. – Hoogduin, L.H. (eds): A Framework for Monetary Stability. Kluwer Academic Publishers, pp. 55-74.
- Cukierman, Alex – Webb, Steven B. – Neyapti, Bilin (1992): Measuring the Independence of Central Banks and Its Effect on Policy Outcomes. World Bank Economic Review Vol. 6 No. 3, pp. 353-398.
- Debelle, Guy – Fischer, Stanley (1994): How Independent Should a Central Bank Be? In Jeffrey C. Fuhrer (ed.): Goals, Guidelines and Constraints Facing Monetary Policymakers. Boston, Federal Reserve Bank of Boston, Conference Series No. 38, 1994, pp. 195-221.
- Dehay, Eric (2003): L'indépendance de la banque centrale en Allemagne: des principes ordolibéraux à la pratique de la Bundesbank. In: Commun, Patricia (ed.): L'ordolibéralisme allemande. Aux sources de l'économie sociale de marché. CIRAC, Cergy-Pontoise, pp. 243-255.
- Eijffinger, Sylvester C.W. – Schaling, Eric (1993): Central Bank Independence in Twelve Industrial Countries. Banca Nazionale del Lavoro Quarterly Review 184, pp. 1-41.
- Eijffinger, Sylvester C.W. – Haan, Jakob de (1996): The Political Economy of Central-Bank Independence. Special papers in international economics No. 19, Princeton University.
- Eijffinger, Sylvester C.W. – Hoeberichts, Marco (2002): Central Bank Accountability and Transparency: Theory and Some Evidence. International Finance 5:1, pp. 73-96.
- Eucken, Walter (1925): Das internationale Währungsproblem. Gersbach und Sohn, Berlin.
- Eucken, Walter (1949): Die Wettbewerbsordnung und ihre Verwirklichung. In: ORDO, Bd. 2, pp. 1-100.
- Eucken, Walter (1950): The Foundations of Economics. William Hodge, London.
- Eucken, Walter (1952/1990): Grundsätze der Wirtschaftspolitik. Mohr, Tübingen 1990.
- Fischer, Stanley (1993): The Role of Macroeconomic Factors in Growth. Journal of Monetary Economics Vol. 32, Issue 3, pp. 485-512.
- Fischer, Stanley (1995a): Central-Bank Independence Revisited. American Economic Review Vol. 85 No. 2 (May 1995), pp. 201-206.
- Fischer, Stanley (1995b): Modern Central Banking. In: Capie, Forrest – Fischer, Stanley – Goodhart, Charles – Schnadt, Norbert (eds) (1995): The Future of Central Banking. Cambridge, Cambridge University Press, pp. 262-308.
- Folz, Willibald (1970): Das geldtheoretische und geldpolitische Werk Walter Euckens. Duncker und Humblot, Berlin.
- Friedman, Milton (1962): Should There Be an Independent Monetary Authority? In: Yeager, Leland B. (ed.) (1962): In Search of a Monetary Constitution. Harvard University Press, Cambridge.
- Ghosh, A. - Phillips, S. (1998): Warning: inflation may be harmful to your growth. IMF Staff Papers, 45, 672–710.
- Goodhart, Charles A.E. (1995): Central Bank Independence. In: Goodhart, Charles A. E. (1995): The central bank and the financial system. Cambridge: MIT Press, pp. 60-71.
- Goodhart, Charles A.E. (2002): The Constitutional Position of the Central Bank. In: Friedman, Milton - Goodhart, Charles A.E. (2003): Money, Inflation, and the Constitutional Position of the Central Bank. Institute of Economic Affairs, London, pp. 91-109.

- Grier, Kevin B. (1991): Congressional influence on U.S. monetary policy. An empirical test. *Journal of Monetary Economics* 28, pp. 201-220.
- Grilli, Vittorio – Masciandaro, Donato – Tabellini, Guido (1991): Political and Monetary Institutions and Public Financial Policies in the Industrial Countries. *Economic Policy* 13, pp. 341-392.
- Haan, J. de, F. Amtenbrink and S. C. W. Eijffinger (1999), ‘Accountability of Central Banks: Aspects and Quantification’, *Banca Nazionale del Lavoro Quarterly Review*, 209, pp. 169–93.
- Haan, Jakob de – Eijffinger, Sylvester C.W. (2000): The Democratic Accountability of the European Central Bank: A Comment on Two Fairy-tales. *Journal of Common Market Studies* Vol. 38 No. 3, pp. 393-407.
- Haan, Jakob de - Kooi, Willem J. (2000): Does central bank independence really matter? *Journal of Banking & Finance*, Apr2000, Vol. 24 Issue 4, pp. 643-664.
- Haan, Jakob de - Leertouwer, Erik - Meijer, Erik - Wansbeek, Tom (2003): Measuring central bank independence: a latent variables approach. *Scottish Journal of Political Economy*, Aug2003, Vol. 50 Issue 3, pp. 326-340.
- Hallet, Andrew H. – Weymark, Diana N. (2002): Independence before Conservatism: Transparency, Politics, and Central Bank Design. Vanderbilt University, Department of Economics Working Paper No. 02-W02, Nashville.
- Hayek, F.A. (1943/76): Warenwährung. In: Hayek, F.A.: Individualismus und wirtschaftliche Ordnung. Neugebauer, Salzburg, pp. 268-280.
- Hayek, Friedrich A. (1976): Denationalisation of Money. The Institute of Economic Affairs, London.
- Hefeker, Carsten (1995): Monetary Union or Currency Competition? Currency Arrangements for Monetary Stability in East and West. *Constitutional Political Economy* Vol. 6 No. 1, pp. 57-69.
- Hibbs, Douglas A. (1986): Political Parties and Macroeconomic Policies and Outcomes in the United States. *American Economic Review* Vol. 76 Issue 2, pp. 66-70.
- Ilieva, Janet – Harrison, Barry – Healey, Nigel (2003): Central bank independence: cases, measurement and future developments. *European Business Journal*, pp. 147-158.
- Issing, Otmar (1993): Unabhängigkeit der Notenbank und Geldwertstabilität. Steiner, Stuttgart.
- Issing, Otmar (1997): Geldwertstabilität als ordnungspolitisches Problem. *ORDO*, Bd. 48, pp. 167-177.
- Keefer, Philip - Stasavage, David (1998): When does delegation improve credibility? Central Bank independence and the separation of powers. Oxford University, Center for the Study of African Economies Working Paper WPS/98.18.
- Kahn, M.S., Senhadji, A.S. (2001): Threshold effects in the relationship between inflation and growth. *IMF Staff Papers*, 48, 1-21.
- Lippi, Francesco (1999): Central Bank Independence, Targets and Credibility. Edward Elgar, Cheltenham.
- Lohmann, Susanne (1992): Optimal Commitment in Monetary Policy: Credibility versus Flexibility. *American Economic Review* 82 (1), pp. 273-286.
- Lohmann, Susanne (1998): Federalism and Central Bank Independence. The Politics of German Monetary Policy, 1957-92. *World Politics* 50, pp. 401-446.

- Lutz, Friedrich (1936/62): Das Grundproblem der Geldverfassung. Walter-Eucken-Institut (ed.): Geld und Wahrung. Mohr, Tubingen, pp. 28-103.
- Maliszewski, Wojciech S. (2000): Central Bank Independence in Transition Economies. *Economics of Transition* Vol. 8 No. 3, pp. 749-789.
- Mangano, Gabriel (1998): Measuring central bank independence: a tale of subjectivity and of its consequences. *Oxford Economic Papers* Vol. 50 Issue 3, pp. 468-492.
- McCallum, Bennett T. (1995): Two Fallacies Concerning Central Bank Independence. NBER Working Paper No. 5075
- Miksch, Leonard (1949a): Die Geldschopfung in der Gleichgewichtstheorie. *ORDO*, Bd. 2, pp. 308-328.
- Miksch, Leonard (1949b): Die Geldordnung der Zukunft. *Zeitschrift fur das gesamte Kreditwesen*, Jg. 2, Heft 7, pp. 155-158.
- Miksch, Leonard (1949c): Die kunftige Bundes-Bank. *Zeitschrift fur das gesamte Kreditwesen*, Jg. 2, Heft 22, pp. 517-519.
- Moser, Peter (2000): *The Political Economy of Democratic Institutions*. The Locke Institute, Edward Elgar, Cheltenham UK.
- Nordhaus, William D. (1975): The Political Business Cycle. *Review of Economic Studies* 42, pp. 169-90.
- Persson, Torsten – Tabellini, Guido (1994): Designing Institutions for Monetary Stability. In: Persson, Torsten – Tabellini, Guido (eds): *Monetary and Fiscal Policy. Volume 1: Credibility*. MIT Press, Cambridge, Massachusetts, pp. 279-310.
- Posen, Adam S. (1993): Why Central Bank Independence Does Not Cause Low Inflation: There Is No Institutional Fix For Politics. In: O’Brien, Richard (ed.): *Finance and the International Economy: vol. 7*. Oxford University Press, Oxford, pp. 40-65.
- Quaglia, Lucia (2003): European Monetary Integration and the „Constitutionalization“ of Macroeconomic Policy Making. *Constitutional Political Economy* Vol. 14 No. 3, pp. 235-251.
- Rogoff, Kenneth (1985): The Optimal Degree of Commitment to an Intermediate Monetary Target. *The Quarterly Journal of Economics* 100 (4), pp. 1169-1189.
- Romer, David (2001): *Advanced Macroeconomics. Second Edition*. McGraw-Hill, New York.
- Sack, Brian P. - Wieland, Volker (1999): Interest-Rate Smoothing and Optimal Monetary Policy: A Review of Recent Empirical Evidence. FEDS Working Paper No. 99-39.
- Sargent, Thomas J. – Wallace, Neil (1981): Some unpleasant monetarist arithmetic. *Federal Reserve Bank of Minneapolis Quarterly Review* 5, pp. 1-17.
- Selgin, George – White, Lawrence H. (2005): Credible Currency: A Constitutional Perspective. *Constitutional Political Economy* Vol. 16 No. 1, pp. 71-83.
- Simons, Henry C. (1936): Rules versus Authorities in Monetary Policy. *Journal of Political Economy* 44, pp. 1-30.
- Šmıdkova, Kateřina – Tuma, Zdeněk (1999): Soudobe evropske pojetı nezavislosti centralnı banky. *Finance a uver* 49 (9), pp. 507-524.
- Spinelli, Franco – Masciandaro, Donato (1993): Towards Monetary Constitutionalism in Italy. *Constitutional Political Economy* Vol. 4 No. 2, pp. 211-222.

- Svensson, Lars E.O. (1997): Optimal inflation targets, Conservative central banks, and Linear Inflation Contracts. *American Economic Review*, Vol. 87 Issue 1, pp. 98 – 114.
- Tabellini, Guido - la Via, Vincenzo (1989): Money, Deficit, and Public Debt in the United States. *Review of Economics & Statistics* Vol. 71 Issue 1, pp. 15-25.
- Terres, Paul (1999): *Die Logik einer wettbewerblichen Geldordnung*. Mohr, Tübingen.
- Vanberg, Viktor (1988): 'Ordnungstheorie' as Constitutional Economics. The German Conception of a 'Social Market Economy'. *ORDO*, No 39, pp. 17–31.
- Vanberg, Viktor J. (1994): *Rules and Choice in Economics*. Routledge, London and New York.
- Vanberg, Viktor (2004b): Market and State: The Perspective of Constitutional Political Economy. *Freiburger Diskussionspapiere zur Ordnungsökonomik*, 10/2004.
- Veit, Otto (1954): Pecunia in ordine rerum. In: *ORDO* Bd. 6, pp. 39- 79.
- Viner, Jacob (1962): The Necessary and the Desirable Range of Discretion to Be Allowed to a Monetary Authority. In: Yeager, Leland B. (ed.) (1962): *In Search of a Monetary Constitution*. Harvard University Press, Cambridge.
- Walsh, Carl E. (1995): Optimal Contracts for Central Bankers. *American Economic Review* 85 (1), pp. 150-167.

VI POLITICAL ECONOMY OF PUBLIC DEFICITS: PERSPECTIVES FOR CONSTITUTIONAL REFORM*

1. Introduction

Over the past years, the debate on public deficits and public debt reemerged again, mainly as a response to serious problems of number of countries with bringing public finance into balance or surplus. Assuming that too high public deficits are harmful for the economy, a number of proposals emerged in the theoretical and empirical literature since 1950s how to eliminate or reduce them. Public deficit is besides some unexpected external shocks definitely a result of fiscal policy, which lies in the realm of collective choice and is therefore determined in the political process. Thus, the only appropriate way of how to treat the issue of public deficit and its reduction or elimination must inevitably include a deep analysis of the political process and especially the fiscal constitution, i.e. the rules that set incentives for political representatives in the realm of fiscal policy.

This paper was motivated especially by one strand of argumentation that suggests that we treat the problem of fiscal policy in analogy to the already solved problem of monetary policy. In particular, this literature, represented for example by Hagen (2003) or Wyplosz (2002), argues that when expansionary monetary policies were eliminated by the creation of an independent central bank, thus why should not we move the responsibility for fiscal policy to a body independent from the political process?

From the point of view of constitutional economics, the creation of more independent central banks represents nothing else than a constitutional reform of political markets in the area of monetary policy. Even if central banks are nowadays regarded as independent from politics, they *in fact* still remain in the political process in a broader sense. The reason for that is not only that the rules setting responsibilities and duties of a central bank are usually written in the official political constitution of the country and that the representatives running the central bank are selected via political markets (for example appointed by some political body). The main reason is that central banks – regardless of their constitution – conduct activities that we, as members of the society, prefer to be done at the level of collective choice rather than private choice, in the sense of Buchanan and Tullock (1962).¹

From this point of view, creation of an independent body assigned with responsibility for fiscal policy cannot as such solve the problem without discussing the precise constitutional position of such a body in the political markets.

The paper applies the standard analytical tools and arguments from the dynamic inconsistency literature on the issue of public deficit, its origins, and proposals for its elimination via reform of political constitution. A stylized model of dynamic inconsistency of fiscal policy will be presented and basic assumptions discussed. Why do politicians have incentives to run budget deficits if deficits can be also harmful, thus going against the interest of individuals, which in turn may decide not to reelect politicians who run deficits? The answer to this question lies in the intricate nature of political process, in the democratic institutions and in the way deficit financing of public expenditures propagate finally into political choice of individuals.

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¹ The private solution of issuing money, in the literature usually called private banking, is not impossible (see for example Hayek 1976), but there are good reasons to prefer central banking, discussed for example in Goodhart (1988).

After having shown that current political constitution in the area of fiscal policy leads to public deficits, possible solutions in line with those suggested for expansionary monetary policies are discussed. I start with the simple and well-known proposal to legislate a requirement for ever-balanced budget. The problem of this solution is that it is not state-contingent, i.e. in the case of a large external shock it might be in interest of the public to allow for deficit. However, the state-contingent rules, an example of which may be the EMU Stability and Growth Pact allowing for higher public deficits in the case of unexpected shock, are much more difficult to legislate and enforce. Finally, the creation of an independent body assigned with the responsibility for fiscal policy is discussed.

2. Survey of the literature

The paper is related to three lines of work on public finance and political economy. The first line of research aims at answering the question whether government should finance some of the public expenditures via issuing public debt, thus running public deficit by spending more than receiving on taxes. This issue has two basic dimensions that correspond to two roles of fiscal policy, i.e. provision of public goods (together with elimination of externalities and some redistribution or social security) and macroeconomic stabilization.

Balassone and Franco (2001) review the literature and arguments on public debt since the Bible age. Their findings can be summarized as follows: in principle, until 1950s the common approach to the public budget was to have it balanced. As they argue, this rule was probably based on an analogy between government and family finance, but additional economic rationale was found mainly with respect to the historical experience with bringing the state to bankruptcy when the debt rose beyond a certain threshold. To this rule, nevertheless, two exceptions are usually discussed, one related to the public good role and the other one to the stabilization role of fiscal policy.

As regards the former, a distinction between current and capital spending must be made. As Kilpatrick (2001) argues, government decisions on spending may have important implications across generations, especially if large-scale investments to infrastructure produce benefits over more than one generation. In such a case, it is fair that future generations also bear some of the costs, implying debt financing of such projects and imposing some of the burden to repay the debt on future generations. Nevertheless, even within one generation a debt financing can be welfare-enhancing, as argued by Wyplosz (2002), provided that citizens are credit-constrained, thus allowing the government to borrow on their behalf. As a result, a proposal to “double budget” was discussed and implemented in some countries: the budget is split into a current account and capital account. While the current account should be balanced, the capital account can run a deficit. This rule is known as a “golden rule” of public finance.²

As regards the latter exception to the ever-balanced budget, this relates to the current account of the public budget. Balassone and Franco (2001, pp. 42-45) survey the arguments based on Keynesian theory where public budget plays a crucial role in “cushioning the effects of cyclical downswings”. The stabilization role of fiscal policy thus implies that the current account of the budget should be balanced rather over the cycle than within one fiscal year, with deficits in recessions and surpluses in booms, dampening the effects of external shocks.

The second line of research relates to what is known as political business cycle, pioneered especially by Nordhaus (1975). A detailed survey of the political business cycle literature may be found in Mueller (2003) or Wagner (2001). In short, if voters reflect macroeconomic conditions when voting in elections for or against the incumbent government, and if the government maximizes reelection chances, it will always have an incentive to use

² However, a number of practical problems were found when dealing with the golden rule, see Balassone and Franco (2001) or Schneider and Hedbavny (2003) for the discussion.

macroeconomic policy for its political objectives. With respect to preceding argumentation, this would mean that the government does not run the public deficit in order to maximize citizens' welfare, in both public good provision and stabilization roles, but only to maximize political support. In this paper, we concentrate only on stabilization role of fiscal policy.³

Methodologically, this paper belongs to a part of the political business cycle literature that is based on the dynamic inconsistency model, known mainly from the monetary policy (Kydland and Prescott 1977; Gordon and Barro 1983a, 1983b). While in the monetary policy model the policymaker "plays" with inflation, here the policymaker plays with public deficit, which serves as a proxy for expansionary fiscal policy. As both monetary and fiscal policy constitute the macroeconomic stabilization policy, it is necessary to make an assumption about their interaction. In this respect, this paper makes use of the modern game-theoretic approach to the issue, as can be found for example in Buti, Veld and Roeger (2001).

The third line of research emphasizes the necessity to impose rules on fiscal policy and discusses alternative reform proposals. Even if the issue of restraining public finance is an old and ever-lasting one, starting with the notion of the ever-balanced budget and continuing with golden-rule-like constraints (Buchanan and Vanberg 1986; Wildavsky 1980; Brennan and Buchanan 1980; Buchanan 1967; Buchanan 1958), reform proposals attracted a lot of attention quite recently. The main reason was of course the establishment of the Economic and Monetary Union within the EU and introduction of the Stability and Growth Pact aimed at enhancing fiscal discipline of the countries adopting the common currency.⁴ The very recent proposals, made especially by Wyplosz (2002) or Hagen (2003), suggest using an analogy with monetary policy: if making the central bank independent from political pressures eliminates the inflation bias, why should not we make fiscal stabilization policy independent as well, for example by creating a kind of Fiscal Policy Committee? Hence, rather than on fiscal rules we should concentrate on institutional reform in the field of politics, an issue emphasized in constitutional political economy (Buchanan 1975, 1990) and applied for the monetary policy case by Moser (2000).

Before we start with the theoretical background for analysis of constitutional reforms of the fiscal policy, some issues must be clarified. First, in what follows we assume that the government is able to set deliberately the level of public deficit. In reality, this does not have to be always the case: both public revenues and expenditures are to a large extent tied to the performance of the economy, a phenomenon known as automatic stabilizers.⁵ Thus, if a negative shock hits the economy and raises unemployment, higher expenditures on unemployment benefits and lower than expected tax revenues due to a number of companies in default will automatically imply public deficit if the public finances were balanced before. However, we assume that the government has always the power to balance the budget and act against the automatic stabilizers, cutting public expenditures as needed. Thus, letting automatic stabilizers work is equivalent to running public deficit discretionarily.

Second, we abstract from the long-term capital investment motives for issuing debt and concentrate only on the stabilization role of fiscal policy. Thus, when referring to a deficit or surplus, we actually refer to capital-investment-adjusted deficit. This does not have to be a concern if we assume that the government keeps the borrowing for financing infrastructure

³ Political support motives in provision of public goods and redistributive government's policies are largely discussed in other public choice literature, especially within economic theory of regulation or interest group theory, see Mueller (2003).

⁴ For a thorough discussion of the Stability and Growth Pact see Coeure and Pisani-Ferry (2003), Hagen (2003) or Balassone and Franco (2001).

⁵ For automatic stabilizers see Mills and Quinet (2001) or Balassone and Franco (2001).

investment constant, i.e. rolling over the debt. In such a case, any increase of public debt reflects only macroeconomic considerations.

3. The model

The setup of the model is inspired by the seminal dynamic inconsistency model that already became an obligatory part of current monetary policy textbooks (Obstfeld and Rogoff 1996, Bofinger 2001).⁶ However, seen from the political economy perspective, we do not aim at identifying social welfare consequences, concentrating purely on incentives of government with discretionary power over fiscal policy.

Assume a self-interested government or policymaker whose sole interest is to maximize the political support function, and thus the re-election chances. In line with the dynamic inconsistency literature, his objective function is expressed in terms of a loss function that is given by (1) and that will be minimized.

$$L = (y - y^*)^2 + ad^2, \quad a > 0 \quad (1)$$

The loss function, here denoted L , has two main arguments: the real output y and the public deficit d . Both variables enter the loss function L in terms of squared deviations from the targeted values, or policymaker's "bliss" points y^* and d^* , which are treated as parameters, assuming additionally that, for simplicity, $d^*=0$. Thus, both too low and too high levels of output and both public deficit and public surplus are undesirable. The term a denotes the relative weight the policymaker places on the deficit goal as against the output goal.

The specification of the political loss function requires some further clarification. First, why is the political loss function based on deviations rather than on absolute levels of real output and public deficit, and second how, i.e. through which channels, do changes in both variables influence the political support? As regards the first question, there are two possible explanations: first, the government might have announced its desired level of real output and deficit before being elected, thus, while in office, aiming at reaching these levels. Second, the government might recognize that, for the real output, there are some "natural" limits as on the rate of possible increase, thus aiming only at "reasonably high" values of real output, treating too high values equally undesirable as too low values. For the public finance surplus, the government may simply be politically rewarded only for zero public deficits, with surpluses generating no additional political support. Thus, public surplus is not rewarding as the money could be spent on different public projects to maximize political support.

We assume that political support has two related forms. The first, obvious one is the political support in terms of political popularity among potential voters; the other one reflects the necessity to build up reputation of being the "good" government, as seen by independent observers, economic journalists, and international institutions regularly assessing the compliance of their member countries with "best practices of economic policy".⁷ It seems clear that for the first form of political support the real output is the key variable, because of the direct effect on income and wealth of citizens of a country, while for the reputation a prudential and sound fiscal policy aimed at balanced budget plays the role. The reputation is additionally important not only because of the open access of policymakers to the facilities

⁶ Modeling the political incentives of the government using the dynamic inconsistency model represents only one of the possibilities how to capture the inherent motives to run public deficits. For other models, but similar explanation see Persson and Tabellini (2000), Mueller (2003) or Strauch and von Hagen (2000). The advantage of using the dynamic inconsistency model lies in the numerous contributions already written for monetary policy.

⁷ Similarly, in the traditional interest groups literature the policymaker maximizes political support from both voters (potential votes) and interest groups (means for financing election campaigns), see Mueller (2003), chapters 15 and 20.

provided by international institutions to those member states that comply, but as well due to its effect through media on public opinion.

Hence, the specification of the loss function of the government means that citizens are aware of possible negative consequences of public deficit, but only to a limited extent. Molander (2000) emphasizes two basic reasons given in the literature for why citizens do not fully internalize effects of public deficits when generating political support. First, the fiscal illusion, i.e. the natural difference between immediate and visible benefits of extra public spending and related, more concealed and lagged costs in the form of higher taxes, and second, the deficit bias, i.e. the incentive to maximize revenues from public programs and minimize the taxes paid to public budget. Additionally, if we take into account the voter's rational ignorance bias (Mueller 2003), i.e. the rational incentive not to invest resources into complicated analysis of effects of public deficit, the citizens will consider more or less only the *real* income and to some extent the *public* opinion when voting for or against incumbent government. Thus, even if we assume that citizens may know that running public deficit *usually* implies higher long-term interest rates, higher upward price pressures and inevitable rise of taxes in the future, as well as resulting negative effects on real output, they are biased towards present output and resulting consumption.

Government minimizes the political loss function by setting the level of public deficit accordingly, subject to two constraints: first, the IS curve denoting how the economy works, and second, the reaction function of an independent central bank. The IS curve shows how the output depends on structural parameters, fiscal policy, monetary policy and shocks:

$$y = \bar{y} + bd - ci + z, \quad b, c > 0, \quad (2)$$

where \bar{y} stands for potential (natural) output, i denotes the nominal interest rate gap (i.e. the difference between the current nominal interest rate and "natural" interest rate), z represents the supply shock, b gives the responsiveness of output gap (i.e. difference between actual and potential output) to the public deficit and c the responsiveness of output gap to the interest rate gap. We further assume that supply shocks z are distributed with zero mean and a positive variance. The natural level of output corresponds to the natural level of employment that, following Friedman (1968), is determined only by real forces like structure of the labor and commodity markets, costs of mobility etc.⁸ The natural level of interest rate may be understood as such a level that is compatible with natural output, i.e. which neither raises nor lowers the output above or below the natural level. Interest rates are set by the central bank, natural interest rate is assumed to be known and constant.

The relationship (2) is based on the assumption that, within a period, quantities adjust in the short term faster than prices because of existence of menu costs or other real and nominal rigidities that prevent price-setters to change prices. Assume first that there are no external supply shocks to the output and that the central banks acts neutrally (i.e. $i=0$). If a government decides to run public deficit, it will succeed in raising the real output above its potential level. The effect of public deficit on real output follows the traditional logic: public deficit as such will raise the output above its potential level by definition as government consumption forms a part of the GDP. However, there are two other effects: first, public deficit may have a multiplication effect of the private consumption and thus output, and second, because of inflexible prices in the very short run, the fiscal impulse will have only real impact, but no inflation impact that would lower the real value of increased output.

The central bank, which has a sole objective of price stability and long-term horizon, influences the economic activity as shown in equation (2) via changes in policy interest rates

⁸ Alternatively, the potential level of output may be understood as a level that corresponds to the NAIRU, i.e. the non-accelerating-inflation-rate-of-unemployment.

that result from an analysis of output gap.⁹ It is believed in what has been called by Blanchard (2003) “divine coincidence”, i.e. the idea that stabilizing inflation is under some reasonable assumptions equivalent to stabilizing output around its natural level. Thus, it is assumed that if current output is expected to be higher than natural/potential output, i.e. if a positive output gap is expected, inflation pressures will follow, leading the central bank to raise interest rate above the level of natural interest rate, calming the economic activity back to the natural level via standard transmission channels of monetary policy.

The preceding logic can be written formally as follows: due to important lags in transmission mechanism, the central bank must adjust its interest rates *before* the period, using the forecast of the output gap (i.e. expected output minus natural output). Using equation (2), expected output is equal to

$$E[y] = y^e = \bar{y} + bE[d] - cE[i] + E[z], \quad (3)$$

but because expectations of shocks are by definition equal to zero and the interest rate gap is the instrument variable of the central bank, equation (3) simplifies to

$$y^e - \bar{y} = bE[d] - ci, \quad (4)$$

written already in the form of output gap. The central bank sets the interest rate to stabilize the output around its natural level, i.e. to reach a zero output gap. Thus,

$$\begin{aligned} 0 &= bE[d] - ci \\ i &= \frac{b}{c}E[d] = \frac{b}{c}d^e \end{aligned} \quad (5)$$

From equation (5), the central bank reaction function follows that the central bank sets interest rates according to the expected level of public deficit. Central banks regularly assess the so-called fiscal policy stance, i.e. the fiscal impulse coming from the public sector and influencing the rest of the economy. If a fiscal impulse is not neutral, say for example positive, it will raise current output above its natural level. The optimal response of the central bank is to offset fully the effect of expansionary fiscal policy by restrictive monetary policy.

The last building block of the model is a simple assumption that the policymaker’s output bliss point y^* is higher than the natural level of output \bar{y} , thus

$$y^* - \bar{y} = k, \quad k > 0. \quad (6)$$

Within the welfare economics tradition, there has been a large discussion on why should the targeted level of output be higher than natural level. Some have argued that this is because of distortion in the economy like non-lump-sum income taxes or unemployment benefits (Barro and Gordon 1983a); others have shown that labor unions have impact on the level of real wage, unemployment, and thus natural output (Canzoneri 1985). However, from the political economy point of view, the reasons are obvious: the government seeking the political support must target a level of output that is above the current natural level because, when being elected, it usually promised to raise the welfare of citizens.¹⁰

⁹ This logic is typical for inflation targeting central banks, see Coats et al. (2003).

¹⁰ Of course, the government could reach the aim via raising the natural output, using structural policies and indirect, market-comfortable instruments aimed at improving the legislative and institutional framework of the economy. However, this way is much more complicated due to special interest groups that would eventually lose during structural reforms, as well as due to much more delayed positive effects of such policies, see IMF (2004).

4. Discretionary solution

We can denote the interaction of government and the central bank as a game of two players. The government plays with the variable d (public deficit), minimizing the political loss function, subject to the IS curve and the central bank's reaction function:

$$\min_d L = \left[\bar{y} + bd - c\left(\frac{b}{c}d^e\right) + z - (\bar{y} + k) \right]^2 + ad^2 = \left[b(d - d^e) + z - k \right]^2 + ad^2 \quad (7)$$

Differentiating with respect to d and setting equal to zero yields

$$\frac{\partial L}{\partial d} = 0 = 2b[b(d - d^e) + z - k] + 2ad \quad (8)$$

Thus, the optimal public deficit d^{opt} will be set as follows:

$$d^{opt} = \frac{b^2}{a + b^2}d^e + \frac{b}{a + b^2}k - \frac{b}{a + b^2}z \quad (9)$$

The central bank “plays” with the interest rate gap that depends on the expected public deficit d^e . What level of public deficit should a central bank rationally expect? At the first sight it seems reasonable to assume that the central bank should expect the level announced by the government as its target (or bliss point, i.e. $d^e=0$ in our model), and set policy neutral interest rates. However, this is not rational: if the central bank expects a zero deficit, the government will set the deficit according to the equation (9)

$$d^{opt} = \frac{b}{a + b^2}k - \frac{b}{a + b^2}z. \quad (10)$$

Thus, even without any shocks the government will run a positive public deficit. Hence, expecting a zero deficit is not rational from the central bank's point of view. The rational expectations of public deficit must take into account the government's optimal response, i.e. the expected deficit must be equal to expectation of the government's optimal deficit,

$$d^e = E[d^{opt}] = E\left[\frac{b^2}{a + b^2}d^e + \frac{b}{a + b^2}k - \frac{b}{a + b^2}z \right] = \frac{b^2}{a + b^2}d^e + \frac{b}{a + b^2}k, \quad (11)$$

where we made use of the certainty equivalence principle, i.e. that expectation of expectation (of the deficit) is simply the expectation itself, and of the assumption of the zero mean of shocks z . As a result, the rationally expected level of public deficit is equal to

$$d^e = \frac{b}{a}k. \quad (12)$$

Substituting equation (12) back into the optimal response function of the government (9) yields – with the exception of the effect of shock z – the rationally expected level of public deficit (subscript D stands for “discretionary” equilibrium level):

$$d^D = \frac{b}{a}k - \frac{b}{a + b^2}z. \quad (13)$$

Substituting (12) into (5) yields the equilibrium interest rate gap

$$i^D = \frac{b^2}{ac}k, \quad (14)$$

which substituted into the IS curve (2) together with the public deficit (13) gives the real output y :

$$y^D = \bar{y} + \frac{a}{a+b^2} z \quad (15)$$

As we can see, the output is equal to the natural output and a proportional part of shock z . The shock does not transmit fully to the output as would one think from the specification of the IS curve (2) due to the stabilization role of fiscal policy: as $\frac{a}{a+b^2} < 1$, the government actively uses the fiscal policy to accommodate the impact of shocks on real output and adjusts the public deficit accordingly because of political support concerns. From (15) also follows that government did not succeed in raising output above the natural level in spite of expansionary fiscal policy. As a result, the economy remains operating on a potential level, but suffers from higher than necessary deficits and higher than necessary interest rates, leading to inefficiency and lower expected political support for the government,

$$E[L^D] = \frac{a}{a+b^2} \sigma^2 + \frac{a+b^2}{a} k^2 \quad (16)$$

(σ^2 stands for the variance of shocks z).

Why is the discretionary solution inefficient? Assume that the policymaker could credibly pre-commit to follow zero-deficit fiscal policy in times of no shocks and to use public deficits to stabilize output in response to the supply shocks z . Such commitment would correspond to maximizing a modified political loss function

$$L = (y - \bar{y})^2 + ad^2, \quad a > 0, \quad (17)$$

in which k is set to zero. Using equations (10), (12) and (13), it is easy to show that in times of no shocks the public deficit will be zero and in case of a shock the deficit will be set according to

$$d^C = -\frac{b}{a+b^2} z \quad (18)$$

(subscript C stands for “commitment” equilibrium level). Thus, if a negative shock hits the economy, government will run a public deficit to get output back towards the natural level, but not completely back due to political support concerns given by the second part of the political loss function. On average, the central bank and the public will expect zero budget deficits and get natural output,

$$y^C = \bar{y} + \frac{a}{a+b^2} z \quad (19)$$

while the political loss of the policymaker will be (using the original political loss function) equal to

$$E[L^C] = \frac{a}{a+b^2} \sigma^2 + k^2, \quad (20)$$

and thus lower than in the discretionary case. The public is left with natural output on average, i.e. the same is in the discretionary case, but with no public deficits and neutral interest rates. The policymaker is also better off now.

If a pre-commitment technology to follow a rule such as (18) were easy to introduce, the government would gain by having it in place. However, any announcement by the government that it will onwards follow the rule (18) is not credible, since the government has

always an incentive to disobey the rule and surprise the public with public deficits as the real objective function of the government is (1) and not (17). Indeed, the best strategy for the government to follow is a dynamic inconsistent strategy, i.e. to announce before the “game” that zero-deficit fiscal policy will be followed, influencing the central bank’s expectations d^e , but as soon as the game starts to set the deficit according to (10) and surprise the public and the central bank. In this “surprise” case, the government would on average gain more political support than in both discretionary and pre-commitment cases (i.e. lower political loss)

$$E[L^S] = \frac{a}{a+b^2} \sigma^2 + \frac{a}{a+b^2} k^2. \quad (21)$$

In the surprise case, the public deficit would equal to the one already given in (10), i.e to

$$d^S = \frac{b}{a+b^2} k - \frac{b}{a+b^2} z, \quad (22)$$

while the output would equal to

$$y^S = \bar{y} + \frac{b^2}{a+b^2} k + \frac{a}{a+b^2} z, \quad (23)$$

i.e. it would be higher than natural output even in case of no shocks.

Nevertheless, as we have already mentioned, this strategy cannot in fact succeed as the central bank behaves rationally and will never expect a zero deficit if the government has discretion to choose the fiscal policy according to its political support function. As a result, a positive public deficit will be expected, leaving the government with the only option to reaffirm it, as delivering a zero deficit if a positive one is expected is according to (9) not rational (yields higher political loss) if there are no shocks hitting the economy.

5. Enhancing fiscal discipline: introduction to constitutional analysis

As we have seen, political motivations of the government lead to an inherent deficit bias of the public finance, implying higher deficits and interest rates than necessary. Before we discuss any of the reform proposals that would eliminate this bias, we have to clarify two questions, both regarding normative issues. First, who should judge which proposal is best to implement? Second, according to which criteria the judgment should be made?

As regards the first question, the only entitled entity that should decide on what is the best are of course the citizens. The ideal – in reality rather unattainable – is a consensual and unanimous decision. As regards the second one, citizens would of course decide according to their individual utility functions, which we may make dependent only on the output y . However, and this is the main difference, the decision must be made on a constitutional level in the sense of Vanberg (1994), i.e. taking into account all possible future contingencies and resulting impact of alternative proposals, and not only on the sub-constitutional level of current period.¹¹

The difference between these two levels can be illustrated by comparing the discretionary, surprise and commitment cases of the “public deficit game” described above. If the utility function depends on y , in the sub-constitutional stage (i.e. within the current period) the highest output is attained in the surprise case. Thus, if the decision were made in the sub-constitutional stage, the citizens would propose to be surprised by the government and,

¹¹ A key assumption used in constitutional analysis is that of “veil of uncertainty” by decision on alternative proposals, i.e. impossibility to preview citizen’s future position within the society, ensuring that the constitutional reform adopted will not harm any certain group and thus be on average “fair”, see Buchanan and Tullock (1962) or Buchanan (1975). Here, however, we treat the fiscal policy as unselective, having on average the same impact on all citizens, so that the assumption is not needed.

additionally, to even eliminate the independence of the central bank that counteracts the surprise by rationally expecting higher public deficits.

On the constitutional level, when looking over more than one future period, the picture is much different. Citizens know that, without independent central bank, lasting public deficits would bring inflation, macroeconomic instability, doubts about the government solvency to repay all of its debts, leading to higher risk premium demanded for holding government bonds, and even a financial and currency crises, which would definitely mean lowering real output. As the independent central bank can partly prevent such a negative scenario to come out, the citizens would consensually retain the independent central bank, which serves as a kind of constitutional protection against large macroeconomic instability. However, even with independent central bank and thus the discretionary case of the game, the economy still suffers under higher than necessary public deficits, worsening the government's credibility as of being able to repay all the accumulated debt in the future, as well as under higher than necessary interest rates if compared to the commitment case. Higher interest rates (especially the long-term interest rates due to future expected deficits and future high short-term interest rates) would calm the private investment activity, having negative effects on future levels of natural output. As a result, on the constitutional level the citizens would rather choose the commitment type of the game than the discretionary one.

Any policy measures that would make the output higher than natural one are from the citizens' constitutional perspective undesirable, but equally undesirable are shocks that would push output above or below the natural output. As a result, the individual objective function is made to be dependent on the output gap, with smaller output gap yielding higher utility.

If the government was given the fiscal policy tool to stabilize the economy, which seen from the constitutional level is a reasonable objective to give to the government, but if it misused the tool to boost the economy only because of political considerations, a natural response of the citizens when considering constitutional reform can have two basic modalities. The first one is to impose some rules on how the government can operate the public budget, possibly limiting the use of deficit financing of public expenditures in case of no shocks, while the second one is to take the power to run public deficits completely away from the government. The basic aim of the constitutional reform must be, as Kopits (2001, p. 59) argues, "to confer credibility to the conduct of macroeconomic policies by removing discretionary intervention".

In the following, I discuss three proposals to reform fiscal constitution, trying to remove the discretionary power from the government: a return to the ever-balanced budget, state-contingent rule, and establishment of a from the government independent institution in charge of fiscal policy (so called fiscal policy committee, FPC). All three proposals are heavily being discussed in current literature on fiscal policy (Wyplosz 2002; Calmfors 2003) from different angles. Here, the emphasis is put on credibility of discussed institutional arrangements by answering following "constitutional questions" or "parameters": Who decides on the level of deficit and how? In what (legal) form is the decision made? How difficult it is for the government to reverse the already agreed-on decision? How is the decision enforced? What sorts of new incentives are introduced?

There are also other suggestions about how government can be limited in their fiscal behavior. One strand of literature suggests that we can rely more on financial markets, as these punish unreasonable spending and debt accumulation via demanding higher risk premium (Hedbavny et al. 2005). In this chapter we do not focus on this issue, nevertheless the existing evidence suggests that even if financial markets can be helpful, there is still some scope for further improvements in institutional framework governing fiscal decisions.

The normative ideal in constitutional economics is to have an unanimous decision as to the "rules of the game", but not necessary as to decisions made "within the game" on the collective level, especially due to transaction costs (see Buchanan and Tullock 1962). Thus,

we do not assess individual reform proposals with respect to how much “democratic” they are, i.e. to what extent the citizens themselves have influence on setting the level of deficit. We assume that all citizens share the objective of macroeconomic stability to the same extent, but decided to delegate the decision and implementation to a public body (be it the government or not) that can specialize in recognizing optimal reactions to shocks better than the average citizen, ensuring at the same time an appropriate incentive structure for the body.

6. Return to the ever-balanced-budget rule

The first possibility of reforming the fiscal constitution is to re-impose the ever-balanced-budget rule, a “standard” approach to public finance before 1960s (see Balassone and Franco 2001). Thus, as a rule, the public budget should be balanced in all periods.¹² A clear advantage of such a fixed rule is its simplicity, but the institutional framework of the rule may vary, resulting in different expected impact on citizens. Assume first that the rule is credibly implemented and enforced. In such a case, both the realized and expected deficit in all future periods is zero, implying that the output will fully reflect shocks z ,

$$y^{FIX} = \bar{y} + z. \quad (24)$$

From the citizen’s perspective in current period, this result is worse than the one under discretion given by (15), as the government is prevented from stabilizing the output via fiscal policy measures. However, seeing from the constitutional level, the advantage of a credible fixed ever-balanced-budget rule lies in limits imposed on the debt increases, lowering the possibility of a future crisis, and in lower interest rates, preventing the natural output to decrease over future periods.

Let us in accordance with preceding discussion of constitutional interests of citizens assume that individuals, having an infinite horizon, minimize the expected intertemporal disutility function in form of

$$D = E \left[C + \sum_{t=1}^{\infty} \frac{1}{(1+r)^{t-1}} (\bar{y} - y_t)^2 \right], \quad r > 0, \quad C \geq 0, \quad (25)$$

where r is the discount factor and C stands for the cumulative effect of high deficits and high interest rates on future y if the government has discretion (assuming that $C = 0$ if the government is bound by the rule, and has a certain positive value if the government has discretion). In such a case, the expected disutility from the existence of the fixed rule is equal to

$$D^{FIX} = \frac{1+r}{r} \sigma^2, \quad (26)$$

while with the government having discretion the expected disutility is

$$D^D = C + \frac{1+r}{r} \frac{a^2}{(a+b^2)^2} \sigma^2. \quad (27)$$

The expected disutility is lower in the fixed rule arrangement if

$$\sigma^2 \leq \frac{r}{1+r} \left[1 + \frac{a^2}{b^2(2a+b^2)} \right] C, \quad (28)$$

¹² A variant of this rule may be a limit on public spending, as balanced budget may be reached via smart tax strategy, imposing politically neutral taxes and spending on politically rewarding projects. However, as we concentrate on macroeconomic effects, the public deficit is the best indicator of fiscal policy stance.

thus if the variance of shocks is lower relative to the cumulative negative effect of discretionary policies. Summarized, the fixed ever-balanced-budget rule is beneficial only if the lost stabilization tool does not “hurt” too much, which is the case with small variance of shocks, or if the future costs of giving the discretionary power to the government are too high, or both.

Do we have any general information as to how the actual relative ratio of variance of shocks to future costs of discretionary fiscal policy looks like? Empirical evidence suggests that both of the variables are quite high: economic globalization and capital mobility made shocks much more likely and increased their size (variance), while at the same time made economies much more prone to crisis if fiscal discipline is not carefully pursued, as the Argentina case in 2001-2002 showed (C higher). As a result, the fixed rule might be an alternative only for certain countries where the condition given in (28) is fulfilled. Generally, when looking at disutilities given in both (26) and (27), rising σ^2 and C indicate that the fixed rule might have become relatively disadvantageous in comparison to other institutional arrangements.

Nevertheless, we have still assumed that the rule is credibly implemented and enforced, without having discussed the “constitutional parameters. Whether the rule is credible and how does it influence the expectation of the central bank depends on at what level is the rule legislated, implying different possibilities of the government to officially reverse it or even break it. In principle, three levels are imaginable: the government itself, the national assembly (simple consent, but with different overriding schemes if there are two chambers) and the national assembly with qualified majority (with veto power of any chamber).

First, assume that the rule is well enforced, so that the only possibility for the government to renege on the rule is to change the law officially. The following table shows the relationship between credibility and easiness with which the government can change the law.

Table 1: Level of legislation and credibility

| | easiness to change the law | level | form of legislation | check and balances | credibility |
|-----|----------------------------|-------------------|-------------------------|---|-------------|
| I | * | government | government's resolution | no | * |
| II | ** | national assembly | act | one chamber | ** |
| | *** | | | two chambers with overriding ⁺ | *** |
| | **** | | | two chambers without overriding | **** |
| III | ***** | national assembly | constitutional act | qualified majority with veto power of one chamber | ***** |

Note: Easiness to change the law: * = easy, ***** = very difficult; credibility: * = low, ***** = very high. ⁺ Overriding means that one chamber can override the decision of the other chamber via higher voting rule such as qualified majority.

We assume a kind of parliamentary system with two chambers, with government party having majority in one of the chambers.¹³ At the first level, i.e. government resolution, the credibility

¹³ For an US-like presidential system the analysis would be similar, but would have to take into account the possibility that the government party could have minority in both chambers, thus increasing ceteris paribus the credibility of the second and third level.

is very low, because the government can change the resolution any time, leading to a kind of a non-credible announcement of zero public deficit discussed earlier. Of course, because the central bank knows the government's incentive to surprise, it will not expect a zero deficit, leading to the discretionary result. Legislation at higher levels is thus beneficial if citizens want to have the ever-balanced-budget rule in place, ensuring at the same time that the rule will be abandoned only if large consensus among political representatives is reached (for example in case of a large shock).¹⁴

Now, how should be the rule enforced? If it were easy for the government to disregard the rule, the credibility would decline dramatically. Enforceability means that there is an immediate sanction for the government if it disobeys the rule. In principle, we can imagine two kinds of enforcement mechanisms: a market-based mechanism and an institutional enforcement device.

Market-based enforcement (here, political-market-based) means that the sanction is provided via market mechanisms: if a government breaks a rule, it will loose in the political competition due to bad reputation. It is in the constitutional interest of citizens to have such an institutional framework of the political market that would diminish reelection chances of a government that reneges on rules. Within our model the size of this kind of immediate sanction is represented by the parameter a in the political loss function. Thus, all measures that may help to increase a are beneficial.

But even if a were very high, the incentive to surprise the public with deficit and opportunistically use the fiscal policy is still present. An institutional enforcement device, ideally external to the government (i.e. one that cannot be easily influenced by the government), is needed that would impose a more direct sanction (in form of financial fine or threat of new elections). The enforcement mechanism should be legislated at a level higher relative to that of the fixed rule, if it is possible, so that it becomes more complicated for the government to change it. The aim is to make the rule so binding for the government, that the only possibility to renege on it is to initiate its change officially through political procedures.

Does the ever-balanced-budget rule account for any changes in incentives? As any change of institutional framework brings a change in incentives, introduction of the ever-balanced-budget rule is not an exception. Two changes can be emphasized: first, a new created incentive for the government to announce knowingly rather pessimistic outlook of public revenues to be able to use extra money for political reasons together with the incentive not to reveal true figures as regards public finance¹⁵, and second, an incentive to renege on the rule (either officially changing it or simply breaking it) if the central bank just expects that the government could renege, leading to an instable equilibrium and actually lowering the credibility for every level of legislation.

Only the second problem is discussed here:¹⁶ under discretion, the reaction function of the government is given by (9), which substituted into the output equation (2) together with (5) yields output as a function of expected deficit, which then substituted to the political loss function (1) together with the reaction function (9) gives the ex post political loss under discretion:

¹⁴ Having the large consensual parliamentary decision on public finance in case of a big shock is not a never-reached ideal. Finland and Sweden, for example, decided at the parliamentary level on special fiscal measures to consolidate the financial sector hit by serious crisis in early 1990s, see Pesola (2001).

¹⁵ Note that both the legislation and enforcement of the ever-balanced-budget rule relates to the ex ante deficit publicly announced to be strived for in the current period.

¹⁶ This part draws on the famous second-generation model of currency crises, presented in Obstfeld and Rogoff (1996), chapter 9.

$$L^D = \frac{a}{a+b^2}(bd^e + k - z)^2. \quad (29)$$

Under the fixed rule, the government's loss would instead equal

$$L^{FIX} = (bd^e + k - z)^2, \quad (30)$$

which is higher than L^D for a given expected deficit because it does not permit the government to optimize.

Assume now that renegeing on the rule involves additional costs Q for the government, which are simply the minimum of costs related to official change of the legislation and costs incurred via breaking the rule (so that the government chooses the less costly way to renege on the rule). Given these costs, the government will renege on the rule only when z will be high enough (in absolute terms) that it pays to invest the costs Q to renege on the rule, i.e. when

$$L^{FIX} - L^D > Q, \quad (31)$$

i.e. when $z > \bar{z}$ or $z < \underline{z}$, where

$$\bar{z} = \frac{1}{b}\sqrt{Q(a+b^2)} + k + bd^e, \quad (32)$$

and

$$\underline{z} = -\frac{1}{b}\sqrt{Q(a+b^2)} + k + bd^e. \quad (33)$$

The central bank's rational expectation of public deficit must thus be

$$E[d] = E[d | z > \bar{z}]Pr(z > \bar{z}) + E[d | z < \underline{z}]Pr(z < \underline{z}). \quad (34)$$

As the expected deficit by the central bank depends on probabilities that $z > \bar{z}$ and $z < \underline{z}$, but these depend via the level of \bar{z} and \underline{z} on the expected deficit, multiple equilibrium may emerge. Assume for example that some seemingly unimportant announcement of the government makes the central bank think that the government will renege on the balanced budget rule and run public deficit. This will in turn raise both \bar{z} and \underline{z} , changing the probabilities upwards, so that even a small shock that would have been before the announcement left unnoticed will now force the government to break the rule in spite of the costs Q . Of course, the "instability" of the equilibrium is dependent on Q , providing additional argument for having Q as high as possible, i.e. legislating the rule at higher levels and searching for efficient enforcement mechanisms.

7. A state-contingent rule

A state-contingent rule is a rule that makes the deficit dependent only on the shock z without any other constant terms. The main idea behind the rule is that the government should use the fiscal policy only to mitigate shocks, which means having and expecting on average balanced budget because of a symmetric distribution of shocks around zero. The empirical counterpart of this theoretical concept is to have the budget balanced over the economic cycle.

From the perspective of the model presented above, the state-contingent rule is theoretically ideal way how to run fiscal policy without having deficit bias due to political motives. However, a number of questions arise with design, implementation and enforcement of such a rule. First, to what extent should fiscal policy react to shocks, and second, how should the constitutional parameters be set in order to make the rule work properly.

As regards the optimal reaction of fiscal policy, two possibilities can be discussed. The first one is to depart from the disutility function of individuals and to ask to what extent the fiscal policy should mitigate the impact of shocks on y . The second one is to start with the government loss function and to ask which state-contingent rule is incentive-compatible with the government's objective function. As the state-contingent rule makes deficits dependent only on the shock z that has zero mean, the expected deficit will be zero regardless of the concrete specification of the rule. The first approach then yields the state-contingent rule optimal from the point of view of citizens (SCC)

$$d^{SCC} = -\frac{1}{b}z, \quad (35)$$

while the second approach the state-contingent rule optimal from the point of view of government (SCG)

$$d^{SCG} = -\frac{b}{a+b^2}z, \quad (36)$$

which equals the commitment-case rule given by (18). From the citizens' perspective the best rule is of course that in (35) as it compensates the impact of a shock on y to the full extent (see equation (2)). The incentive-compatible rule (36), even if compensating the impact of shocks less than fully, has a big advantage because it partly decreases the still existent incentive of government to break the rule and set deficit equal to (10), as it is just equal to the second part of the optimal deficit given in (10). Thus, the citizens should decide for the rule (35) only if the costs of enforcement mechanism are the same for both rules.

The same discussion of constitutional parameters as in the case of ever-balanced-budget rule applies here. The rule can be legislated on any of the levels defined, with resulting effect on credibility. In comparison with the fixed rule, the state-contingent rule is difficult to legislate precisely because it is impossible to describe all contingencies and all shocks that may hit the economy, as stated by Lohmann (1992) or Moser (2000). As a result, the legislation may only specify *procedures* through which the existence and size of a shock is determined together with an optimal reaction of fiscal policy and, eventually, a penalty if the reaction is not adequate. Thus, *what* is written in the legislation influences credibility of the rule in addition to at what level the rule is legislated and enforced.

There are two types of what the procedures can regulate. In the first type, government is left free to set fiscal policy and the procedures specify the control mechanism by which the fiscal policy is assessed *ex post*, while in the second type government is forced to follow the procedures when determining the existence of a shock and optimal policy reaction. It is clear that the second type is *ceteris paribus* more credible as the control works during the period and eliminates the possibility of politically motivated actions that would be justified *ex post* as reactions to in reality rather non-existent shocks.

In order to warrant as much credibility as possible, the procedures must follow at least two basic principles: first, division of powers when deciding about the existence of a shock, appropriate fiscal reaction and sanctions (i.e. checks and balances), and second, transparency of the whole process. At least two bodies with different preferences should determine existence of a shock and necessity to react, with government taking the lead, i.e. proposing the fiscal policy measure, and the other one approving it or not. Moser (2000, chapter 10) shows how shared responsibility increases credibility of macroeconomic policies. However, coping with shocks requires flexibility of fiscal policy, while reaching consent about existence, impact of shock and appropriate fiscal reaction may take quite a long time. Thus, there is a trade-off between credibility and flexibility, leading often to recommendations to implement the first type of procedures: government has free hands as to fiscal policy measures, but is *ex post* accountable to a body with different preferences.

In order to facilitate the efficient ex post control of fiscal policy conduct, the government decisions must be as transparent as possible, providing the public and the body to which it is accountable with all necessary underlying information. As the state-contingent rule changes the incentives of the government towards hiding information, providing too optimistic forecasts of public revenues and magnifying the impact of a shock, transparency measures must be enforced, too.

A good example of a state-contingent rule is the Stability and Growth Pact (SGP) in the EU. The rule is legislated at a very high level (international association of states), includes an enforcement mechanism (a deposit of a country with the Community that can be turned into a fine) and specifies in detail the procedure through which the existence of an excessive deficit and of “exceptional circumstances” (i.e. a shock) is determined. The whole process seems to be transparent, as all materials are published at the Commission’s website. The body deciding about appropriateness of fiscal policy is the ECOFIN (with information input provided by the Commission), at first sight an external body. However, as the ECOFIN consists of representatives of national governments (ministers of finance), the body does not have truly different preferences: actually, as Hagen (2003, p. 5) argues, “a group of sinners judge the performance of fellow sinners”, so that the checks-and-balances principle is not fulfilled.

Thus, with the state-contingent rules, one has to put more emphasis on checks and balances, requiring at least ex post accountability of the government to political bodies that does not share the government’s political incentives. A second chamber’s ex post consent provides a possible check as to the desirability of public deficits in the national case, while the consent of the European Parliament or even the apolitical Commission or Court of Justice would be an appropriate kind of checks and balances in the SGP case in the EU.

8. An independent Fiscal Policy Committee

Quite recently, a proposal to establish an independent institution in charge of fiscal policy emerged, motivated by the successful conduct of monetary policy by independent central banks. Fiscal Policy Committee (FPC, Wyplosz 2002) or Stability Council (Hagen 2003) would set the public deficit according to the best forecast of macroeconomic shocks with the aim to stabilize the economy. The underlying assumption is that it is possible to dismantle the fiscal policy into a macroeconomic stabilization, a rather technical exercise without value judgments, and structural issues concerning the size of the government, redistribution, tax and expenditure structure, which involve value judgment and thus should remain in realm of political decisions.

Two basic models of FPC are discussed in the literature (Calmfors 2003). An advisory FPC would provide the government or the parliament with forecasts and information about future performance of the economy, serving as a basis for setting public budget, while an executive FPC would directly set public budget balance for the future period, making it binding for the government. The idea behind the advisory FPC is that it raises public concerns for appropriate stabilization policy, influencing the reputation costs for the government, which in our model are represented by the parameter a in the political loss function. The more radical proposal of delegating the decision to a FPC aims at eliminating the politically motivated deficit bias.

From the constitutional point of view, establishing an independent FPC with decision power represents rather a new kind of checks and balances within the state-contingent rule than a truly new institutional arrangement. With the FPC having power to set public deficits independently, we have a radical version of the second type of legislated procedures within the state-contingent rule, where a mutual agreement between government and another political body is no more required. As only *decision* is delegated, but not the actual conduct of fiscal policy that remains in the realm of government, the position of the FPC in the fiscal policy does not correspond fully to the position of an independent central bank in the

monetary policy. However, we may use some of the argumentation regarding independence of central banks and credibility of macroeconomic policies.

Why should be an independent FPC better constitutional provision than say the consent of the second chamber of the parliament, provided that both are equally enforceable? First, even if the party in opposition might rule the second chamber, all elected bodies are suspected to have political loss function in form of (1). Thus, political incentives may lead both political bodies to an unofficial agreement and political trades, for example via logrolling activities. This incentive is weakened if one of the bodies does not aim at maximizing immediate political support because its members are appointed. Second, an independent agency with clearly defined objectives can accumulate knowledge, devoting all of its effort to one issue, i.e. that of estimating impact of shocks on the economy and discussing optimal fiscal policy response. Third, an independent institution may want to build up reputation for what it is doing, in sense of a repeated game discussed in Barro and Gordon (1983a). Thus, its horizon might be much longer than that of an elected body, taking into account all adverse effects of expansionary fiscal policy that may come with time.

Indeed, citizens choosing the appropriate fiscal constitution should consider all three features to be incorporated in the institutional framework of the FPC to ensure its credibility. This implies appropriate appointment procedures, budget independence of the FPC and its long-term focus. As Moser (2000) states, the credibility of an independent central bank depends on costs of withdrawing the independence. Thus, if the FPC arrangement should be credible, it must be difficult to government to override – both formally or informally – the FPC’s decision. There should be as well no easy way for government to influence the functioning of the FPC, either by executing pressure on the daily business, submitting biased information, or by appointment procedures. Besides budget independence, i.e. no government’s influence on setting the FPC’s budget, the responsibility of the appointment of FPC’s members should be shared by more political bodies, none of them being the government or the chamber ruled by the government’s party. Furthermore, overlapping and rather long-term contracts for FPC’s members should be warranted to ensure the FPC’s long-term focus and the impossibility to replace them all at once.

Of course, as with central banks, political pressure can never be totally eliminated, but it can be limited by using smart strategies. As Posen (1993) argues, credibility of a central bank is enhanced if different political pressures – for example the one of the government and the one of the interest groups such as the financial industry – work in opposite directions and eliminate each other. The same applies to the FPC, with pressure groups opposing the government consisting of financial sector participants or resident and non-resident bondholders.

9. Conclusions

In this paper, a simplified dynamic inconsistency model of fiscal policy was used to discuss from the political economy perspective three reform proposals that would eliminate the deficit bias of governments: the ever-balanced-budget rule, a state-contingent rule, and establishment of an independent Fiscal Policy Committee. All proposals were discussed as to the desirability from the point of view of citizens, concentrating on their working properties and welfare implications. At the same time, “constitutional parameters” of all proposals were discussed: who bears the responsibility to decide about deficit, at what level the rule is legislated, how the credibility is ensured and to what extent is the rule enforceable.

The ever-balanced-budget rule was found to be relatively easy to introduce, but with strong welfare implications in case of large shocks hitting the economy and possible unstable equilibrium. The state-contingent rule allows for using the fiscal policy for mitigating the impact of shocks, but it is much more difficult to legislate: as a result, strong checks and balances must be introduced to raise credibility of such a flexible arrangement. The

establishment of a Fiscal Policy Committee is discussed within the concept of state-contingent rule, representing a kind of important check and balance rather than a totally new institutional device. As with central banks, other checks and balances must in turn warrant the independence of such an institution.

Overall, the idea of a Fiscal Policy Committee having the power to set public deficit is promising, provided that its credibility is ensured. This is not an easy task, as fiscal policy will always be much more political than monetary policy. Nevertheless, from the constitutional point of view, if we keep on searching for appropriate checks and balances that mitigate the political pressure, we may succeed in having flexible, but credible fiscal policy that would serve well to all citizens of the community.

10. References

Balassone, Fabrizio – Franco, Daniele (2001): EMU Fiscal Rules: A New Answer to an Old Question? In: Fiscal Rules. Banca d'Italia, 2001.

Barro, Robert J. – Gordon, David B. (1983a): Rules, Discretion and Reputation in a Model of Monetary Policy. *Journal of Monetary Economics* 12 (1), pp. 101-121.

Barro, Robert J. – Gordon, David B. (1983b): A Positive Theory of Monetary Policy in a Natural Rate Model. *Journal of Political Economy* 91 (4), pp. 589-610.

Blanchard, Oliver (2003): Comments on Inflation targeting in transition economies; Experience and prospects, by Jiri Jonas and Frederic Mishkin. Mimeo, April 2003

Brennan, Geoffrey – Buchanan, James M. (1980): *The Power to Tax: Analytical Foundations of the Fiscal Constitution*. Cambridge University Press, Cambridge.

Buchanan, James M. (1958): *Public Principles of Public Debt*. Richard D. Irwin, Homewood, Ill.

Buchanan, James M. (1967): *Public Finance in Democratic Process: Fiscal Institutions and Individual Choice*. The University of North Carolina Press.

Buchanan, James M. (1975): *The Limits of Liberty*. The University of Chicago Press, Chicago and London.

Buchanan, James M. (1990): The Domain of Constitutional Economics. *Constitutional Political Economy* 1 (1), pp. 1-18.

Buchanan, James M. – Tullock, Gordon (1962): *The Calculus of Consent: Logical Foundations of Constitutional Democracy*. The University of Michigan Press, Ann Arbor.

Buchanan, James M. – Vanberg, Viktor (1986): Organization Theory and Fiscal Economics: Society, State, and Public Debt. *Journal of Law, Economics, and Organization* Vol. 2 No. 2, pp. 215-227.

Buti, Marco – Veld, Jan in't – Roeger, Werner (2001): Monetary and Fiscal Policy Interactions Under a Stability Pact. In: Fiscal Rules. Banca d'Italia, 2001.

Calmfors, Lars (2003): Fiscal Policy to Stabilise the Domestic Economy in the EMU: What Can We Learn from Monetary Policy? *CESifo Economic Studies* Vol. 49 No 3, pp. 319-353.

Canzoneri, Matthew B. (1985): Monetary Policy Games and the Role of Private Information. *American Economic Review* 75 (5), pp. 1056-1070.

Coats, Warren – Laxton, Douglas – Rose, David (eds) (2003): *The Czech National Bank's Forecasting and Policy Analysis System*. Czech National Bank, Prague.

- Coeure, Benoit – Pisani-Ferry, Jean (2003): A Sustainability Pact for the Eurozone. Presented at HM Treasury Keynes Seminar, January 2003.
- Goodhart, Charles (1988): *The Evolution of Central Banks*. MIT Press, Cambridge.
- Hagen, Jürgen von (2003): *Fiscal Sustainability in EMU: From the Stability and Growth Pact to a Stability Council for EMU*. ZEI, Bonn.
- Hayek, Friedrich A. (1976): *Denationalisation of Money*. The Institute of Economic Affairs, London.
- Hedbávný, Petr – Schneider, Ondřej – Zápál, Jan (2005): *A Fiscal Rule That Has Teeth: A Suggestion for a Fiscal Sustainability Council Underpinned by Financial Markets*. IES Working Paper No 79/2005.
- International Monetary Fund (2004): *World Economic Outlook: Advancing Structural Reforms*. April 2004.
- Kilpatrick, Andrew (2001): *Transparent Frameworks, Fiscal Rules and Policy-Making under Uncertainty*. In: *Fiscal Rules*. Banca d'Italia, 2001.
- Kopits, George (2001): *Fiscal Rules: Useful Policy Framework or Unnecessary Ornament?* In: *Fiscal Rules*. Banca d'Italia, 2001.
- Kydland, Finn E, - Prescott, Edward C. (1977): *Rules Rather than Discretion: The Inconsistency of Optimal Plans*. *Journal of Political Economy* 85 (3), pp. 473-492.
- Lohmann, Susanne (1992): *Optimal Commitment in Monetary Policy: Credibility versus Flexibility*. *American Economic Review* 82 (1), pp. 273-286.
- Mills, Philippe – Quinet, Alain (2001): *The Case for Spending Rules*. In: *Fiscal Rules*. Banca d'Italia, 2001.
- Molander, Per (2000): *Reforming Budgetary Institutions: Swedish Experiences*. In: Strauch, Rolf R. – von Hagen, Jürgen (eds) (2000): *Institutions, Politics and Fiscal Policy*. Kluwer Academic Publishers, Boston, pp. 191-214.
- Moser, Peter (2000): *The Political Economy of Democratic Institutions*. The Locke Institute, Edward Elgar, Cheltenham UK.
- Mueller, Dennis C. (2003): *Public Choice III*. Cambridge University Press, Cambridge.
- Niskanen, William A. (1992): *The Case for a New Fiscal Constitution*. *Journal of Economic Perspectives* Vol. 6 No. 2, pp. 13-24.
- Nordhaus, William D. (1975): *The Political Business Cycle*. *Review of Economic Studies* 42, pp. 169-90.
- Obstfeld, Maurice - Rogoff, Kenneth (1996): *Foundations of International Macroeconomics*. MIT Press, Cambridge.
- Persson, Torsten – Tabellini, Guido (2000): *Political Economics: Explaining Economic Policies*. The MIT Press, Cambridge.
- Pesola, Jarmo (2001): *The role of macroeconomic shocks in banking crises*. Bank of Finland Discussion Paper 6/2001.
- Posen, Adam S. (1993): *Why Central Bank Independence Does Not Cause Low Inflation: There Is No Institutional Fix For Politics*. In: O'Brien, Richard (ed.): *Finance and the International Economy: vol. 7*. Oxford University Press, Oxford, pp. 40-65.
- Schneider, Ondrej – Hedbavny, Petr (2003): *Fiscal Policy: Too Political?* UK FSV - IES Working Paper 37, Prague.

Strauch, Rolf R. – von Hagen, Jürgen (eds) (2000): *Institutions, Politics and Fiscal Policy*. Kluwer Academic Publishers, Boston.

Vanberg, Viktor J. (1994): *Rules and Choice in Economics*. Routledge, London and New York.

Wagner, Richard E. (2001): *Politics and the macro economy*. In: Shughart II, William F. – Razzolini, Laura (eds): *The Elgar Companion to Public Choice*. Edward Elgar, Cheltenham UK.

Wildavsky, Aaron (1980): *How to Limit Government Spending*. University of California Press, Berkeley.

Wyplosz, Charles (2002): *Fiscal Discipline in EMU: Rules or Institutions?* Group of Economic Analysis, European Commission.

CZECH SUMMARY / ČESKÝ ABSTRAKT

Tato disertační práce obsahuje kolekci šesti výzkumných prací, které se zabývají makroekonomickými politikami z ekonomické a politicko-ekonomické perspektivy.

První kapitola se zabývá problematikou devizových intervencí: popisuje možné důvody silné aprece české koruny v letech 2001-2002 a diskutuje opatření, která byla použita Českou národní bankou za účelem zastavení zhodnocení koruny. Tato kapitola též prezentuje na základě existující literatury přehled motivů pro intervence, kanály vlivu a částečně též empirickou evidenci při či proti jejich účinnosti. V závěru jsou zhodnoceny devizové intervence vykonávané ČNB v letech 2001 a 2002 a některé z nich, zejména ty podniknuté v létě 2002 spíše skrytým způsobem, jsou hodnoceny jako účinné.

Druhá kapitola je přirozeným pokračováním v problematice devizových intervencí, neboť se pokouší ekonometricky testovat účinnost intervencí ČNB z let 2001 a 2002. Kapitola nejprve diskutuje několik přístupů k testování účinnosti intervencí, přičemž některé z nich jsou pak aplikovány na intervence ČNB. Kapitola obsahuje odhad intervenční reakční funkce a odhad vlivu intervencí na úroveň a podmíněnou a implikovanou volatilitu měnového kurzu. Úspěšnost intervencí je diskutována s použitím event-study přístupu. Výsledky indikují, že intervence ČNB v letech 2001 a 2002 měly určitý, avšak poměrně malý a jednorázový efekt na úroveň měnového kurzu, přispěly však k jeho zvýšené volatilitě.

Třetí kapitola diskutuje literaturu založenou na dynamické nekonzistenci měnové politiky a nabízí přehled všech základních přístupů k eliminaci proinflačního chování měnových autorit za účelem krátkodobého zvýšení reálného výstupu. Kapitola tak obsahuje debatu „pravidla versus diskrece“, model budování reputace, problém substitučního vztahu mezi flexibilitou měnové politiky a její kredibilitou, nezávislost centrální banky a teorii optimálních kontraktů pro centrální bankéře. Přidanou hodnotu lze nalézt v aplikaci konstituční ekonomie na pravidla měnové politiky a v diskusi brzd a rovnovah v měnové konstituci.

Čtvrtá kapitola nabízí politicko-ekonomický přístup k měnové politice a aplikuje metodologii Thomase Havrileskeho k měření politických tlaků na centrální banky. Metodologie je aplikována na ČNB, kromě FEDu a německé Bundesbank třetí centrální banku, na kterou byla metodologie Havrileského aplikována. Cílem kapitoly je ukázat, zda-li na českou centrální banku byl vykonáván politický tlak v letech 1997-2005 a jestli ČNB takovému tlaku podlehl nebo ne. Výsledky analýzy jsou porovnány mezi všemi třemi centrálními bankami. Vychází z nich, že ČNB čelila poměrně silnému politickému tlaku směrem k uvolněnější měnové politice, avšak nepodlehla mu a stanovovala svou měnovou politikou nezávisle a na základě sledování cíle cenové stability v souladu s vývojem makroekonomických fundamentů.

Pátá kapitola, napsána ve spoluautorství s Nilsem Goldschmidtem (Walter Eucken Institut, Freiburg) a Ekkehardem Köhlerem (Universität Freiburg), diskutuje koncept nezávislosti centrální banky z perspektivy konstituční ekonomie. Optimální měnové konstituce musí zaručit určitou nezávislost centrální banky, která jí dovoluje nepodléhat krátkodobým politickým tlakům, zároveň však dovoluje zohlednit preference občanů ohledně inflačního cíle a reakce na ekonomické šoky. Kapitola obsahuje přehled návrhů na měnovou konstituci pocházejících z konstituční ekonomie, popř. od kompatibilních subdisciplín jako je německý ordoliberalismus či učení F.A. von Hayeka, a diskutuje jednotlivé elementy konstituce, které ovlivňují vztah centrální banky a politických představitelů v obou výše zmíněných rolích.

Poslední, šestá kapitola aplikuje model dynamické nekonzistence na fiskální politiku a analyzuje tři možné fiskální konstituce, jejichž účelem je omezit sklon vlád využívat fiskální politiku k maximalizaci přežití na politických trzích. Kapitola modelově analyzuje vlastnosti pravidla věčně vyrovnaného rozpočtu, pravidla reagujícího na vývoj ekonomiky a ustanovení nezávislého Výboru pro fiskální politiku a diskutuje výsledky z hlediska konstituční ekonomie.