

Central Bank independence and its effect on money market stability

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Abstract

Since 1990s many countries have moved toward greater central bank independence (CBI) by either amending their Central Bank's laws or writing them de novo. Also countries of Western Balkans and many other transition countries have moved toward greater CBI. There are many potential benefits associated with greater CBI, and one of them is stable growth of money and liquidity. For a given level of money market development the hypothesis is that a more independent CB is likely to promote more stable growth of money supply (Dželetović et al., 2008). As a result the main research task of this work is to estimate the effects of CBI on money market growth for five Western Balkans countries and five other European transition countries. Because the empirical studies were very limited for the relationship between CBI and money market growth, there were no clear conclusions. In addition, there were different measuring methodologies that attempt to quantify the extent of legal and actual CBI. Related to the main research task, this dissertation has examined the effects of CBI on money market stability (proxied by bank deposit growth) for a sample of 10 countries for a period from 1999-2009 by using fixed effect model. Through this methodology different regressions have been estimated, but the results were not robust and there are no clear finding on the relationship between CBI and money market growth.

Key-words: Central Banks, Central Bank Independence, Money Market, Growth, Stability.

1. Introduction

The Western Balkans comprises of relatively small-sized economies. Monetary stability and sovereignty in these counties has increased since 1990s which has positively contributed to macroeconomic performance. It has been argued that a main contributors were the central banks, which by conducting monetary policies have managed to ensure price stability by controlling money supply (keeping a low inflation rate without creating a high unemployment rate), which then affected the economic growth, employment, balance of payment, etc. The central banks of the countries in Western Balkans were established after the 1990s but faced several difficulties during this process. According to Belke and Zenkić (2007, p.17), some of the difficulties were lack of experience in using their powers and instruments and so the implementation of policy objective was not effective. The authors added that the environment in which they were operating, the lack of track record¹ and the lack of credibility² made the process of their formation even harder. The environment was characterized with weak tax systems and fiscal controls, weak banking systems, weak market discipline and weak legal systems (Belke and Zenkić, 2007, p.17). Now, the financial system has improved but there is still need of time to achieve the full compatibility of practices and standards with that of the European Central Bank. Monetary Policy continues to remain prudent, with the objective of having stable prices and exchange rates (EC-European Economy, 2006). However, due to a high degree of euroisation the extent of fully use of independent monetary policy is limited (Kosovo and Montenegro have euro as legal tender while majority of other states have pegged their currencies to the Euro) (EC-European Economy, 2006)

The financial system in Western Balkan is composed 90% from the banking sectors, while the other sectors such as non-banking sector and capital market play only a marginal role (Müller-Jentsch, 2007). The money market (MM) as a segment of financial market, which is characterized as “the heart of any national financial system” (Galac, Ivičić and Dumičić, 2007), is little developed or not developed at all. Kosovo does not have money market (CBK Report - Vision of the Future of the National payments, 2009) while in BiH it is underdeveloped. In Montenegro, the MM is in its early stages of its development and is characterized with a small number of participants and low volumes of trading (Vukajlović-Grba, 2007, p.326). The same situation is also in Macedonia (Atanasova et al., 2008) in terms of instruments and volume.

¹ “the central banks of the SEECs lacked a track record that might help establish public confidence in the credibility of their policies” (Belke and Zenkić, 2007, p.17)

² “the lack of CB credibility, results in a slower adjustment of public expectations of inflation, with the result that real interest rates rise or remain high longer” (Belke and Zenkić, 2007, p.17)

The development of the MM in Albania has experienced growth in its volume and instruments used. However, because it still falls behind from the MM of developed countries the Bank of Albania remains committed in developing it more (Bank of Albania Development Plan 06-08, p.15). Serbia and Croatia are more experienced in MM as they establish them in the 1990s, but it was not until the mid 2000s when these markets became more developed and more up to date, however it still is in its early stages of development and needs more improvements (Mu and Horgan, 2006). The money market in the Western Balkans still fall behind from that of the developed one but it is very important to keep them improve because they help maintain stability of money and liquidity, and hence, regulate the economic spectrum and encourage economic development (Galac, Ivičić and Dumičić, 2007). Because it plays a significant role in the process of conducting the monetary policy by the central bank, in this thesis we would like to estimate what are the effects of Central Bank Independence on money market stability.

2. The rationale for more Independent Central Banks and an overview of empirical literature

The theoretical aspects of the relationship between CBI and inflation have been much explored. However, because majority of Western Balkan countries have chosen more or less a fixed exchange rate system with the euro as the anchor currency or with euro as sole legal tender, they have limited control over their monetary policy. As such the relationship between CBI and inflation will not be empirically tested for countries in our sample (this relationship will be only theoretically mentioned). On the other hand, because one of the potential benefits arrived from autonomous CBs is stable money growth, the relationship that will be investigated in this thesis is between CBI and money market growth (proxied by bank deposit growth).

Central Bank Independence (CBI) has been part of many discussions and papers starting from 1980s, but it was not until the mid 1990s when this topic reached its highest prominence due to the work of Cukierman and of many other authors. Since then many countries have moved toward greater CBI by either amending their CB's laws or writing them *de novo*. This trend was not only seen in industrialized countries but also in developing and transition countries. One of the main reasons towards the greater CBI was the problem known as "time inconstancy", firstly introduced by seminal papers of Kydland and Prescott (1977) and Barro and Gordon (1983). According to the authors, discretionary monetary policies would create incentives to expand the economy and reduce unemployment through monetary expansion. In the long run this discretionary monetary policy would lead only to higher inflation because the

economy cannot exceed its potential GDP or its natural rate of unemployment (Crowe and Meade, 2007). This is known as “inflationary bias”. This happens because the government wants to be re-elected and is willing to sacrifice long-term welfare for short term political gains (Eijffinger, Van Rooij, and Schaling, 1996). One of the solutions to this problem, suggested by Rogoff (1985), is to delegate monetary policy to an institution that is inflation averse and has credibility to maintain this low inflation, e.g. independent central banks. Another solution suggested by Walsh (1995) is to give greater incentive to central bank’s management to pursue low inflation by establishment a system of penalties if the price stability goal is not achieved. This is known as contracting approach, where the contract is signed between principal (government) and agent (central bank) to maintain low inflation rates.

Why countries have moved toward greater CBI is also explained by the work of Sargent and Wallace (1981). They suggested that if an economy is dominated by an autonomous monetary policy, the CBs cannot be pressured by the government to create money to pay their deficits and as a result the fiscal authorities will not have the incentive to deepen their deficits. The opposite would happen if the government controls the monetary policy and the deficits would be financed by creating money (Eijffinger and De Haan, 1996). The dependence of the CB from the government has effects in both inflation and budget deficits. Moreover, the breakdown of the Bretton Woods system and the European Monetary System (EMS) as safeguards of price stability, led the countries to search for another option that would keep the prices stable, e.g. greater CBI (Cukierman, 1995). The author also suggests that to be part of the European Monetary Union, according to the Maastricht Treaty’s criteria, a country should have stable prices which again can be achieved by greater CBI. Another potential benefit arrived from autonomous CBs is stable money growth and less volatility in inflation variability (Eijffinger and De Haan, 1996). As low unemployment and low inflation are two of the main objectives, one of them raises and the other lowers depending of which political party is running the country e.g. in the USA if the Democratic party runs the state the low unemployment rate objective is maintained. This is achieved by monetary expansion and as a result the inflation rate rises and the opposite happens if Republicans win the elections. This implies that overall inflation variability may raise as a result of the government changes because their objectives change (Hibbs (1997); Alesina (1988); Alesina (1989). This can create inflation uncertainty and have negative effect on economic performance (Fischer, 1993). An autonomous CB will not change its objectives and policies and as a result the inflation variability will remain low, despite any governmental changes. Greater CBI in addition to inflation variability is also argued to increase

economic growth through economic stability and reduced risk premia in interest rates and which will also lower fluctuations in real output (Alesina and Summers, 1993). Overall, providing CBs with higher independence should lead to stable prices which are essential for proper planning of developments and investments which would not happen when politicians control the monetary policy (Atchariyachanvanich, 2003). So, providing the central banks with more independence and credibility will benefit both the economy and the government (Cukierman et al., 1992)

2.1 *Measuring Central Bank Independence*

In the last three decades, different measures of the degree of CBI have been proposed, however two most used indices are legal and actual indices. The legal measures of CBI (*de jure*) are proposed by Grilli, Masciandaro, and Tabellini in 1991 (henceforth GMT) and those proposed by Cukierman, Webb and Neyapti in 1992 or by Cukierman in 1992 (henceforth CWN). These are indices which quantify the level of CBI based on legal characteristics obtained from the charters of central banks (Crowe and Meade, 2007). However, the most comprehensive measures of legal independence of CBs are the CWN indices. According to the authors, the index follows two main principles; it codes only the most important legal characteristics and it uses only the written information that can be found in the charters of CBs, indicating that the interpretation of CB's law are very important. Moreover, this index comprises 16 components classified in four main clusters of issues (Cukierman et al., 1992):

- i. The appointment procedure of the governor of the CB.
- ii. The process of the formulation of monetary policy and the resolution of conflicts.
- iii. The objectives of the CB.
- iv. The limitations of lending to the public sector (e.g. government).

Each component is coded on a continuous scale from 0 to 1, where the higher the value indicates greater CBI. The aggregated index is either calculated by using the unweighted mean "LVAU" or the weighted mean "LVAW". The first method aggregates the 16 components into eight legal variables, by using the simple mean of variables. In the second method, by using weights, these eight legal variables are aggregated into one single index. Because both methods are highly correlated, the indices from both of methods are very similar. However, the weighted method is more widely used in practice because the authors believe that each category deserves different importance and as such they cannot be treated equally by providing them the same weight.

Even though the law regulates the independence of CBs, in reality it often happens that the CBs do not enjoy the same level of independence as it is provided by law. This is known as the actual or *de facto* independence of CB which represents a more realistic relationship between CBs and the governments than the legal CBI does. According to Cukierman et al. (1992, p369) the actual independence differs from legal independence because; firstly, the central banks laws are incomplete as it is impossible to specify all the characteristics of bank's authority in the charter, secondly, if they are complete then actual practice may be different e.g. in Argentina the term of the governor is four year, but if the Minister of Finance changes then the governor also changes without completing the term. As such the legal independence may not provide the true relationship between the CB and the government, hence, actual indices are sometimes used. Cukierman et al. (1992) uses turnover rates of governors (TOR) to construct the actual indices of CBI. These are calculated by dividing the number of governors changed by the number of years from the establishment of the CB. The larger index indicates that the CB is less independent as the governors are changed more often in the specified range of time. TOR is used more as proxy for the *de facto* CBI compared to questionnaires. In the case of transition countries, as these positions are decided by prime minister or the parliament then due to political turmoil that these economies have experienced, the TOR is high which may indicate governmental instability and not a direct attack to CBI (Loungani and Sheets, 1995), so the actual indices will not be used in our empirical study due to this limitation.

2.2 *Empirical Studies*

Several empirical studies have been conducted in the subject of Central Bank Independence. The majority of these studies investigate the direct relationship between CBI and level of inflation, while for other relations these studies are more limited. Authors, including Bade and Parkin (1988), Alesina (1988, 1989), Grilli, Masciandaro, and Tabellini (1991), Cukierman et al. (1992), De Haan and Sturm (1992), Alesina and Summers (1993), Eijffinger et al. (1993, 1994) found that more independent central banks are associated with lower levels of inflation. One of the limitations of these studies is that they are confined to the industrialized countries where legal CBI is negatively correlated with inflation. However, the investigations of Cukierman (1992) and Cukierman et al. (1992) include in their analysis also developing countries but found no significant relationship between legal CBI and inflation for developing countries. One of the main reasons for this result is that in developing countries the legal enforcement are weaker and as a result the legal

indices are not a good proxy for CBI, therefore the actual indices of CBI (proxied by the TOR) have been used instead. The results from Cukierman et al. (1992), De Haan and Kooi (2000), Sturm and De Haan (2001), Crowe and Meade (2007) suggest significant negative relationship between actual CBI and inflation for developing countries, similar as found for industrialized countries.

On the other hand, the empirical studies regarding the effect of CBI on other aspects of the economy e.g. economic growth, is more limited. One of the main studies in this regard is that of Alesina and Summers (1993) who investigate the relationship between the legal CBI and real macroeconomic performance in industrialized countries. More specifically, the control variables were either the level or variability of economic growth. The authors found no significant relationship between the variables, indicating that higher CBI is not associated with higher real economic performance. Similar studies were conducted by De Haan and Sturm (1992), Eijffinger and Schaling (1993b), Eijffinger, Van Rooij, and Schaling (1996), Jordan (1998). De Haan and Kooi (2000) investigated the same relationship but in developing countries by using TOR as proxy for CBI and found no significant relationship. The same result is also delivered by a study from Akhand (1998) who used legal indices as proxy for CBI for developing countries and from the study of Alpanda and Honig (2009). Even if it does not have an effect on macroeconomic performance, greater CBI does not appear to cause costs neither. According to Grilli, Masciandaro, and Tabellini (1991, p375) "having an independent bank is almost like having a free lunch; there are benefits but no apparent costs in terms of macroeconomic performance". However, in the study of De Long and Summers (1992) there is a positive relationship between CBI and GDP in industrial countries and in the study of Cukierman et al. (1993) there is positive relationship for developing countries by using actual CBI.

In transition economies empirical studies are also limited. One of the pioneering studies for these economies is that of Loungani and Sheets (1997) who investigated the correlation between CBI and inflation in twelve transition countries. They conclude that a higher CBI would improve inflation performance only after the variable of adequate level of liberalization of economy is included into regression (Bogeov et al., 2011). Another study from Alpanda and Honig (2009) who included also emerging countries in their sample found no relationship between CBI and growth. A study conducted more specifically for Western Balkans and other transition economies was of Bogeov et al. at 2011, who in their panel regression on 17 former communist countries investigated this correlation and found the same inverse relationship as the theory suggests, after including several macroeconomic and institutional variables and controlling for autocorrelation in residuals.

The literatures for relationship between CBI and money growth, the similar relationship that will be investigated in this thesis, are even more limited. The authors that investigate this relationship are Eijffinger, Van Rooij, and Schaling (1996), who for the sample of 10 industrial countries found a negative and significant effect of CBI on average money market rates. However, in this thesis the same relationship will not be investigated, instead the relation between CBI and money market growth (proxied by bank deposit growth) will be estimated. Because of the absence of literature there are no clear expectations.

3. Methodology, Data issues, and Estimation

Orthodox theory argues that the efficient implementation of monetary policy depends on the full institutional and functional independence of the Central Banks (Bishev, 1997, pp. 5). A potential benefit arrived from autonomous CBs is stable money growth and liquidity of economy which is best achieved by money markets. For a given level of money market development the hypothesis is that a more independent CB is likely to promote more stable growth of money supply (Dželetović et al., 2008). In developed economies, money markets are the most efficient way of conducting monetary policy while in transition countries money markets are still in their early stages of developments. The relationship between CBI and money market stability will be investigated for the Western Balkans countries and some transition countries. Because Western Balkans countries lack the money market data, the deposit growth data will be used as the proxy for the money market stability. The final relationship to be investigated is between CBI and bank deposit growth.

3.1 Model Specification and Data

The empirical study is focused on five Western Balkans countries and five Transition countries, namely Albania, Bosnia and Herzegovina, Croatia, Macedonia, Serbia, Bulgaria, Czech Republic, Hungary, Moldova, and Slovakia. The data for 10 countries and for the period from 1999 to 2009 will provide us with a panel with annual data. To estimate the regression the panel data technique will be used.

The regression model specification is:

$$\begin{aligned} \text{Log Deposit Growth}_{it} = & \beta_0 + \beta_1 \text{CBI}_{it} + \beta_2 \text{CPI}_{it} + \beta_3 \text{GDPgrwoth}_{it} + \beta_4 \text{DIR}_{it} + \\ & \beta_5 \text{NER}_{it} + \beta_6 \text{NBB}_{it} + \beta_7 \text{DI}_{it} + \beta_8 \text{Year2001} + \beta_9 \text{Year2002} + \\ & \beta_{10} \text{Year2003} + \beta_{11} \text{Year2004} + \beta_{12} \text{Year2005} + \beta_{13} \text{Year2006} + \\ & \beta_{14} \text{Year2007} + \beta_{15} \text{Year2008} + \beta_{16} \text{Year2009} + u_{it} \end{aligned}$$

with $i=1\dots n$, $t=1\dots T$ and:

- Log Deposit Growth is the log of bank deposit growths;
- β_0 is the constant parameters while β_1 to β_6 are the parameters before the measures of the legal CBI (CBI index), inflation rate, GDP growth, deposit interest rate, Nominal exchange rate, Number of bank branches per 1,000 km², and the dummy for deposit insurance, respectively. β_8 to β_{16} are the parameters for year dummies from 2001 to 2009, respectively;
- u are residuals;
- i and t are the country and time subscripts, respectively;

In this empirical model, log of bank deposit growth is taken as the dependent variable while the CBI indices are our main independent variable of interest. The negative values of bank deposit growth that can be found in our sample are treated as positive values because of stability. As the theory suggested, there is a potential effect of CBI on money growth and because of this a positive sign between CBI and bank deposits growth (as proxy for money market stability) is expected. The reason for this positive sign is that as CBs are more independent they will more efficiently affect the money market rates which then enable the banks to transform short-term monetary funds into investment funds which means that additional banking capital is created (Dželetović et al., 2008). On the other hand, more independent CBs will also promote more stable money markets rather than have a positive effect on it. Because of this we have ambiguous relationship and as literature is very limited regarding this relationship we do not have clear expectations. In collecting data for bank deposit growth the annual reports and statistics from each CBs in our sample have been used. Both deposits in domestic currency and foreign currency were taken into considered. For CBI indices two main techniques of calculations were used; the weighted CWN index and GMT index which are based on charters of CBs as presented in section 2.2.1. As actual practice may differ from what the law indicates regarding the mandate of the governor etc, the actual indices are preferred for transition countries. However, due to political turmoil that these economies have experienced, the governor has been changed very often which has made the actual indices very high³ which may indicate governmental instability and not a direct attack to CBI, as a result actual indices are not an accurate proxy for CBI for the countries in our sample (Loungani and Sheets, 1995).

³ The larger the actual index is, the lower is the CBI as the governors are changed more often in the specified range of time.

Because of this critique the legal indices will be used instead which have been calculated by Bogeov et al (2011) by using the techniques proposed by Grilli et al. (1991) and Cukierman et al. (1992).

The other control variables which might have impact on deposits are; Inflation rate, GDP growth, Deposit interest rate, Nominal exchange rate, Number of bank branches, and the dummy for Deposit insurance and year dummies. Consumer price index is used as proxy for inflation and it affects deposits in two ways. Firstly, as the uncertainty increases when inflation increases then consumers increase their deposits to have money for unpredictable situations (consumers are assumed to be risk averse), secondly, if the consumers want to keep the same level of wealth then they have to increase their bank deposits as the inflation rates increase (Haron and Azmi, 2006). However, it is expected for the developed countries that when inflation rates increase the deposit interest rates decline and as such people are not willing to keep money as bank deposits, but because in Western Balkans there are no developed alternative financial intermediates (e.g. no developed capital markets to invest in stocks or in bonds) people in these countries use commercial banks to save.

Regarding the relationship between bank deposits and growth it is more ambiguous, however it is postulated that “higher growth reduces current saving because higher anticipated future income” and so people save less against future earnings (Haron and Azmi, 2006, pp. 8). Even though our dependent variable is not savings, we provide this explanation due to the lack of financial intermediated in Western Balkan and where people save instead of investing in capital markets. The data for inflation rate are collected from World Economic Outlook 2011 (IMF) while the data for GDP growth are collected from World Development Indicators and Global Development Finance by World Bank.

Table1: Summary statistics of the variables

Variable Name	Variable Label	Mean	Min	Max	Standard Deviation	Number of missing obs.
Log Bank Deposit Growth	Log Deposit Growth	22.38	-25.63	275.62 ⁴	33.68	14.00
CBI (CWN-LVAW)	CWN	0.79	0.39	0.98	0.15	0.00
CBI (GMT)	GMT	10.76	5.00	14.00	2.39	0.00
Inflation Rate	CPI	7.16	-0.81	80.60	11.39	0.00
GDP Growth	GDP Growth	3.83	-11.20	10.58	3.76	0.00
Deposit Interest Rates	DIR	6.36	1.20	27.54	4.78	7.00
Nominal Exchange Rates	NER	53.63	1.34	286.49	67.73	1.00
Number of Bank Branches	NBB	19.17	3.88	56.26	14.67	63.00 ⁵
Deposit Insurance	DI	0.91	0.	1	0.29	0
Year Dummies	Year2001-2009 ⁶	0.09	0	1	0.29	0

Source: Author's own calculation

On the other hand, the deposit interest rates are one of the main features that explain the saving behaviour of individuals and businesses (Haron and Azmi, 2006). According to the authors, the higher the deposit interest rates the more money will be deposited because people are more willing to forgo present consumption. For this variable the macroeconomic data from EBRD will be used. The lack of alternative financial intermediates (capital markets) as

⁴ This high number is the deposit growth that Serbia experienced in 2000. After the conflict of 1999 Serbia received a high amount of deposits.

⁵ There are 63 missing observation for this variable, which is 63 out of 905 observations of the total sample, this low proportion may not impose a serious problem

⁶ The year dummies are separated for each year and the statistics are the same for each year dummies. In the tables is presented only the statistics for year dummy2001.

explained above, explains the reason for higher deposits in the case of increased deposit interest rates for Western Balkans countries and transition countries. The number of bank branches is also believed to increase the amount of bank deposits as it captured the money that people could keep in cash. By having a bank branch near the working place or living place may encourage people to keep cash as deposits in banks (Cohen and Kaufman, 1965). The bank branches per 1000km² has been collected from Financial Access Survey (IMF) for countries in our sample but are available only from 2004, while for Croatia and Slovakia they are missing. In addition, bank deposits depend also on exchange rates which are an important “channel in countries where households and firms switch readily between local currency and foreign currency deposits”, which is the case for Western Balkan countries (Turner, 2006, pp. 8). As exchange rates, the nominal exchange rates (market rates) provided by International Financial Statistics by the IMF will be used. Lastly, the dummy for deposit insurance is also included as it is believed that this insurance increases depositors’ confidence which can contribute to the increase of deposits, other things being equal, and has the potential to make the banking system more stable. Deposit insurance has been adopted in many transition countries in 1990s and in some after 2002, according to the data from the CBs of each country. The year dummies from 2001 to 2009 are included to see whether the effects are different for different years. The year dummies for 1999 has been excluded to avoid the dummy variable trap (Wooldridge, 2006) and the year dummy for 2000 for each lag. The description and sources of each variable are summarized in the table in the end.

3.2. Estimation of the Empirical Models and Results

The relationship between CBI and bank deposit growth is analyzed by employing a fixed effect panel data model (FE model) specified as:

$$\begin{aligned} \text{Log Deposit Growth}_{it} = & \beta_0 + \beta_1 \text{CBI}_{it} + \beta_2 \text{CPI}_{it} + \beta_3 \text{GDPgrowth}_{it} + \beta_4 \text{DIR}_{it} + \\ & \beta_5 \text{NER}_{it} + \beta_6 \text{NBB}_{it} + \beta_7 \text{DI}_{it} + \beta_8 \text{Year2001} + \beta_9 \text{Year2002} + \\ & \beta_{10} \text{Year2003} + \beta_{11} \text{Year2004} + \beta_{12} \text{Year2005} + \beta_{13} \text{Year2006} \\ & + \beta_{14} \text{Year2007} + \beta_{15} \text{Year2008} + \beta_{16} \text{Year2009} + u_{it} \end{aligned}$$

Before deciding to work with fixed effect panel data model, it was firstly compared with the random effect panel data model (RE model) and ordinary least square model (OLS) through different tests for each combination. It is suggested that the FE model is preferred.

As we have two measures for CBI (CWN and GMT indices), the results from the estimated regressions for both kinds of indices will be presented in the table below.

Regression 1 uses CWN indices as the measure for CBI but does not include all the variables in its model (it only includes CBI, CPI, GDP Growth, DIR, and year dummies). This regression is specified like this as the excluded coefficients (NER, NBB, and DI) are jointly insignificant based on the F-test. Regression 2 is complete and uses CWN indices as measure for CBI. Regression 3 has the GMT indices as the proxy for CBI and has all the variables in its regression. The diagnostic tests of these regressions suggest failure of the test of heteroskedasticity which in our sample it is expected as we are dealing with panel data where "the cross-sectional units may be of varying size and as a result may exhibit different variation" (Baltagi, 2008, pp.87). On the other hand, the test for serial correlation suggests no serial correlation in residuals and the normality test suggests normality in the residuals. As the sample has heteroscedasticity, the results will be interpreted with robust standard errors (robust S/E can adjust the problem of heteroscedasticity).

As we can see from regression 1, the coefficient of our main variable CBI, has a negative sign and is statistically significant at 5% and 10% significance level, indicating that higher CBI has negative effect on bank deposit growth. Therefore this regression provides empirical support regarding a negative relationship between the bank deposit growth and the independence of Central Banks. As for the other independent variables, inflation rate as measured by CPI has a positive sign and is statistically significant at all significance levels. GDP growth is statistically not significant, indicating that it has no effect on bank deposit growth. In addition, the deposit interest rates which were expected to have significant positive effect, in this study it is suggested to have no empirical relationship with bank deposit growth. Year dummies suggest that years do not have any effect on bank deposit growth as they are insignificant except for the year dummy of 2008 and 2009 which indicate that greater CBI had positive effect in 2008 more than it did in 1999, and same for year 2009. The R^2 of regression 1 is 52% which indicates that the regressors explain 52% of the variation in bank deposit growth for the sample of 10 Western Balkans and transition countries, which is a surprisingly good fit.

Table 2: Panel data estimation results for three regressions where Log Deposit Growth is the dependent variable. Sample period: 1999-2009. Results are presented with Robust S/E.

Variables	Regression 1 (CWN indices as proxy for CBI - excluding B ₅ , B ₆ , and B ₇)	Regression 2 (CWN indices as proxy for CBI, with all variables)	Regression 3 (GMT indices as proxy for CBI, with all variables)
^Constant	3.73***	3.64	3.64
^CBI	-1.25**	-0.20	-0.02
^CPI	0.01***	0.04	0.04
^GDP Growth	0.01	0.09	0.09
^Deposit Interest Rates	0.02	0.12**	0.12**
^Nominal Exchange Rates	Excluded	-0.02	-0.02
^Number of Bank Branches	Excluded	-0.06	-0.06
^Deposit Insurance	Excluded	Omitted	Omitted
^Year2001	0.30	Omitted	Omitted
^Year2002	-0.43	Omitted	Omitted
^Year2003	0.04	Omitted	Omitted
^Year2004	0.19	Omitted	Omitted
^Year2005	0.00	-0.06	-0.06
^Year2006	0.15	0.19	0.19
^Year2007	0.18	0.23	0.23
^Year2008	-0.70*	-1.10*	-1.14*
^Year2009	-1.39**	-0.63	-0.63
R ²	0.52	0.33	0.34
Observations	82	41	41

Note: *** significant at 1%, ** significant at 5%, * significant at 10% significance level.

Source: Author's own calculations

When we include the other three regressors (the nominal exchange rates, number of bank branches per 1,000 km² and deposit insurance) then the variable of our main interest (CBI) is still with negative sign but is statistically insignificant. Hence, regression 2 analysis suggests no empirical evidence for the relationship between bank deposit growth and CBI (proxied by CWN index). Also other variables are insignificant, apart from deposit interest rate which has a positive and significant effect and year 2008 which has negative and significant effect. The R² of regression 2 declined even though we have more regressors. The reason for this is that we have fewer observations in regression 2 than in regression 1.

On the other hand, regression 3 has all variables in its regression but has GMT indices as proxy for CBI. In this case, the results are very similar to regression 2, where again the coefficient of CBI has the negative sign and is statistically insignificant.

Overall, this study does not provide strong empirical evidence for a relationship between bank deposit growth and CBI. Even though, it was expected that greater CBI may lead to a moderate increase of money supply, in this empirical study the minimum model suggested a negative effect of CBI on bank deposit growth but in other regressions the effect of CBI on bank deposit growth is not significant leading to the conclusion that the results are not robust and there is no clear effect.

4. Conclusion

Previous research on the relationship between CBI and inflation is abundant, but because the countries in our sample have the euro as a currency anchor or euro as a sole legal tender, then similar research is inappropriate. On the other hand, since the 1990s the CBI has increased a lot in many countries and a potential benefit arrived from autonomous CBs is stable money growth and liquidity. For a given level of money market development the hypothesis is that a more independent CB is likely to promote more stable growth of money supply (Dželetović et al., 2008). The development of money markets in Western Balkans is still in its early stages of its development while in some other countries money markets are the most effective way of conducting monetary policy. Because of these benefits, the relationship that was investigated in this thesis was between CBI and money market stability (proxied by bank deposit growth) for five countries of Western Balkans (Albania, Bosnia and Herzegovina, Croatia, Macedonia, and Serbia) and five transition countries (Bulgaria, Czech Republic, Hungary, Moldova, and Slovakia).

To investigate this relationship there were estimated three different regressions. The first two regressions used CWN indices as proxy for CBI.

The difference between them is that the first regression included only some of the preferred regressors (as some others were jointly insignificant based on F-test) while the second regression included all the regressors in its model. Regression 3 has GMT indices as the proxy for CBI and includes all the regressors in its model. Only the limited model (regression 1) suggested a significant negative relationship between bank deposit growth and CBI while the other two regressions suggested an insignificant relationship. Other models such as using a log-log functional form or level-level function form, or by including logged variables were also tried, but all these models suggested an insignificant relationship. Even though it was expected to have a positive and significant relationship as an increase in CBI may lead to increase in money supply and as such may have positive effect on bank deposit growth, this relationship was not robust and as a result we do not have a clear effect.

References:

- Akhand, H.A., (1998),** "Central Bank Independence and Growth; A sensitivity Analysis," *Canadian Journal of Economics*, Vol.31, No.2, pp. 303-17.
- Alesina, A., and Summers, L., (1993),** "Central Bank Independence and Macroeconomic Performance: Some Comparative Evidence," *Journal of Money, Credit and Banking*, Vol. 25, pp. 151-62.
- Alpanda, S., and Honing, A., (2009),** "Political monetary cycles and a de facto ranking of central bank independence," *Amherst College, Amherst, MA 01002*
- Atanavska, G., Kacarska, S., Koneska, C., Pulejkos, A., and Risteska, M., (2008),** "Integration Perspectives and synergic effects of European Transformation", *Centre for EU enlarged studied and CEU*.
- Bade, R. and Parkin, M., (1988),** "Central Bank Laws and Monetary Policies," unpublished, London (Ontario, Canada), University of Western Ontario.
- Baltagi, B., (2008),** "Econometric Analysis of Panel Data," John Wiley & Sons, Chichester.
- Barro, R. and Gordon, D., (1983),** "Rules, Discretion and Reputation in a Model of Monetary Policy," *Journal of Monetary Economy*, Vol. 12, pp.101-121.
- Bartlett, W., (2008),** "Europe's Troubled Region" Routledge, London and New York.
- Belke, A., and Zenkić, A., (2007)** "Exchange Rate Regimes and the Transition Process in the Western Balkans" *University of Duisburg-Essen, University of Stuttgart-Hohenheim / KPMG Stuttgart* Nr. 288/200.
- Bishev, G., (1997),** "Reliability of the exchange rate as a monetary target in a suboptimal currency area- Macedonian case," Vienna.

- Bogoev, J., Petrevski, G., and Sergi, B., (2011),** "Investigating the link between central bank independence and inflation in Central and Eastern Europe – evidence from panel data models," forthcoming.
- Central Bank of Kosova, (2009),** "Financial Stability Report 2009," Central Bank of Kosova, Prishtina.
- Cohen, B. C. and Kaufman, G., (1965),** "Factors determining bank deposit growth by state: an empirical analysis," *Journal of Finance*, vol. 20, pp. 59-70.
- Crowe, C. and Meade E., (2007),** "The Evolution of Central Bank Governance around the World," *Journal of Economic Perspectives*, Vol. 21, No.4, pp. 69-90.
- Cukierman, A., (1992),** "Central Bank Strategy, Credibility, and Independence: Theory and Evidence," Cambridge, Mass., MIT Press.
- Cukierman, A., Webb, S., and Neyapti, B., (1992),** "Measuring the Independence of Central Banks and its Effect on Policy Outcomes", *World Bank Economic Review*, Vol. 6, No. 3, pp. 353-398.
- De Haan, J. and Kooi, W., (2000),** "Does central bank independence really matter? New evidence for developing countries using a new indicator," *Journal of Banking and Finance*, Vol. 24, 643-664.
- De Haan, J., and Siermann, C., (1994),** "Central Bank Independence, Inflation and Political Instability," Department of Economics, University of Groningen, *Journal of Policy Reform*.
- De Haan, J., and Sturm, J.E., (1992),** "The Case for CB Autonomy," *Banca Nazionale del Lavoro Quarterly Review*, Vol. 182, pp.305-27.
- De Long, J. and Summers, L., (1992),** "Macroeconomic Policy and Long-Run growth," *Federal reserve Bank of Kansas City Economic Review*, Fourth Quarter, pp. 5-29.
- Dželetović, M., Slobodan, R., and Andrejević, A. (2008),** "Interdependence of Development of Financial Markets and Efficiency of Monetary-Credit Instrumentarium," Paper presented at the conference: "Financial System Integration of Balkan Countries in the European Financial System", Belgrade, 2008.
- Eijffinger, S. and De Haan, J., (1996a),** "The political economy of central bank independence," Special Papers in International Economics, No 19, Princeton.
- Eijffinger, S., and Schaling, E., (1993),** "Central bank independence in twelve industrial countries," *Banca Nazionale del Lavoro Quarterly Review*, Vol.184, 49-89.
- Eijffinger, S., Van Rooij, M., and Schaling E., (1996),** "Central Bank Independence: A Paneldata Approach," *Public Choice*, Vol. 89, pp.163-82.
- Grilli, V. Masciandaro, D. and Tabellini, G., (1991),** "Political and Monetary Institutions and Public Finance Policies in the Industrial Countries." *Economic Policy* 13 (October 1991), 341-92.

- Haron, S., and Azmi, W., (2006)**, "Deposit Determinants of Commercial Banks in Malaysia", Working Paper Series 009, *Finance India*, Vol. XX, No. 2.
- Kydland F., and Prescott E., (1977)**, "Rules Rather than Discretion: The Inconsistency of Optimal Plans", *Journal of Political Economy*, Vol. 85, No. 3 pp. 473-92.
- Loungani, K., and Sheets, N., (1995)**, "Central Bank Independence, Inflation, and Growth in Transition Economies," *Journal of Money, Credit, and Banking*, 29, 381-399.
- Mu, Y., and Horgan, M., (2006)**, "Government Securities, Money market and Cash Management in Serbia," Financial Sector, World Bank.
- Müller-Jentsch, D. (2007)**, "Financial Sector Restructuring and Regional Integration in the Western Balkans," Office for South East Europe, European Commission.
- Rogoff, K., (1985)**, "The Optimal Degree of Commitment to a Monetary Target", *Quarterly Journal of Economics*, Vol. 100, No. 4, pp.1169-1189.
- Sargent, Th. and Wallace, N., (1981)**, "Some Unpleasant Monetarist Arithmetic," *Federal reserve bank of Minneapolis Quarterly Review*, 5, pp.1-17.
- Sturm, E. and De Haan, J., (2001)**, "Inflation in developing countries: Does central bank independence matter? New evidence based on a new dataset," *Ifo Studien*, 47 (4), 389-403.
- Turner, Ph., (2006)**, "The banking system in emerging economies: how much progress has been made?" *Bank for International Settlements*, No 28.
- Vukajlović-Grba, D., (2007)**, "The Money Market in Montenegro - Conditions, Development and Outlook" *Panaeconomicus*, 3, str. 325-346.
- Walsh, C., (1995)**, "Optimal Contracts for Central Bankers", *American Economic Review*, Vol. 85, No. 1, pp. 150-167.
- Wooldridge, J., (2006)**, "Introductory Econometrics," Thomson South-Western, 3rd Edition,

Web-sites used:

- Bank of Albania**, <<http://www.bankofalbania.org>>.
- Bank of Bosnia and Herzegovina**, <<http://www.cbbh.ba/?lang=en>>.
- Bulgarian National Bank**, <http://www.bnb.bg/?toLang=_EN>.
- Central Bank of Montenegro**, <<http://www.cb-mn.org/eng/>>.
- Central Bank of Kosovo**, <<http://www.bqk-kos.org/>>.
- Croatian National Bank**, <<http://www.hnb.hr/eindex.htm>>.
- Czech National Bank**, <<http://www.cnb.cz/en/>>.
- European Bank for Reconstruction and Development**, <<http://www.ebrd.com/pages/research/economics/data.shtml>>.
- European Commission**, <http://ec.europa.eu/index_en.htm>

International Monetary Fund, < <http://fas.imf.org/>>

National Bank of Hungary, < www.mnb.hu/>.

National Bank of Republic of Macedonia, < <http://www.nbrm.mk/default-en.asp>>.

National Bank of Serbia, < <http://www.nbs.rs/internet/english/> >.

National Bank of Slovakia, < <http://www.nbs.sk/en/home>>.

National Bank of Moldova, < <http://www.bnm.md/en/home>>.

World Bank, < <http://www.worldbank.org/>>

Data Description

Variable	Description	Source
Log Bank Deposit Growth (Log Dep Growth)	Annual Deposit Growth	Central Banks of each country in our sample
Cukierman weighted CBI index (cwn)	Index Value	Calculations from Bogeov et al (2011)
GMT index (gmt)	Index Value	Calculations from Bogeov et al (2011)
Inflation Rate (CPI)	Annual Average Consumer Prices (in percentage change)	World Economic Outlook Databases (IMF)
GDP Growth	Annual Percentage	World Development Indicators and Global Development Finance (WB)
Deposit Interest rate (DIR)	End-year Percentage	Macroeconomic Data (EBRD)
Nominal Exchange Rates (NER)	Annual Percentage	International Financial Statistics (IMF)
Number of Bank Branches (NBB)	The bank branches per 1000km ²	Financial Access Survey (IMF)