Do Central Bank Independence Reforms Matter for Inflation Performance?*

Mats Landström†

University of Gävle

December 30, 2008

Abstract

In this paper it is investigated whether CBI-reforms matter for inflation performance using a difference-in-difference approach. The analysis is based on a novel data set including the possible occurence of CBI-reforms in 133 countries during the period 1980-2003. The results does not support the popular view that CBI-reforms are important for improving inflation performance. There is, however, some evidence that CBI-reforms are more efficient in bringing down inflation in countries characterized by historically high inflation rates.

---

1 Introduction

In recent years many countries have implemented institutional reforms that formally establish the independence of central banks towards elected policymakers (Daunfeldt et al., 2008). The reason for this might be that independent central bank are widely believed to perform better at achieving low inflation than central banks controlled by political policymakers. The theoretical background of this belief is the literature on time-inconsistency in monetery policy (Kydland and Prescott, 1977; Barro and Gordon, 1983; Rogoff, 1985).

There exists some empirical evidence that countries with independent central banks have better inflation performance[1]. For example, a number of empirical studies (e.g., Cukierman et al., 1992; Alesina and Summers, 1993) have found a negative correlation between average inflation and the degree of central bank independence (CBI), suggesting that inflation might be brought down with CBI-reforms. However, these earlier studies only use data from a small set of, mostly highly industrialized, countries. This might be a problem since the importance of CBI-reforms might differ between countries on different levels of development[2]. It might therefore be desirable to increase the number of countries under study.

In addition, previous studies do not adress the question of causality, since correlation analysis is not sufficient for establishing a causal relationship

---

[1] For an overview, see Cukierman (2008).

[2] Cukierman et al., (2002) studies the relation between inflation and CBI in 26 former socialist countries during their transition to market economies. Their evidence shows that inflation is unrelated to CBI, at least in the early stages of economic liberalization. The study by Cukierman et al., (1993) presents results that indicates no correlation between CBI and inflation in up to 70 developing countries.

between variables. In this case it might be that low inflation cause CBI, rather than that the CBI cause low inflation. Or there might be a variable omitted from the model that causes both CBI and low inflation, for example social attitudes (Posen, 1993; Hayo, 1998). It has also been noted that CBI-indicies are characterized by a large subjectivity bias (Forder, 1996, 1998; Mangano, 1998).

This paper is an attempt to adress some of the problems inherent in most earlier empirical studies on CBI and inflation performance. The paper is focused on possible changes in the legal independence of the central banks, instead on the level of CBI. Therefore, as the reforms by definition have increased CBI, the analysis is not distorted by the subjectivity bias that plagues the most commonly used indicies of CBI (see also Daunfeldt and de Luna 2008)[3]. The analysis is based on a novel data set compiled by Daunfeldt et al. (2008), covering the possible occurence of CBI-reforms in 133 countries during the period 1980-2005. This means that the study includes more countries than any previous study on CBI and inflation performance.

The purpose of this paper is to study whether countries that have implemented CBI-reforms perform better in terms of inflation performance than countries that have not implemented such institutional reforms. Legal reforms that are considered as CBI-reforms in this paper are reforms that formally decreases the influence of elected policymakers on monetary

---

[3]Note, however, that focusing on changes rather than the level of CBI does not mean that the bias is totally eliminated. There is still some subjectivity involved in interpreting what constitutes a change. But the claim can be made, though, that changes claimed to be made with the intent to change the legal status towards more independence, indeed do just that. A qualitative variable is thus obtained, indicating whether a change was made or not, without being concerned with how much the status is changed, according to indicies.

policy[4].

The study is based on a difference-in-difference methodology, and it is closely related to a study by Ball and Sheridan (2005). The difference-in-difference methodology has also previously been used to identify the effect of a change in institutional factors, for example a change of a law (see e.g., Meyer, 1995). Ball and Sheridan (2005) used the difference-in-difference approach to study whether inflation targeting improved inflation performance in a sample of 20 OECD-countries. Their results indicated that although targeters improved average inflation performance more than non-targeters, this result was no longer true when one controlled for regression to the mean.

In this paper, instead of comparing targeters and non-targeters, countries that have implemented CBI-reforms are compared to countries that have not implemented such reforms during the study period. In accordance with Ball and Sheridan (2005), the statistical phenomenom of regression to the mean is controlled for by including average inflation in the pre-reform period as an explanatory variable. In addition, the initial levels of CBI are included in the dataset to, following Willard (2006), be used as an instrument. This makes sense since the usefulness of making a reform, for improving inflation performance, might be influenced by the historical level of independence. Also, a sensitivity analysis is performed whereby different countries are included or excluded from the regressions, depending on their

---

[4]Considered here are reforms that safe-guards the low inflation goal in the legislation, decreases the possibilities for the government to override the central bank´s descision on its operationg targets, put restrictions on the governments opportunities to use central bank credits in order to finance budget deficits, decreases the possibilities to dismiss a central bank governor, increases the terms in office and the number of members of the central bank´s governing body for monetary policy, and so on.

level of inflation in the pre-reform period.

The results from the full sample in this paper indicate that CBI-reforms have no significant influence on inflation performance once regression to the mean is accounted for. Thus, the paper does not support the popular view that reforms that delegates authority from politicians to independent central banks are important for improving inflation performance. There is though some evidence in the data that the efficiency of a CBI-reform might be higher in countries characterized by historically high inflation rates compared to countries that have had low inflation rates.

The paper is organized as follows: In the next section the data and sample of countries used in this paper are presented. In section 3, the empirical methodology is presented and discussed, while the results are presented and commented in section 4. Finally section 5 summarizes and draws conclusions.

2   The Sample and Descriptive Statistics

2.1   The sample

To investigate whether countries that have implemented CBI-reforms perform better in terms of inflation performance than non-reform countries, information on the dates of when more independence formally was granted to the central banks is necessary. This information is available in the dataset obtained and previously used by Daunfeldt et al. (2008).

The dates of CBI-reforms were obtained by contacting, by e-mail, all cen-

tral banks listed in the Morgan Stanley's *Central Bank Directory 2004*. The e-mail contained the following questions: (i) Has your country implemented any institutional reforms that grant your central bank more independence from elected policymakers?, (ii) If yes, when?, (iii) Where can we find more information about this? The reason for using this approach for data collecting is to be able to, as far as possible, treat all countries with central banks equally, at least initially[5].

From a total of 162 central banks contacted, 95 central banks finally answered the questionnaire, corresponding to a a respondent rate of 59 percent. For the countries that did not provide any answer, the dates of CBI-reforms were obtained by using other information channels (e.g., central bank acts, central bank publications, and scientific articles). These kind of sources were also used to validate the answers obtained by e-mail.

The data set used in this paper consist of a panel of 133 countries over the period 1980-2005, meaning that we have information on the possible occurence of CBI-reforms in about 81 percent of the countries that were initially contacted by e-mail. As many as 89 of these 133 countries had granted their central banks more independence from political policymakers during the study period. The implementation years of CBI-reforms are displayed in Table A1 in the appendix; whereas Table A2 shows countries with no information on CBI-reforms. Note that inflation data is missing for five countries[6], thereby reducing the number of countries to 128.

---

[5] That is, although information in some cases is readily available from the central banks homepage, in some cases it is not.

[6] Afganistan, Bosnia and Herzegovina, Georgia, Slovak Republic, United Arab Emirates.

The countries in the dataset are classified as either reform- or non-reform countries. In this paper, for the reform-countries, time is partitoned into a pre-reform period and a post-reform period. The break between the periods is defined as being the year when a CBI-reform was implemented. Thus, the post-period is being defined as beginning the year a CBI-reform is formally implemented according to the data. In order to use a difference-in-difference approach, a break point between the pre-reform and post-reform period needs to be defined for the the countries that did not implement any CBI-reforms during the study period. Following Ball and Sheridan (2005), for non-reform countries, the break between periods is defined as the unweighted average year of when CBI-reforms were implemented in reform countries, which is 1998. In the next step average inflation is calculated for both the pre-reform period and post-reform period, for all the countries in the sample, using inflation measures from the *IMF Financial Statistics*.

2.2   Descriptive statistics

The time series for mean and median inflation for reform and non-reform countries from 1980 to 2005 are presented in Figure 1 and 2, respectively. Clearly the inflation rates are typically much lower in the end of the study period, both for reform and non-reform countries. There are only eight countries in the sample that experience a higher inflation rate in the post-reform period. Note that the mean inflation rates are somewhat lower for reform countries in the post-period, although it was higher in the pre-reform period, giving the impression that CBI-reforms are important for improving inflation performance.

- Figure 1 about here -

- Figure 2 about here -

Figure 3 plots the change in inflation against the level of inflation in the pre-reform period. The regression to the mean-effect is clearly visible in this figure, i.e., inflation decreased more in countries that experienced a relatively high inflation rate in the pre-reform period. However, no clear difference is visible between reform countries and non-reform countries.

- Figure 3 about here -

Figure 3 also reveals that the sample includes some extreme observations that can distort the results obtained in the empirical analysis. Therefore, a boxplot-analysis was performed on the pre-reform inflation variable in order to exclude outliers and extreme values from the data-set (Figure 4). A country is considered as an outlier if the pre-reform inflation rate is more than two standard deviation above the mean. In this case it means that outliers correspond to countries with pre-reform inflation levels above 55.19%. This excludes a further 23 countries, leaving 105 countries in the dataset.

- Figure 4 about here -

Mean and standard deviations for the variables used in the empirical analysis are presented in Table 1. The variables included are further discussed in Section 3.

- Table 1 about here -

3 Empirical Model

The aim of this paper is to investigate whether CBI-reforms improves inflation performance. To do this we have to distinguish between reform- and non-reforms countries. This is done by comparing inflation performance in reform and non-reform countries using a difference-in-difference approach, where reform- and non-reform countries are distinguished in the dataset by a dummy variable. As a first comparison, the following regression model (Model I) is estimated:

$$\pi_i^{pre} - \pi_i^{post} = \alpha_0 + \alpha_1 D_i + \epsilon_i, \tag{1}$$

where π_i^{pre} is the average inflation rate in country i in the pre-reform period; π_i^{post} is country i's inflation rate in the post-reform period; D_i is a dummy variable that is equal to one if country i has implemented an institutional reform during the study period that formally gives the central bank more independence from political policymakers; and ϵ is the regression error term. The parameter α_1 measures the impact of CBI-reforms on inflation performance, and the hypothesis that CBI-reforms does not matter for inflation performance is rejected if the estimate of α_1 is significantly different from zero. If CBI-reforms contributes to lower inflation the estimate is expected to be positive and statistically significant determined.

However, equation (1) might produce biased parameter estimates, since it does not control for the statistical phenomenon of regression to the mean. This phenomenon refers to situations when results, values or measures well above the average tend to be followed by results, values or measures closer

to the average[7]. In this case it suggests that high-inflation countries might distort the results, because they are likely to improve their inflation performance more than other countries, regardless of which type of monetary regime they are operating under.

Following Ball and Sheridan (2005), average inflation in the pre-reform period (π_i^{pre}) is, therefore, included in the next step as an explanatory variable. The estimated model (Model II) can be written:

$$\pi_i^{pre} - \pi_i^{post} = \alpha_0 + \alpha_1 D_i + \alpha_2 \pi_i^{pre} + \epsilon_i, \qquad (2)$$

In this case the coefficient for the CBI-dummy (α_1) indicates whether CBI-reforms affects country i´s inflation performance, for a given level of inflation in the pre-reform period[8].

One potential problem with equations (1) to (2) is that D_i and π_i^{pre} might be endogenous in the sense that they are correlated with the error term (Kennedy, 2003). For example, the CBI-reform dummy, D_i, might depend on inflation in the pre-reform period, π_i^{pre}. To control for the possible endogeniety of D_i, the predicted value of the dummy variable $\widehat{D_i}$ is used as an explanatory variable instead. Following Willard (2006), whether the country is an English speaking country or not is used to predict the value of the dummy. This instrument is probably valid, since inflation is likely not

---

[7] A well known example of this is that athletes in team sports that have been extremely successful in their rookie year, find it almost impossible to live up to expectations during their sophomore year. More generally, an athlete's superior performance is likely to be followed by poorer performance, due to regression alone (Gilovich, 1991).

[8] The variable CBI^{pre} was included as an explanatory variable in a third model, but dropped due to endogeniety problems. Note also that this variable is not used in earlier studies.

directly influenced by language. Also, the initial levels of CBI might be used to predict the value of the dummy. The likelihood of a CBI-reform is in this case first estimated using the following probit model:

$$\Pr(D_i = 1) = \beta_0 + \beta_1 English_i + \beta_2 CBI_i^{pre} + \beta_3 P_i + \beta_4 GDP_i + \epsilon_i, \quad (3)$$

where the variable $English$ is a dummy variable taking the value one if english is an official language in the country; CBI_i^{pre} is the initial level of CBI in the country using Cukierman's et al (1992) CBI-index; P_i is the degree of political fragmentation in the parliament, from Lundell and Karvonen (2003); and GDP_i is the gross domestic product per capita in country i in the beginning of the study period, obtained from the World Bank's *World Development Indicators.*

Then, in the next step, the estimated probability of a CBI-reform, $\widehat{D_i}$, is used to estimate whether CBI-reforms are important for improving inflation performancce, i.e.:

$$\pi_i^{pre} - \pi_i^{post} = \alpha_0 + \alpha_1 \widehat{D_i} + \epsilon_i, \quad (4)$$

Note that equation (4) does not control for the statistical phenomenom "regression to the mean". However, as previously noted, inflation in the pre-reform period might be endogenously determined and it is difficult to obtain suitable instrumental variables. To control for the effect of regression to the mean in some other way, the sample was split into a low - and high

11

inflation group, according to a criteria explained below. As the results might be sensitive to the inclusion of countries in the low and high inflation group, a sensitivity analysis was also conducted.

First, all countries were ranked according to the level of inflation in the pre-period, and then partitioned into decentiles, with all outliers and extreme values excluded. The difference in inflation between the pre - and post-reform period was then regressed against the reform dummy for different percentages of the whole sample. Formally, the following regressions were estimated:

$$\pi_{iL}^{pre} - \pi_{iL}^{post} = \alpha_0 + \alpha_1 D_{iL} + \epsilon_i, \tag{5a}$$

$$\pi_{iH}^{pre} - \pi_{iH}^{post} = \alpha_0 + \alpha_1 D_{iH} + \epsilon_i, \tag{5b}$$

where $\pi_{iL}^{pre} - \pi_{iL}^{post}$ is the average inflation difference between the pre-reform period and the post-reform period for the countries that are classified into the low-inflation group; whereas $\pi_{iH}^{pre} - \pi_{iH}^{post}$ is the average inflation difference between the pre-reform period and the post-reform period for the countries that are classified into the high-inflation group. The same analysis was then also made, using the estimated probability of implementing a CBI-reform, $\widehat{D_i}$.

4   Results

The results from estimating equations (1)-(2) are presented in Table 2.

- Table 2 about here -

The null hypothesis that CBI-reforms does not matter for inflation performance can be rejected on all reasonable significance level in Model I. The results thus indicate that reform countries have improved average inflation performance more than non-reform countries, supporting the belief that CBI-reforms are helpful in achieving price stability.

However, in Model II, when average inflation in the pre-reform period is included as an explanatory variable to control for the possibility of regression to the mean, the results does not indicate that CBI-reforms significantly matter for inflation performance. The estimated coefficient for the pre-reform inflation is 0.60, and statistically significant on all reasonable significance levels, indicating a strong regression to the mean. In accordance with the results presented in Ball and Sheridan (2005), it thus seems important to include inflation in the pre-reform period to control for regression to the mean[9].

As described in the previous section, the estimated probability of a CBI-reform is used in the next step, instead of a CBI-reform, as an explanatory variable to control for endogenity problems. The results from the probit estimation (eq. 3) is presented in Table A3 in the appendix and the results from estimating equation (4) are presented in table 3.

- Table 3 about here -

---

[9]Note though that, using inflation in the first year in the dataset instead of average inflation in the pre-period, makes the coefficient for the CBI-dummy statistically significant.

As can be seen from table 3, the results does not indicate that the probability of a CBI-reform significantly affect inflation performance.

The regression for the low-inflation group (eq. 5a) was first run for only ten percent of the countries, i.e., those with an inflation level of 3.2 percent or lower in the pre-period. Then a corresponding regression for all other countries (the high inflation group), i.e., for those with an inflation level higher than 3.2 percent was estimated. In the second step, the low inflation group was defined as the twenty percent of the countries that had the lowest pre-reform inflation rates, i.e., those with an inflation level in the pre-period lower than 4.6 percent. The high inflation group correspondingly included all countries (80% of the sample) with a pre-reform inflation rate above 4.6 percent, and so on. The results from the estimations, using the CBI-dummy, D_i, are presented in the Table 4.

- Table 4 about here -

The results indicate that the CBI-dummy in general is negatively correlated with inflation performance for countries with a pre-inflation rate lower than 9.6%, implying that countries that not had implemented CBI-reforms had reduced inflation more than countries that had choosen to delegate power from politicians to an independent central bank. One possible explanation is that the group of countries with modest inflation might include countries with stable political systems that are able to adopt low inflation policies without the necessity of implementing formal CBI-reforms (for a similar explanation, see Daunfeldt and de Luna, 2008). The reforms were then perhaps only adopted as part of a package of reforms aimed at tran-

14

sition towards a market economy or joining a political union. Or it may simply be a reflection of the regression to the mean detected in Model II. When more countries are included in the low-inflation group, no significant results were found. The results then, seems to be sensitive to which countries are included in the low-inflation group.

Turning to the high-inflation countries, the results indicate that the CBI-dummy is positive and significantly determined at the 10% level for most countries. Thus, CBI-reforms seem efficient in bringing down inflation in countries characterized by high inflation rates, whereas this does not seem to be the case for low inflation countries. For regressions restricted to twenty percent of the countries with the highest pre-inflation rates there seems to be no significant effects of doing a CBI-reform.

When the same analysis was performed using the probability of implementing a CBI-reform (Table 5), $\widehat{D_i}$, no significant results were found, indicating that it is the reform itself rather than the probality to make a reform that seem to matter.

- Table 5 about here -

5   Conclusions

One of the most important macroeconomic findings in recent time is the strong negative correlation between average inflation and the degree of central bank independence (see e.g., Cukierman et al., 1992; Alesina and Summers, 1993). These findings have suggested that inflation might be brought down with CBI-reforms. In recent years many countries have also imple-

mented institutional reforms that formally establish the independence of central banks towards elected policymakers. The purpose of this paper has been to study whether countries that have implemented CBI-reforms performed better in terms of inflation performance than countries that have not implemented such institutional reforms using a difference-in-difference methology (Ball and Sheridan, 2005). The empirical analysis is based on a data set covering the possible occurence of CBI-reforms in 133 countries during the period 1980-2005.

According to the results presented in this paper the coefficient for the CBI-reform dummy is positively related to inflation performance, indicating that countries that have implemented CBI-reforms have brought down inflation more than countries that have not implemented such reforms. This result is, however, no longer true when one control for regression to the mean.

The empirical analysis was affected by endogeniety problems in the sense that the independent variables are correlated with the error term. To correct for the probable bias in the estimation of the effect of the reform dummy, a regression was run using the predicted values of the reform dummy, rather than the reform dummy itself. This regression gave no significant results, maybe indicating that it is the reform itself rather than the probalility to make a reform that matter for some countries. Also, the level of inflation in the pre-period was probably endogenously determined. Since no suitable intrumental variable was found, countries were instead ranked according to the level of inflation in the pre-period, and then partitioned into different groups. The difference in inflation between the pre - and post-reform period

was then regressed against the reform dummy for different percentages of the whole sample. According to the results presented in the paper, CBI-reforms seem more efficient in improving inflation performance in countries that have been characterized by historically high inflation rates; while this effect was not not present in countries with low inflation rates in the pre-reform period. On the other hand, no significant results were found when the probability of a CBI-reform was used instead of the CBI-dummy.

Hence, this paper does not support the popular view that a CBI-reform is important for improving a countrys inflation performance. The efficacy of a CBI-reform seem instead to depend on inflation experience in the past, suggesting that CBI-reforms are not important for reducing inflation rates in low-inflation countries. In these countries it might be the case that the politicians unemployment target coincides with the natural rate of unemployment, therby eliminating any need for a CBI-reform to reduce inflation levels. In high inflation countries, on the other hand, a CBI-reform might be needed in order to achieve credibility for a low inflation rule.

The results in this paper also raises the question if there perhaps are other conditions that together with formal legal independence are important for improving inflation performance. For example, the efficacy of a CBI-reform might be influenced by the level of political stability in the country under study. It might also be the choice of nominal target for the central bank that matter, perhaps together with how transparent the responsibilities and actions of the central bank are to the public. These questions constitute fruitful areas for future research.

References

Alesina, A., Summers, L., 1993. Central bank independence and macroeconomic performance: some comparative evidence. Journal of Money, Credit and Banking 25 (2), 151-162.

Ball, L., Sheridan, N., 2005. Does inflation targeting matter? In: Bernanke, B.S., Woodford, M., (Eds.), The Inflation-Targeting Debate. University of Chicago Press. Chicago, 249-276.

Barro, R.J., Gordon, D.B., 1983. A positive theory of monetary policy in a natural rate model. Journal of Political Economy 91 (4), 589-610 .

Buiter, W.H., 2007. How robust is the new conventional wisdom in monetary policy? CEPR Discussion Papers 5772,C.E.P.R. Discussion Papers.

Cukierman, A., Webb, S.B., Neyapti, B., 1992. Measuring the independence of central banks and its effect on policy outcomes. The World Bank Economic Review 6 (3), 353-398.

Cukierman, A., Kalaitzidakis, P., Summers, L.H., Webb, S.B., 1993. Central bank independence, Growth, investment and real rates. Carnegie-Rochester Conference Series on Public Policy 39, 95-140.

Cukierman, A., Miller, G.P., Neyapti, B., 2002. Central bank reform, liberalization and inflation in transition economies-an international perspective. Journal of Monetary Economics 49, 237-264.

Cukierman, A., 2008. Central bank independence and monetary policymaking institutions - Past, present and future. European Journal of Political Economy 24, 722-736.

Daunfeldt, S-O., de Luna, X., 2008. Central bank independece and price stability: evidence from OECD-countries. Oxford Economic Papers 60(3), 410-422.

Daunfeldt, S-O., Hellström, J., Landström, M., 2008. Why do politicians implement central bank independence reforms? Umeå Economic Studies 733, Department of Economics, Umeå University.

De Haan, J., Van't Hag, G-J., 1995. Variation in central bank independence across countries: some provisional empirical evidence. Public Choice 85, 335-351.

Eijffinger, S., Schaling, E., 1995. The ultimate determinants of central bank independence. Discussion Paper 5, Center for Economic Research, Tilburg University .

Eijffinger, S., De Haan, J., 1996. The political economy of central bank independence. Special Papers in International Economics 19, Department of Economics, Princeton University.

Fischer, S., 1995. Modern approaches to central banking. NBER Working Paper 5064.

Forder, J., 1996. On the assessment and implementation of institutional remedies. Oxford Economic Papers 48, 39-51.

Forder, J., 1998. The case for an independent European Central Bank: a reassessment of evidence and sources. European Journal of Political Economy 14, 53-71.

Gilovich, T., 1991. How We Know What Isn't So: The Fallibility of Human

Reason in Everyday Life. Free Press, New York, NY.

Hayo, B., 1998. Inflation culture, central bank independence and price stability. European Journal of Political Economy 14, 241-263.

Jonsson, G., 1995. Institutions and macroeconomic outcomes - the empirical evidence. Swedish Economic Policy Review 2, 181-212.

Kennedy, P. 2003. A Guide to Econometrics. The MIT Press, Massachusetts.

Kydland, F.E., Prescott, E.C., 1977. Rules rather than discretion: the inconsistency of optimal plans. Journal of Political Economy 85 (3), 473 - 491.

Lundell, K., Karvonen, L. 2003. A comparative data set on political institutions. Department of Political Science. Åbo Akademi.

Mangano, G., 1998. Measuring central bank independence: a tale of subjectivity and of its consequences. Oxford Economic Papers 50, 468-492.

Maxfield, S., 1997. Gatekeepers of Growth: The International Political Economy of Central Banking in Developing Countries. Princeton University Press, Princeton.

Meyer, B., 1995. Natural and quasi-natural experiments in economics. Journal of Business and Economic Statistics 13(2), 151-62.

Mishkin, F.S., 2007. Monetary Policy Strategy. The MIT Press, Massachusetts.

Morgan Stanley's Central Bank Directory, 2004. Central Banking Publications, United Kingdom.

Posen, A., 1993. Why central bank independence does not cause low inflation: there is no institutional fix for politics. In: O'Brien, R., (Ed.), Finance and the International Economy 7. Oxford University Press, Oxford.

Posen, A., 1998. Central bank independence and disinflationary credibility: a missing link? Oxford Economic Papers 50 (3), 335-359.

Rogoff, K., 1985. The optimal degree of commitment to an intermediate monetary target. Quarterly Journal of Economics 100 (4), 1169-1190.

Vega, M., Winkelried, D., 2005. Inflation targeting and inflation behavior: a successful story? International Journal of Central Banking 1 (3), 153-175.

Walsh, C.E., 2008. Central bank independence. In: Durlauf, S.N., Blume, L.E. (Eds.) New Palgrave Dictionary of Economics, Palgrave Macmillan.

Willard, L. 2006. Does Inflation Targeting Matter? A Reassessment, CEPS Working Paper No. 120.

6 Appendix

Table A1: Year and sources of possible CBI-reform in 133 countries, 1980-2005

Country	Year	Sources
Afganisthan	2003	Law Da Afganisthan Bank (www.centralbank.gov.af) and e-mail correspondence.
Albania	1998	Constitution of the republic of Albania (article 161) (www.bankofalbania.org).
Argentina	1992	BCAR's chapter reform, law 24.144 (www.bcar.gov.ar) and e-mail correspondence.
Australia	1996	Statement on the conduct of monetary policy (www.rba.gov.au), Polillo and Gillen (2005), Acemoglu et al. (2008), Daunfeldt and de Luna (2008), and e-mail correspondence.
Austria	1998	Nationalbankgesetz-Federal Law Gazette Part I No161/2004 (www.oenb.at) and e-mail correspondence.
Azerbaijan	2004	Law of the Republic of Azerbaijan on the National Bank of the Republic of Azerbaijan (www.nba.az).
Bahamas	2000	Central Bank Act of the Bahamas 2000 (www.centralbankbahamas.com) and e-mail correspondence.
Bahrain	None	e-mail correspondence
Bangladesh	None	www.bangladesh-bank.org
Barbados	None	www.centralbank.org.bb
Belarus	None	www.nbrb.by and e-mail correspondence
Belgium	1999	Polillo and Gillen (2005), Acemoglu et al. (2008), and Daunfeldt and de Luna (2008).
Belize	None	www.centralbank.org.bz
Bhutan	None	www.rma.org.bt

Table A1 (Cont): Year and sources of possible CBI-reform in 133 countries, 1980-2005

Country	Year	Sources
Bolivia	1995	Jácome and Vazques (2005)
Bosnia	1997	Dvorsky (2004), http://cbbh.ba and e-mail correspondence
Botswana	None	Bank of Botswana Act (www.bankofbotswana.bw)
Brazil	None	Ribeiro (2002)
Brunei	None	www.finance.gov.bn/bcb/bcb_index.htm, and e-mail correspondence.
Bulgaria	2005	Law on the Bulgarian National Bank (www.bnb.bg) and e-mail correspondence
Burundi	None	e-mail correspondence
Cambodia	None	http://www.imf.org/external/np/ms/2004/071504.htm
Canada	None	http://www.bankofcanada.ca/en/about/act_loi_boc_bdc.pdf, and e-mail correspondence
Cap Verde	None	http://www.bcv.cv
Cent. Af. States	None	http://www.beac.int
Chad	None	http://www.beac.int
Chile	1989	http://www.bcentral.cl/eng/funorg/organiclaw/, Jácome and Vazques (2005), and e-mail correspondence.
China	None	Law of the People´s Bank of China (www.pbc.gov.cn/english)
Colombia	1992	www.banrep.gov.co/board_directors/bd_mission.htm, Jácome and Vazques (2005), and e-mail correspondence.
Comoros	None	www.bancecom.com/bcc_home.php
Costa Rica	1995	Law No 7558 Act of the Central Bank of Costa Rica (www.bccr.fi.cr), e-mail correspondence, and Jácome and Vazques (2005).
Croatia	2001	Dvorsky (2004) Law of the Croatian National Bank (www.hnb.hr), and e-mail correspondence.

Table A1 (Cont): Year and sources of possible CBI-reform in 133 countries, 1980-2005

Country	Year	Sources
Cyprus	2002	Central Bank of the Cyprus Law - L138(I)/2002 (www.mof.gov.cy), and e-mail correspondence.
Czech Republic	1993	Constitutional Court of the Czech Republic - decision No 278/2001 (www.cnb.cz), and e-mail correspondence
Denmark	None	(www.nationalbanken.dk), and e-mail correspondence
Djibouti	2005	e-mail correspondence
Dominican Rep	2002	Jácome and Vázquez (2005)
Ecuador	1992	Jácome and Vázquez (2005)
Egypt	None	(http://www.cbe.org.eg/)
El Salvador	1991	Organic Law of the Central Reserve Bank of El Salvador (http://www.bcr.gob.sv/ingles/acerca/resenia.html), e-mail correspondence, and Jácome and Vázquez (2005).
Estonia	2004	Eesti Pank Act (www.legaltext.ee/text/en/X70022.htm), and e-mail correspondence.
Ethiopia	None	www.nbe.gov.et
Fiji	None	www.reservebank.gov.fj, and e-mail correspondence
Finland	1998	The Act on the Bank of Finland (www.bof.fi), and e-mail correspondence
France	1993	www.banque-france.fr/gb/instit/histoire/histor5.htm, and e-mail correspondence.
Gambia	2005	www.cbg.gm/pdf/strategic%20plan.pdf
Georgia	1995	Organic Law of Georgia on the National Bank of Georgia (www.nbg.gov.ge/nbg_new/about_the_bank/nbg_history.htm)
Germany	None	www.bundesbank.de, and e-mail correspondence
Ghana	None	www.bog.gov.gh/privatecontent/File/Secretarys/bog-act.pdf

Table A1 (Cont): Year and sources of possible CBI-reform in 133 countries, 1980-2005

Country	Year	Sources
Greece	1994	Law 2275, articles 45 and 46 (www.bankofgreece.gr/en), Maxfield (1997), Panagioditis and Triampella (2006), and Acemoglu et al. (2008).
Guatemala	2002	Principales Leyes Bancarias y Financieras (www.banguat.gob.gt), and e-mail correspondence
Guyana	1998	The Bank of Guyana Act (www.bankofguyana.org.gy/legalregframewk.htm), and Jácome and Vázquez (2005).
Honduras	1996	Jácome and Vázquez (2005)
Hungary	1991	Act of the Magyar Nemzeti Bank (http://english.mnb.hu)
Iceland	2001	www.sedlabanki.is, and e-mail correspondence
India	None	Polillo and Guillen (2005), and Acemoglu et al. (2008).
Indonesia	1999	Central Bank Act, UU No. 23, 1999 (www.bi.go.id), Polillo and Guillen (2005), and Acemoglu et al. (2008).
Iran	2005	www.cbi.ir/default_en.aspx
Ireland	1998	Central Bank Act 1998 and convergence report (www.ecb.int/pub/pdf/conrep/cr1998en.pdf).
Israel	None	e-mail correspondence
Italy	1993	Legaslative Decree 385, 1993 (www.bancaditalia.it), Polillo and Guillen (2005), and Acemoglu et al. (2008).
Jamaica	None	www.boj.org.jm/uploads/pdf/qmp_report/fqmp_report_october_ december2003.pd, and Nelson-Fouglas (2004).
Japan	1998	www.boj.or.jp/en/type/exp/about/foboj.htm, and Werner (2003), chapter 18.
Jordan	None	www.cbj.gov.jo/pages.php
Kazakhstan	2005	www.nationalbank.kz/cont/publish626681_1720.doc, and e-mail correspondence

Table A1 (Cont): Year and sources of possible CBI-reform in 133 countries, 1980-2005

Country	Year	Sources
Kenya	None	e-mail correspondence
Korea	1997	Polillo and Guillen (2005), and Acemoglu et al. (2008).
Kuwait	None	www.cbk.gov.kw/WWW/index.html
Lao	None	www.bol.gov.la/bollaw1.html, and e-mail correspondence
Latvia	2002	www.bank.lv/eng/main/lvbank/llb/), convergence report (http://www.ecb.int/pub/pdf/conrep/cr2004en.pdf), and e-mail correspondence.
Lesotho	2000	www.centralbank.org.ls/about/default.htm), and e-mail correspondence.
Lithuania	2001	Morgan Stanley (2004)
Luxemburg	1998	www.bcl.lu/en/bcl/index.html
Macedonia	2002	Dvorsky (2004)
Madagascar	1994	e-mail correspondence
Malaysia	1994	Arnone et al. (2007)
Maldives	None	e-mail correspondence
Malta	2002	www.centralbankmalta.com/site/about4a.html), and e-mail correspondence
Mauritius	2004	e-mail correspondence
Mexico	1994	Jácome and Vázquez (2005), and e-mail correspondence
Mongolia	1995	Slok (2002), and Polillo and Guillen (2005).
Namibia	2004	e-mail correspondence
Nepal	2002	www.nrb.org.np/index.htm, and e-mail correspondence
Netherlands	1998	www.dnb.nl/dnb/home/file/bankact1998_tcm13-36143.pdf, and e-mail correspondence

Table A1 (Cont): Year and sources of possible CBI-reform in 133 countries, 1980-2005

Country	Year	Sources
New Zealand	1989	Dalziel and Lattimore (1996), Silverstone et al. (1996), Daunfeldt and de Luna (2001), and e-mail correspondence.
Nicaragua	1992	www.bcn.gob.ni/english/about/origin_bank.htm, and Jácome and Vázquez (2005).
Nigeria	1999	e-mail correspondence
Norway	2003	www.regjeringen.no/Rpub/OTP/20022003/081/PDFS/ OTP200220030081000DDDPDFS.pdf), and e-mail correspondence.
Oman	None	www.cbo-oman.org/BankingLaw/BankingLaw.pdf
Pakistan	1997	Morgan Stanley (2004)
New Guinea	2000	www.imf.org/external/pubs/ft/scr/2000/cr00137.pdf), and e-mail correspondence.
Paraguay	1995	Jácome and Vázquez (2005)
Peru	1993	Jácome and Vázquez (2005)
Philippines	1993	www.bsp.gov.ph/about/history_cbp.asp
Poland	1998	www.nbp.pl/en/publikacje/integracja/role_nbp_en.pdf, and e-mail correspondence
Portugal	1998	www.bportugal.pt/default_e.htm, ECB (1998), and e-mail correspondence
Romania	2004	Dvorsky (2004), www.bnro.ro/def_en.htm, and e-mail correspondence
Russia	1995	www.cbr.ru/eng/today/history/central_bank.asp
Samoa	None	e-mail correspondence
Serbia	2003	Dvorsky (2004)
Seychelles	2004	www.cbs.sc/acro/QuarterlyReviewQ22005.pdf, and e-mail correspondence

Table A1 (Cont): Year and sources of possible CBI-reform in 133 countries, 1980-2005

Country	Year	Sources
Singapore	None	Polillo and Guillen (2005)
Slovak Rep	1993	(http://www.nbs.sk/INDEXA.HTM), and e-mail correspondence
Slovenia	2002	ECB (2004)
Solomon Isl	None	www.cbsi.com.sb/CBSI%20ACT.pdf
South Africa	1996	www.reservebank.co.za/internet/Publication.nsf/LADV /700A8754AC98C40242257037003CAB4C/$File/Factsheet1.pdf
Spain	1994	www.bde.es/normativa/be/leyautone.pdf, and e-mail correspondence.
Sri Lanka	2002	e-mail correspondence
Sudan	None	(http://www.bankofsudan.org/)
Suriname	2005	e-mail correspondence
Swaziland	None	(http://www.centralbank.org.sz/history.php)
Sweden	1999	www.riksbank.com/templates/Page.aspx?id=9173, Daunfeldt and de Luna (2008), and e-mail correspondence.
Switzerland	2004	www.snb.ch/e/snb/index.html?file=recht/content_recht.html, and e-mail correspondence
Syrian	None	www.banquecentrale.gov.sy/eg-laws/law23-eg.htm, and e-mail correspondence.
Tanzania	1995	www.bot-tz.org/AboutBOT/BOT_Function.htm
Thailand	None	www.bot.or.th/bothomepage/BankAtWork/AboutBOT /Response/History/Response_E.pdf)
Trinidad	None	www.central-bank.org.tt/the_bank/1041.pdf), and e-mail correspondence.
Tunisia	None	(http://www.bct.gov.tn/bct/siteprod/english/presentation/historique.jsp)

Table A1 (Cont): Year and sources of possible CBI-reform in 133 countries, 1980-2005

Country	Year	Sources
Turkey	2001	www.tcmb.gov.tr/yeni/banka/law.html, and e-mail correspondence
Turkmenistan	None	www.heritage.org/Index/country.cfm?id=Turkmenistan
Uganda	1993	e-mail correspondence
Ukraine	1999	Schwödiauer (2006)
United Kingdom	1998	www.bankofengland.co.uk/about/legislation/legis.htm, Morgan Stanley (2004), and e-mail correspondence
United States	None	e-mail correspondence
Uruguay	1995	Jácome and Vázquez (2005)
Uzbekistan	1995	Jácome and Vázquez (2005)
Vanuatu	None	e-mail correspondence
Venezuela	1992	Jácome and Vázquez (2005)
Vietnam	1997	e-mail correspondence
Yemen	2000	Central Bank Law no 14, (www.buyusa.gov/yemen/en/yemen2008.pdf)
Zambia	None	e-mail correspondence
Zimbabwe	None	www.rbz.co.zw/about/about.asp

Table A2: Countries with no information on CBI-reforms

Country	Country
Algeria	Saudi Arabia
Angola	Senegal
Armenia	Sierra Leone
Congo	Taiwan
Eritrea	Tajikistan
Guinea	Tonga
Haiti	United Arab Em
Hong Kong	
Kyrgyz Republic	
Lebanon	
Liberia	
Libya	
Malawi	
Mauritania	
Moldova	
Morocco	
Mozambique	
Myanmar	
Netherlands Antilles	
Panama	
Qatar	
Rwanda	
São Tomé and Príncipe	

Table A3: Probit estimation

Variable (parameter)	Est.	z-value
English	-0.66	-2.15
CBI-level	-0.03	-1.47
Political Competition	0.00	0.71
GDP/Capita	0.00	0.37
Constant	1.41	1.77

Table 1: Mean and standard deviations for variables used in the analysis

Variable	All Mean	s.d.	Reform Mean	s.d.	Non-Reform Mean	s.d.
Pre-reform inflation	13.79	12.30	15.86	13.53	9.98	8.61
Post-reform inflation	7.75	16.44	6.95	6.73	9.29	26.79
Inflation performance	6.07	17.93	8.98	11.80	0.75	24.98
CBI-level	35.3	8.34	34.62	8.53	36.78	7.84
CBI-dummy	0.66	0.47				
Political competition	5514.10	2289.12	5763.53	2121.46	4908.36	2594.61
GDP per capita	5819.10	7988.77	6335.86	8476.58	4785.58	6906.69
Number of countries	105					

Table 2: Estimation results, determinants of inflation performance

	Model I		Model II	
Variable (parameter)	Est.	t-value	Est.	t-value
Constant (α_0)	0.74	0.26	-5.25	-1.78
CBI-dummy (α_1)	8.24	2.30	4.71	1.40
Inflation pre-period (α_2)			.60	4.55

Table 3: Estimation results, probability of making a CBI-reform

Variable (parameter)	Est.	t-value
Constant (α_0)	1.33	0.14
Probability CBI-dummy (α_1)	5.62	0.42

Table 4: Sensitivity analysis (dummy)

Decentile (inflation)	Low inflation countries		High inflation countries	
	Est.	t-value	Est.	t-value
10(3.2%)	-0.86	-1.71	7.49	1.83
20(4.6%)	-0.60	-1.35	8.67	1.94
30(6.1%)	-0.88	-2.11	9.65	1.79
40(7.5%)	-0.82	-1.95	10.99	1.77
50(9.8%)	-0.91	-1.96	13.77	1.72
60(11.6%)	-0.77	-1.37	17.31	1.68
70(14%)	0.25	0.38	21.62	1.67
80(21%)	4.45	1.20	0.21	0.02
90(29.7%)	5.28	1.52	7.69	0.69

Table 5: Sensitivity analysis (predicted dummy)

Decentile (inflation)	Low inflation countries		High inflation countries	
	Est.	t-value	Est.	t-value
10(3.2%)	0.31	0.11	5.44	0.38
20(4.6%)	-0.48	-0.29	5.85	0.35
30(6.1%)	0.97	0.62	8.12	0.40
40(7.5%)	1.46	0.97	11.03	0.46
50(9.8%)	2.04	1.33	11.01	0.38
60(11.6%)	0.09	0.05	17.87	0.48
70(14%)	-0.75	-0.03	24.18	0.46
80(21%)	1.40	0.10	5.60	0.15
90(29.7%)	0.61	0.05	48.75	0.54
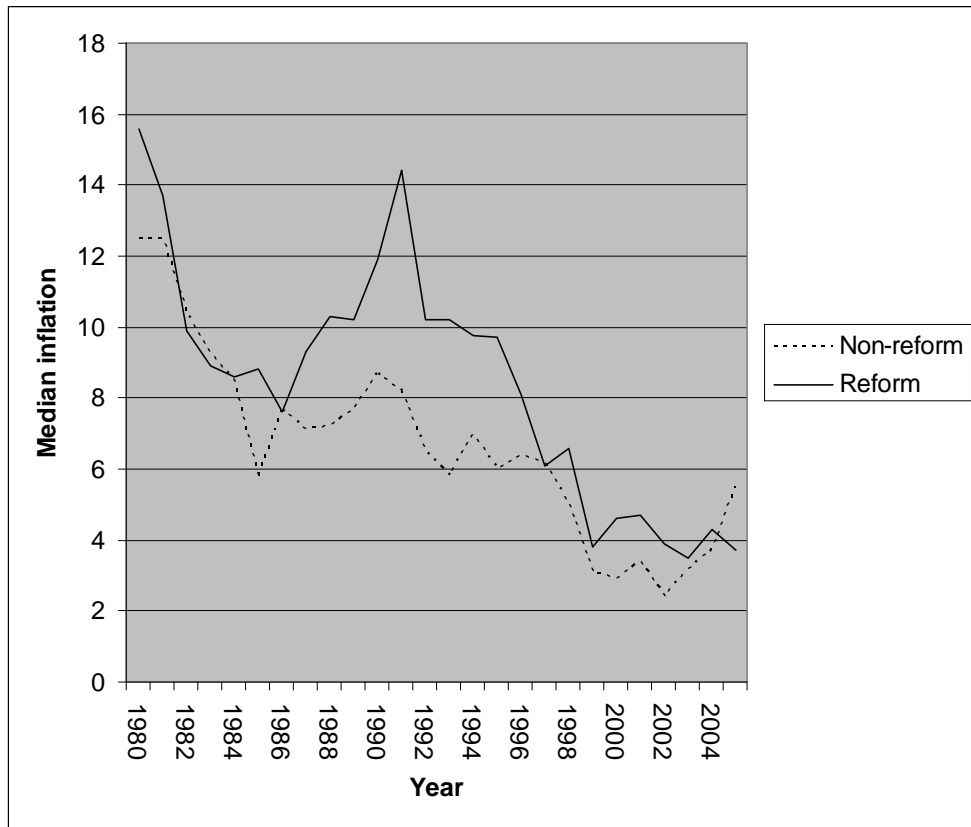
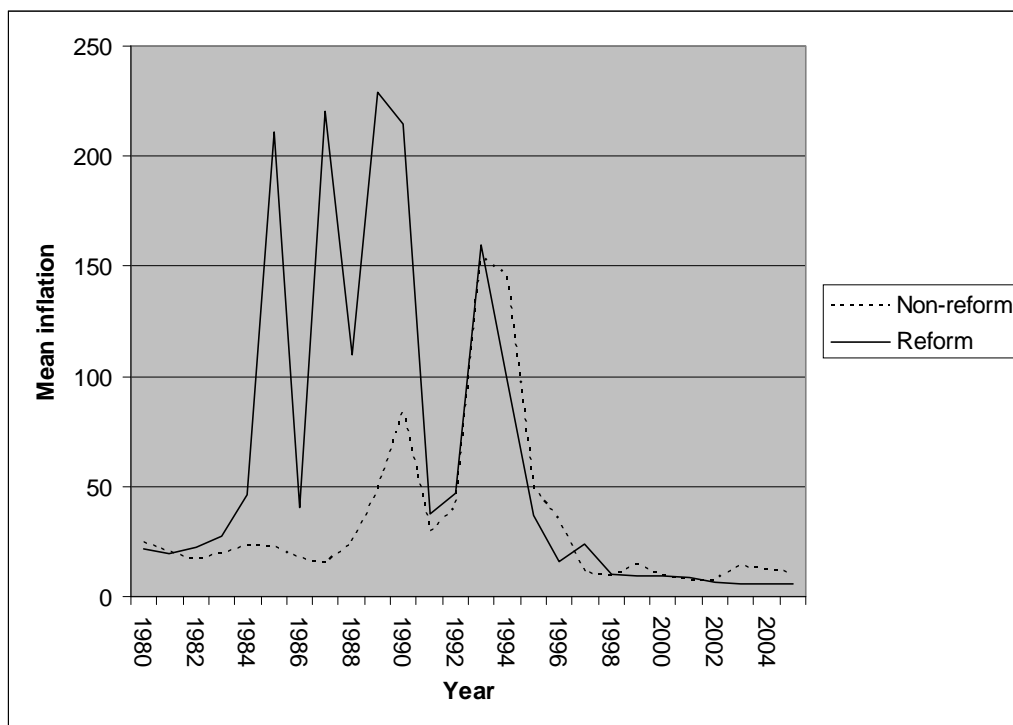Figure 1: Median inflation in reform- and non-reform countries 1980-2005

Figure 2: Mean inflation in reform- and non-reform countries 1980-2005
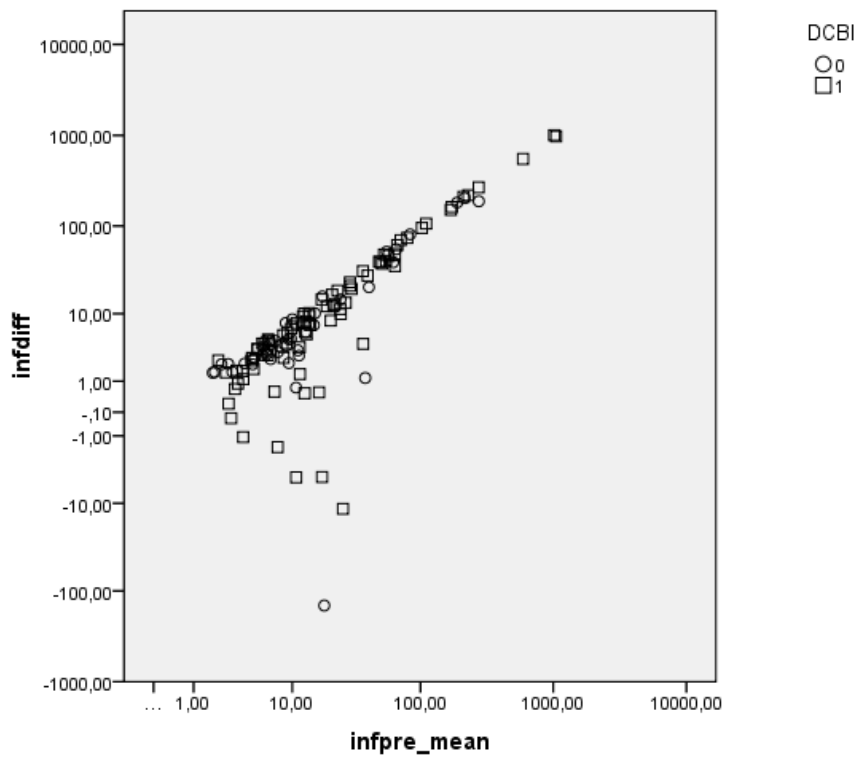
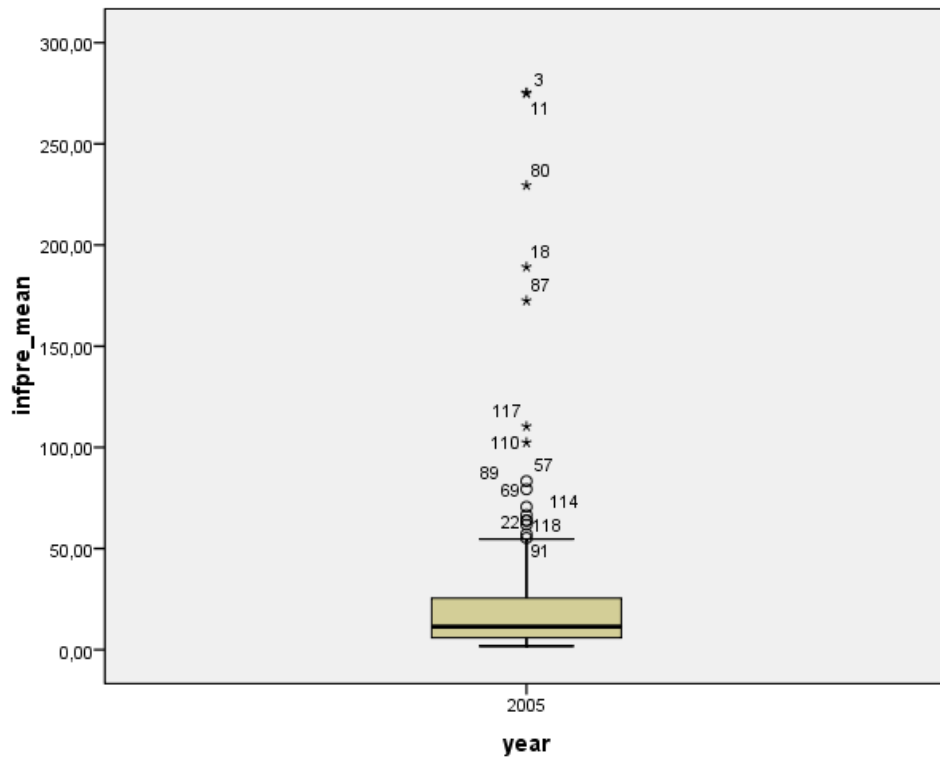Figure 3: Change in inflation against the level of inflation in the pre-period

Figure 4: Boxplot