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Central Bank Independence and economic growth: an analysis of the link between them

*Helder Ferreira de Mendonça**

Abstract: This paper presents a simple Barro-Gordon type model to explain the link between central bank independence (CBI) and inflation. It then extends the model to examine the link between CBI and economic growth. Using an index of CBI created by Cukierman, Webb and Neyapti (1992) the paper empirically tests the link between CBI, investment and growth. This paper finds no evidence that CBI promotes investment or growth.

Keywords: central bank independence, investment, and economic growth.

JEL N. O42, E58.

1 Introduction

Although the majority of the economists do not consider the influence of inflation on economic growth in the long run, several studies have found a negative and significant relationship between output growth and inflation.¹ Thus, even if the best contribution of the monetary policy for economic improvement is the search for price stability, the performance of the monetary policy is an important variable for analyzing economic growth. This idea is well represented by the words of the president of the Federal Reserve Bank of St. Louis "(...) low and stable inflation has turned out to be perfectly compatible with relatively strong growth in output and low unemployment" (MELZER, 1997, p. 5).

A public opinion in favor of the performance of the central bank (CB) in the conduction of monetary policy (to reach a low and stable inflation) implies a high credibility for the policymaker. The public gives high credibility to the central banker if it understands that there is a minimal chance for the occurrence of dynamic-inconsistency problem in the conduction of the policy. "Moreover, high credibility allows the monetary authorities to make a more accurate judgment of the economy's ca-

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¹ See Kormendi and Meguire (1985), Degregario (1993) and Gomme (1993).

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capacity to produce goods and services and to generate employment without automatically sparking new inflation fears" (PERRIER and AMANO, 2000, p. 12).

Following Kydland and Prescott's (1977) and Barro and Gordon's (1983) contributions over rules versus discretion dichotomy, several studies were developed in search of the optimal monetary policy. Under this perspective, the central bank independence proposal (CBI) initiated with Rogoff (1985) gained a great deal of prominence in a political and in an academic level from the end of the eighties to the beginning of the nineties. The main idea is that, in this way, the political pressures that force the monetary authority to stray from its natural function (the price stability) would be attenuated. Thus, the monetary authority could focus its attention on the control of inflation and on bringing credibility to the economy.

The recent interpretation of monetary policy conduction supposes that a high and volatile inflation has adverse implications for the economic growth. The core of the idea is that a high inflation erodes the value of incomes and savings and leads to high nominal interest rates. The inflation volatility raises costs because it increases the uncertainty of future relative prices and of price level implying a higher risk premium in domestic and foreign markets. The consequence of high interest rates is an inflow of short-term risk capital, which has a range of direct and indirect adverse effects. Furthermore, unforeseen inflation reduces the long-term growth potential of the economy due to savers not being able to safeguard the purchasing power of their incomes and savings.

Therefore, there are two main theoretical arguments that sustain the idea that the CBI increases saving and further economic growth: (i) the behavior of an independent CB is more prognosticated because it is less inclined to political pressure, and thus, it contributes to improve the economical stability and the planning capacity of the private agents; and (ii) an ICB decreases the costs for the society because it reduces the volatile inflation implying a lower uncertainty of the inflationary behavior.

The aim of this paper is to appraise the consequences from CBI on economic growth. Besides this introduction, the article is structured in the following way: section 2 analyzes the theoretical relation between credibility and economic growth based on Barro-Gordon's perspectives; section 3 examines the empirical evidences for: investment-growth, CBI-investment, and CBI-growth; and section 4 concludes the paper.

2 Monetary credibility and output

This section appends an analysis of saving onto a Barro-Gordon style model. Furthermore, the model is along with the lines of Backus and Driffill

(1985) where there are two types of CBs. However, in this paper there does not appear to be any uncertainty about the type of CB one faces. The key assumption is that consumption is an increasing function of inflation expectations. In this sense, the advantages of a high credibility as a result of the conduction of monetary policy for economic improvement can be understood in the following way. Consider that the CB adopts the strategy of an inflation target (zero for convenience) and that the reaction of the public for the determination of wages (W) depends on inflation expectations (π^e),

$$W = f(\pi^e) \quad \partial f / \partial \pi^e > 0 \quad (1)$$

Moreover, the output (Y) is assumed to be elastic to deviation of the observed inflation in relation to the expected inflation (b). In other words, the acceleration principle of the Phillips Curve is valid. Hence,

$$Y = b(\pi - \pi^e) \quad b > 0 \quad (2)$$

The conventional view concerning credibility indicates that the main problem in the conduction of monetary policy is the existence of an inflation bias (the temptation of the policymaker to search for a level of unemployment lower than that defined by NAIRU).² In this sense, the CB utility function can be written as an expectation-augmented Phillips curve,

$$U_{CB} = 2a(\pi - \pi^e) - \pi^2 - k(\pi), \quad a > 0 \quad (3)$$

If $\pi = 0 \Rightarrow k(\pi) = 0$ and if $\pi \neq 0 \Rightarrow k(\pi) = k$.

Where k represents the cost of the loss of credibility by the CB ($k > 0$).

In addition, it assumes two types of CB behavior:

- strong (ICB) – target is inflation – thus $k > a^2$; and
- weak – target is unemployment – thus $k < a^2$.

Since the public knows that the increase of inflation is insufficient to maintain the unemployment under the level defined by NAIRU (U_n), the public is adverse to high inflation and low unemployment ($U < U_n$). Therefore, the utility function for the public (U_p) is

$$U_p = -(\pi - \pi^e)^2 - c\pi^2, \quad c > 0 \quad (4)$$

² Credibility is the level of confidence entrusted to the policymakers as a result of the successful implementation of policies.

The consequences for the economy from utility functions can be understood as a game made in one shot with full information. In this situation, the CB has a dominant strategy,

$$\begin{cases} \pi = 0, \text{ if } k > a^2 \text{ (ICB); and} \\ \pi = a, \text{ if } k < a^2 \text{ (weak CB).} \end{cases}$$

Given the dominant strategy of the CB, the public's utility is maximized when $\pi = \pi^e$. Hence, the Nash equilibrium is

$$\begin{cases} \pi = \pi^e = 0 \text{ (ICB); and} \\ \pi = \pi^e = a \text{ (weak CB).} \end{cases}$$

Substituting the CB's Nash equilibrium in utilities functions, the following solutions for ICB and weak CBs are found:

$$\begin{cases} U_G = U_P = 0 \text{ (ICB); and} \\ U_G = -a^2 - k; e U_P = -ca^2 \text{ (weak CB).} \end{cases}$$

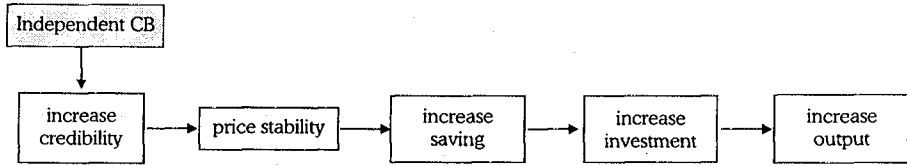
Therefore, an ICB implies an outcome that has a Pareto superior to that of a weak CB. In other words, the credibility derived from CBI is capable of maintaining a low and stable rate of inflation, and thus, a higher level of utility for the public and for the CB is reached.

The consequence of a gain in credibility due to CBI is not limited to inflation; another outcome is the improvement of the expectations of the economic agents. This observation matters because expectations affect the agents' decisions. If the public believes that the fundamentals of the economy are strong, there is the possibility of increasing the level of activity due to an improvement in the planning capacity of the private sector. On the other hand, if the public does not believe in the fundamentals of the economy, the public's conservative position can decrease the economic activity due to an increase in the risk in making new investments.

The relationship between credibility and output is a result of the observation that inflation increases the level of uncertainty. The literature concerning credibility highlights the argument that the presence of an ICB is capable of assuring a low variation in prices,³ and thus, it increases the planning capacity of the actors. Therefore, there is an incentive for increasing saving that implies an increase in investment, and thus, in the

³ See Alesina and Summers (1993).

output (see Scheme 1). Since credibility is necessary for the public to make its decision, it is a factor that must be considered when analyzing the distribution of the income between consumption and saving.



Scheme 1

The observation above implies a different interpretation of the variables presented in traditional analysis concerning economic growth. In the models derived from Solow and endogenous growth models, technological progress, expenditures for education, and the saving rate are the main variables. This analysis is focused on the saving rate. It is true that loans from the international financial market are a source of resources for increasing technology, education, health, etc. However, loans imply payment of interest that can contribute to an increase in debt. In general, the increase in debt implies fragility in the fundamentals of the economy (especially emergent economies) inducing a fall in investment from other countries. Thus, the loans (foreign saving) cannot be considered as an adequate tool for all economies. In this sense, the necessity of an increase in the domestic saving rate is a necessary condition to attenuate recessions.

The question that emerges is – how to build a framework capable of increasing the saving? The answer for this can be found by considering saving as an endogenous function of the credibility. The following theorem shows that the level of consumption (C), in the case of a weak CB (WCB – low credibility), is higher than in the case of an ICB (high credibility). Thus, the case of CBI implies a higher level of saving (S).

Theorem 1: Since (5) $Y=C+S$ and (6) $C=f(Y^D, \pi^e)$, where $\partial f/\partial Y^D > 0$ e $\partial f/\partial \pi^e > 0$ and it is known that $\pi^e_{WCB} > \pi^e_{ICB}$, then $C_{WCB} > C_{ICB}$ and thus, $S_{WCB} < S_{ICB}$.

Proof of Theorem 1: Rewriting the consumption function in the linear form (7) $C_t = \alpha Y_t^D + \beta \pi_{t+1}^e$ ($\alpha, \beta > 0$), and knowing that $\pi_{t+1}^e = E_t(\pi_t | \text{type of CB})$ there are two outcomes:

$$\begin{cases} \text{weak CB} \Rightarrow \pi_{t+1}^e = a > 0; \text{ and} \\ \text{ICB} \Rightarrow \pi_{t+1}^e = 0. \end{cases}$$

Therefore, assuming the same level of net output (Y^D) in both cases $\Rightarrow C_{WCB} > C_{ICB} \therefore S_{WCB} < S_{ICB}$.

Figure 1 shows how the credibility (denoted by ICB and weak CB) has an influence on the decision between consumption and saving by the actors. The level of consumption for the CBI case is illustrated by line C_{ICB} . Observe that this line does not have an inclination because in this case $\pi^e = 0$, and thus, all the consumption corresponds to $\alpha \bar{Y}^D$. Then, the saving in this case is also constant at level $\bar{S}_{ICB}$. On the other hand, for the weak CB case, the level of consumption is given by line C_{WCB} . Contrary to the previous case, this line has a positive inclination and does not start at the same level of CBI case, because $\pi^e = a > 0$. Therefore, the saving in the CBI case is potentially higher than weak CB case.

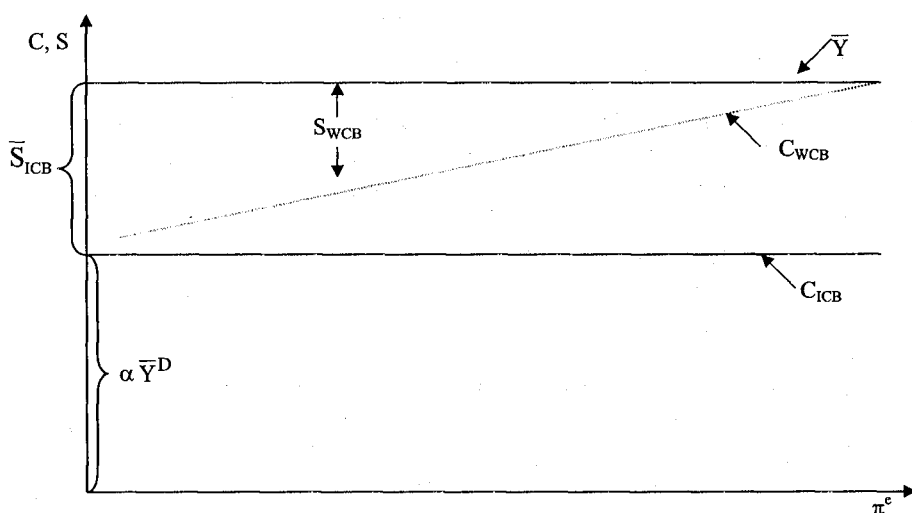


Figure 1

Following the idea presented in the Solow model, in the short run, an increase of saving stimulates the investment thus starting an economic growth until a new steady-state equilibrium is reached with an increase in capital and output. Therefore, any strategy that increases CBI, and thus credibility, can be a good way to restore the activity in economies (especially emergent countries) that have problems concerning recession and insufficient saving.

3 Empirical evidence

The argument that the central bank is responsible for economic growth is not stranger to policymaker debates concerning monetary policy objectives. The core idea is that an ICB can improve the monetary credibility,

and thus, this improvement implies more investment and output. One example is the recent declaration of Gary H. Stern (2000, p. 2) – President of Federal Reserve Bank of Minneapolis – “The ultimate objective of monetary policy is to help the economy achieve maximum sustainable economic growth and rising living standards”.

It is important to highlight that the idea of central banks sustaining economic growth is not contradictory with the search for price stability. In fact, some authors, like McDonough (1997), believe that the price stability helps to promote sustainable economic growth. The main argument is based on the fact that inflation represents a cost for society. In this sense, the adoption of CBI would solve two problems:

- i) Attenuate the uncertainty about the outcome of business decisions and profitability; and
- ii) Inhibit the incentives to engage with nonproductive activities.

The first point is associated with the argument that an ICB implies economic stability. In other words, a monetary policy constrained by low price levels over the long term puts limits on inflation expectations. The essence of the second point can be understood as the transfer of resources from the productive sector to a nonproductive activity (financial sector) in economies with high inflation. In the words of the President of the Federal Reserve Bank of New York – “the costs of overinvestment in the financial sector, like the costs of all inflation-induced nonproductive activities – such as tax code dodges – decrease the resource base available to the economy for growth. A move to price stability would give these economies the necessary incentives to shift resources back to productive uses” (McDONOUGH, 1997, p.2).

In agreement with the arguments above, it is expected that a higher CBI would imply more investment and so, economic growth. With the objective of verifying the validity of this proposition, an analysis is made about the relationship between CBI index (CUKIERMAN, WEBB and NE-YAPTI, 1992)⁴ and real investment, and CBI index and average real GDP/Capita growth (data from Penn World Table 5.6.a) in 69 countries⁵ during the '70s and '80s. Prior to this analysis, the relationship between investment and economic growth is analyzed using the same data and period mentioned above.

Although the theoretical argument that investment is an important key in the promotion of economic growth is well known, the analysis of

⁴ The selection of this index is due to the fact that the sample is representative (72 countries) for a large period (1950-1989). For developments in regard to the role of CBI on growth see Walsh (1994), Akhand (1998), and de Haan and Kooi (2000).

⁵ See appendix I.

the relationship between investment and economic growth is relevant to test the validity of the argument in the previous section. If the evidence denotes a lack of effect (or negative effect) due to investment on economic growth, the previous framework is not valid. Then, there should be no motive for expecting that a higher CBI could improve investment and so, economic growth.

Figure 2 suggests that there is a positive relationship (see correlation in Table 1) between investment and economic growth for all cases (developing or industrial countries) and for both periods (1972-79 and 1980-89). The statistics in Table 1 confirm the idea that investment causes economic growth. The results denote that influence of the real investment on economic growth is positive and significant at a 99% level. Furthermore, the average of the R-squared denotes that investment explains 22% of the economic growth variation.

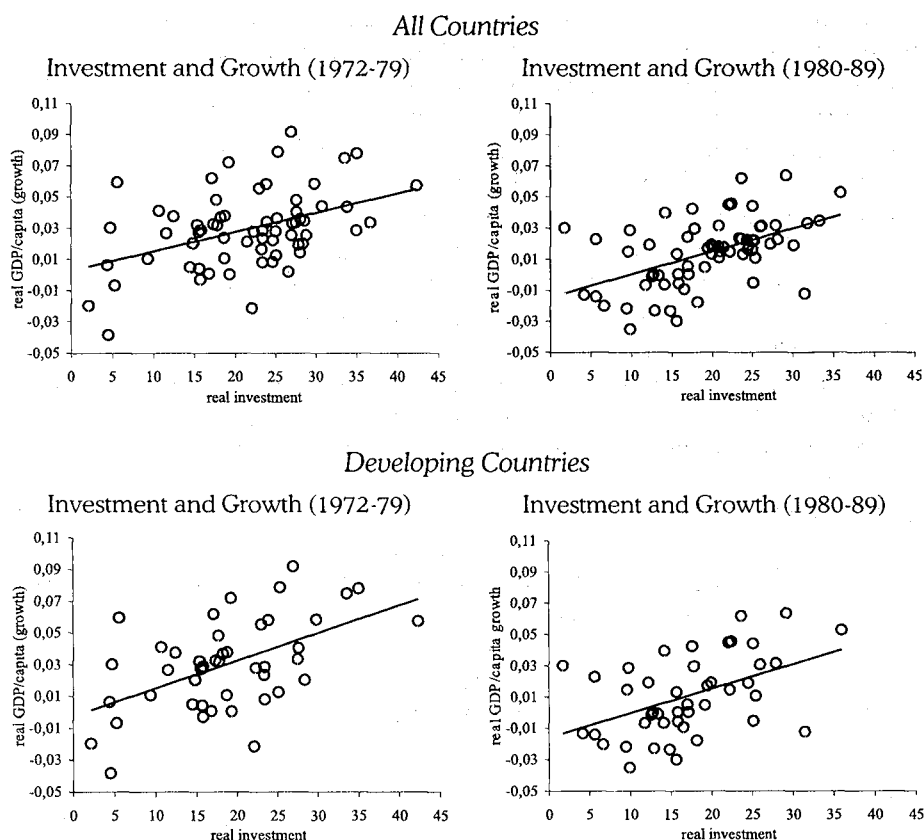


Figure 2

Industrial Countries

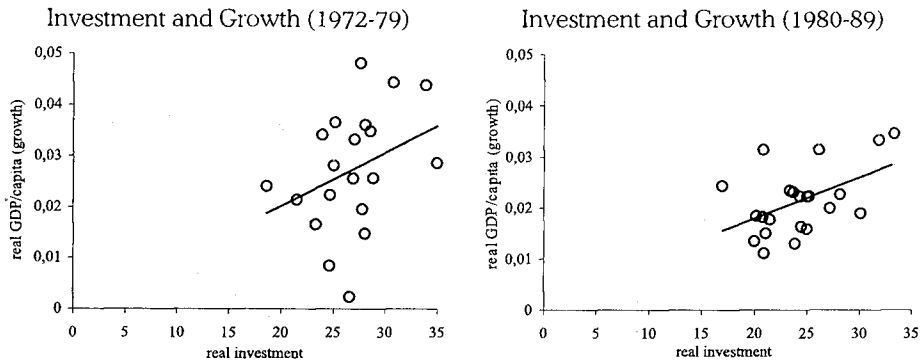


Figure 2 (cont.)

Table 1: OLS estimates.

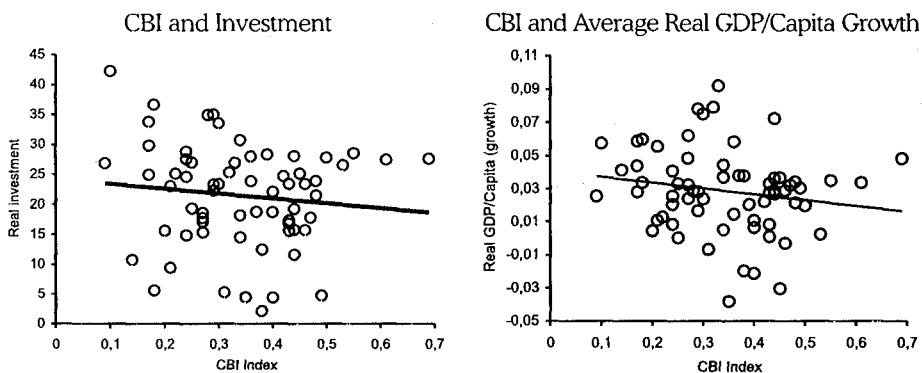
Growth = $\alpha_0 + \alpha_1 \text{investment} + \varepsilon$						
1972-1979	constant	t-stat	investment	t-stat	R ²	correl.
All countries	0,0029	0,3922	0,0012	3,8059**	0,1869	0,4324
Dev. Countries	-0,0024	-0,2658	0,0004	4,0510**	0,2810	0,5301
Ind. Countries	-0,0007	-0,0449	0,0010	1,8137**	0,1476	0,3842
1980-1989	constant	t-stat	investment	t-stat	R ²	correl.
All countries	-0,0143	-2,1940*	0,0015	4,6821**	0,2551	0,5051
Dev. countries	-0,0159	-1,8667*	0,0016	3,4063**	0,2165	0,4653
Ind. Countries	0,0019	0,2477	0,0008	2,5491**	0,2452	0,4952

Notes: *Significant at the 5 percent level; and **significant at the 1 percent level.

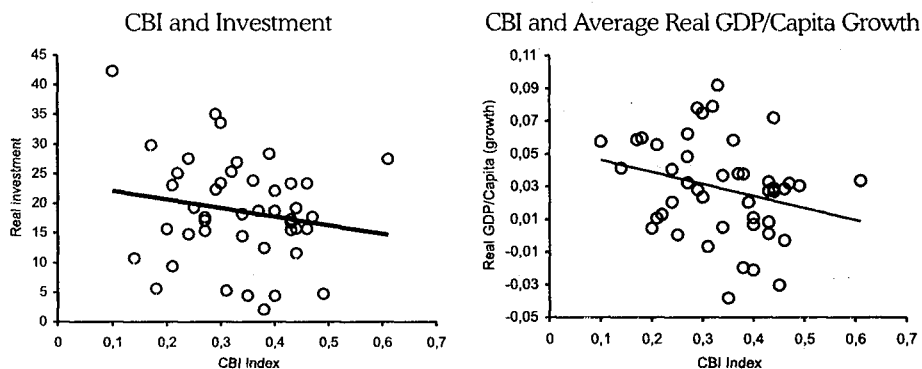
In spite of the results found about the relationship between investment and economic growth, figures 3a and 3b show the weak negative correlation between CBI and investment for the two decades analyzed. The same result is also verified for CBI and GDP/Capita growth (see Table 2). Contrarily to the theoretical perspective, the correlations suggest a CBI opposite effect on investment and economic growth. In other words, according to the figures, CBI would be associated with less investment and economic growth. With the objective of analyzing if the results of the correlations are consistent, the relationship between CBI index and

investment, and CBI index and average Real GDP/Capita growth were regressed (OLS method).

All Countries



Developing Countries



Industrial Countries

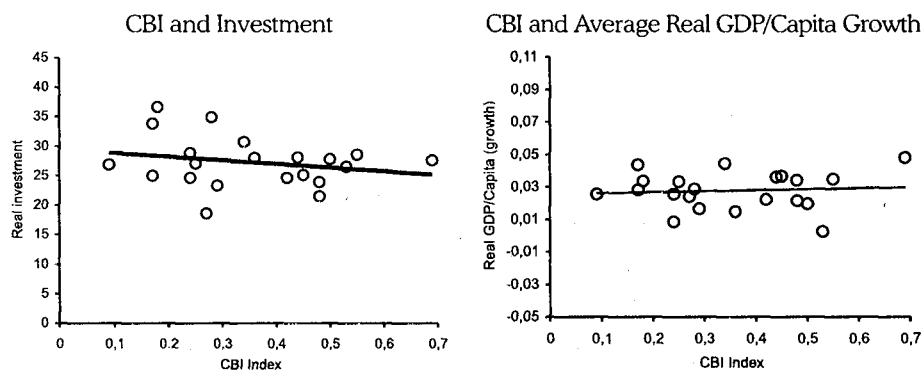
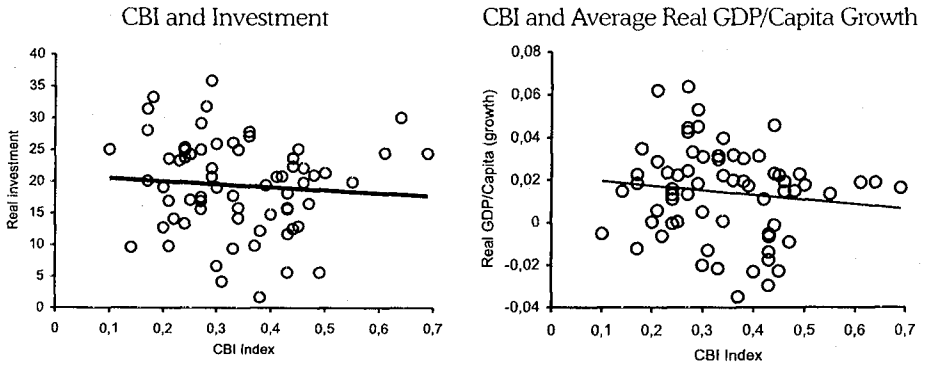
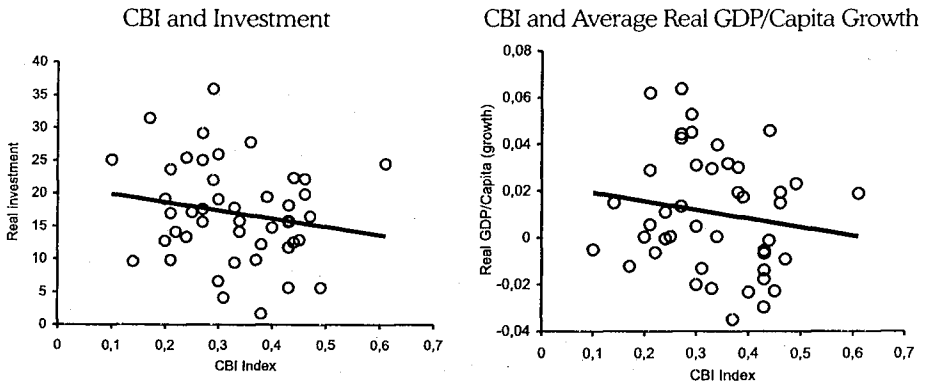


Figure 3a – 1972-79.

All Countries



Developing Countries



Industrial Countries

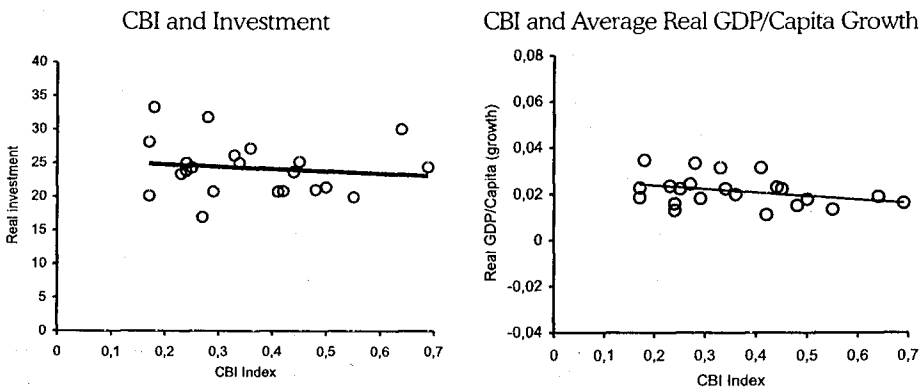


Figure 3b - 1980-89.

In accordance with Table 2 there are no meaningful evidences that the presence of CBI implies higher investment or Real GDP/Capita growth. The analysis of the relationship between CBI and investment denotes that in both developing and industrial countries the CBI effect on investment is not significant. Therefore this result is in disagreement with some authors like Cukierman et al. (1993) that found evidence that in developing countries a higher CBI is associated with higher levels of investment.

Table 2: OLS estimates.

Real investment = $\alpha_0 + \alpha_1 \text{CBI} + \varepsilon$						
1972-1979	constant	t-stat	CBI	t-stat	R ²	correl.
All countries	24,1978	7,6991***	-8,0783	-0,9315	0,0136	-0,1166
Dev. Countries	23,5244	5,4105***	-14,4829	-1,1709	0,0316	-0,1778
Ind. Countries	29,4351	12,3538***	-6,1762	-0,9958	0,0496	-0,2227
1980-1989	constant	t-stat	CBI	t-stat	R ²	correl.
All countries	20,9969	7,8238***	-4,7278	-0,6359	0,0062	-0,0786
Dev. countries	21,1449	5,8683***	-12,4855	-1,2014	0,0324	-0,1802
Ind. Countries	25,4269	10,7463***	-3,3299	-0,5467	0,0147	-0,1213
Average real GDP/Capita growth = $\alpha_0 + \alpha_1 \text{CBI} + \varepsilon$						
1972-1979	constant	t-stat	CBI	t-stat	R ²	correl.
All countries	0,0405	4,3917***	-0,0349	-1,3777	0,0288	-0,1697
Dev. Countries	0,0536	3,7073***	-0,0732	-1,7924**	0,0695	-0,2637
Ind. Countries	0,0256	3,8724***	0,0059	0,3446	0,0062	0,0788
1980-1989	constant	t-stat	CBI	t-stat	R ²	correl.
All countries	0,0216	2,7186***	-0,0216	-0,9875	0,0150	-0,1225
Dev. Countries	0,0229	1,8174**	-0,0368	-1,0193	0,0241	-0,1554
Ind. Countries	0,0269	7,4283***	-0,0154	-1,6533	0,1202	-0,3468

Notes: *Significant at the 10 percent level, **significant at the 5 percent level, and ***significant at the 1 percent level.

The results of the regressions for CBI and economic growth denote that a higher CBI does not imply economic growth. In spite of this result, contrarily to the relationship between CBI and investment, the CBI effect on economic growth cannot be neglected completely. Some cases (all and developing countries in the '70s, and industrial countries in the '80s) denote that the CBI negative effect on economic growth is statistically significant. Although this observation is true, R-squared for all cases (except for industrial countries in the '80s) denotes that the estimated effect is insignificant.

The above-mentioned result, the one about CBI not contributing to economic growth, is in accordance with the literature. Grilli, Masciandaro and Tabellini (1992) observed that CBI is associated with a lower output growth, but the estimated effect is generally insignificant. The same result is presented in de Haan and Sturm (1992) and Alesina and Summers (1993). Fuhrer (1997) using Alesina-Summers and OECD samples found that the only significant correlations developed in the specifications examined suggest a negative correlation between CBI and real growth. Akhand (1998), based on Levine-Renelt robustness test, examined the robustness of the empirical relationship between growth and various proxies for CBI and verified that growth is not robustly correlated with CBI. De Haan and Kooi (2000) conclude that there is no robust relationship between CBI and economic growth in their sample of developing countries.

4 Final considerations

Based on the conventional view that inflation damages economic growth,⁶ and following that a stable macroeconomic environment from a higher CBI could improve investment and thus economic growth, a simple theoretical model based on Barro-Gordon and Solow's ideas was made. According to this perspective it is expected that an ICB would be an important vehicle in the promotion of economic growth, especially in developing economies, due to a reduction in the inflation volatility. The theoretical base for this view is the neutrality of money, i.e., it will have no effects on real economic activity in the long run. However, Kirshner (2001) highlights that some economists have argued that monetary events can affect relative prices and thus real economic activity.

In spite of the theoretical proposition showing an internal consistence, the result is not confirmed when an empirical analysis is made. The evidences denote that CBI is not capable of promoting investment, and in

⁶ See Fischer (1993).

some circumstances it is possible that CBI can even reduce the economic growth. This result is consonant with the observation made by Grabel (2000) that independent central banks have the ability to carry out painful deflationary programs. Another view that is favorable to this perspective is presented by Ball (1997). According to his view, disinflation policies can raise the natural rate of unemployment through adding permanent real costs to reducing inflation.

One point that cannot be neglected is that since measures of CBI pay special attention to the inflationary bias, a relationship is assured between CBI and inflation. In other words, if a Central Bank is strongly (weakly) contrary to inflationary bias, this central bank is seen to have a high (low) independence, and thus, a negative correlation between CBI and inflation is found. Therefore, an endogenous feature is observed in the indices. When the economy presents a low inflation level, there is a tendency for indices to reveal a high level of independence. If the inflation is high, the same indices exhibit a low degree of independence. Hence, it is an economy inflation level that determines the degree of independence and not the opposite (de MENDONÇA, 2001). Based on an econometric analysis, Posen (1993) offered evidence of supporting this result.

The endogeneity of the CBI indices suggests that the result of a low level of inflation can be caused by restrictive monetary policy, and thus, a high interest rate that may have detrimental effects on the level of investment, and hence on economic growth. As pointed out by de Haan and Sturm (1992), countries with a low level of inflation have high ex post interest rates. Under this perspective, at least in the short run, a monetary policy designed to disinflate an economy must imply costs to the society. In an attempt to minimize social costs, Hall and Mankiw (1994) argue that the establishment of goals for the growth of output instead of inflation can bring larger benefits to the economy.

The analysis presented in this paper reveals that the standard interpretation that CBI is a synonym for credibility and that it is a “free lunch” needs to be revised. The main point is that CBI is not an efficient variable to improve credibility. As pointed out by Grabel (2000, p.11):

In assuming the exogeneity of policy credibility, new classical theorists deny the significance of factors that are endogenous to all societies that significantly influence the likelihood of a policy's success and, hence, its credibility.

To sum up, credibility is not a variable that can be imposed by one agent; in fact, credibility is endogenous to the public's perception concerning the accountability and transparency of the policymaker in the conduction of economic policy.

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Appendix I

Set of 69 countries

Argentina	Germany, West	Morocco	Switzerland
Australia	Ghana	Nepal	Taiwan
Austria	Greece	Netherlands	Tanzania
Barbados	Honduras	New Zealand	Thailand
Belgium	Hungary	Nicaragua	Turkey
Bolivia	Iceland	Nigeria	U.K.
Botswana	India	Norway	U.S.A.
Brazil	Indonesia	Pakistan	Uganda
Canada	Ireland	Panama	Uruguay
Chile	Israel	Peru	Venezuela
China	Italy	Philippines	Western Samoa
Colombia	Japan	Poland	Yugoslavia
Costa Rica	Kenya	Portugal	Zaire
Denmark	Korea, Rep.	Romania	Zambia
Egypt	Luxembourg	Singapore	Zimbabwe
Ethiopia	Malaysia	South Africa	
Finland	Malta	Spain	
France	Mexico	Sweden	
