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Dynamic central bank independence indices and inflation rate: A new empirical exploration

Marco Arnone[a,1], Davide Romelli[b,c,*]

[a] Centre for Macroeconomics & Finance Research (CeMaFiR), Milan, Italy.
[b] THEMA – Université de Cergy-Pontoise, Cergy-Pontoise, France.
[c] ESSEC Business School, Cergy-Pontoise, France.

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ABSTRACT

It has been argued that economies with more independent central banks experience lower inflation over time. In this paper we show that this relationship is sensitive to the methodology through which central bank independence indices are constructed. We stress the importance of employing dynamic central bank independence indices in two ways. First, we perform unit root tests with structural breaks to verify if the implementation of central bank reforms represents a structural break for the inflation rate dynamics. Second, we implement a panel data analysis.

We find evidence that legislative reforms that modify the degree of independence of a central bank have a strong impact on the inflation rate dynamics. Moreover, underlying the importance of employing dynamic central bank independence indices, we confirm the negative relationship between the latter and inflation for a sample of 10 OECD countries.

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1. Introduction

Rogoff (1985) emphasizes the importance of delegating the monetary policy to a central banker that places a larger weight on inflation rate stabilization relative to employment stabilization. Indeed, an independent policy maker might be able to implement credible monetary policies that will favor a lower inflation rate, thus eliminating the time inconsistency problem of government policies (Kydland and Prescott, 1977). Rogoff's seminal paper had a twofold effect, stimulating the implementation of central bank reforms on the policy side, and creating avenues for the design of indices suitable to capture the degree of independence of these institutions, on the research side.

Starting with Bade and Parkin (1988), various studies have developed indices that proxy central bank independence, hereafter referred to as CBI (e.g. Alesina, 1988; Grilli et al., 1991; Cukierman, 1992; Cukierman et al., 1992; Alesina and Summers, 1993). Following the introduction of these indicators, a burgeoning empirical literature began examining the relationship between CBI and inflation, economic growth and other macroeconomic variables.[2]

This paper has three main purposes. The first is to analyze the effectiveness of central bank reforms in guaranteeing a structurally lower level of inflation in each of the countries analyzed. The second is to re-examine if the negative relationship between CBI and inflation derived from previous cross-country studies still holds when employing dynamic CBI indices. Third, we update the central bank independence indices for the sample of selected countries until 2010.

* Corresponding author at: THEMA – Université de Cergy-Pontoise, Cergy-Pontoise, France. Tel.: +33 647198352.
E-mail address: davide.romelli@essec.edu (D. Romelli).

[1] Sadly, Marco Arnone passed away after the submission of the paper. This paper is dedicated to him, a great scholar and dear friend.

[2] For an extensive overview of the literature, see Arnone et al. (2006), Crowe and Meade (2008) and Cukierman (2008).

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The empirical literature has examined the relationship between CBI and inflation employing indices based on the central bank legislation (*de jure*), or on the turnover rate of the central bank governor (*de facto*). Klomp and de Haan (2010)'s meta-regression analysis of 57 empirical studies shows that legal CBI indices have a negative relationship with inflation in OECD countries, especially during the 1970s. Moreover, studies based on *de facto* CBI remark a positive relationship between this indicator and inflation, even if the causality among these two variable is difficult to evaluate.

Even if we disregard the sign of the relationship of these indices and inflation, it is important to notice how almost all of this literature is based on cross-country analyses. These approaches do not allow for an explicit evaluation of the impact of central bank law reforms on the inflation rate dynamics of each country. Furthermore, studies implemented considering the current level of CBI, might not be able to capture the effect of the evolution of this indicator. Consider, for example, the Deutsche Bundesbank which has been known, more than any other central bank, for its historical commitment to fight inflation (Clarida and Gertler, 1997), and is now characterized by almost the same degree of independence of the other euro area countries.

More recent studies implement panel estimations considering time varying indicators. Cukierman et al. (2002), focusing on a group of newly created central banks of former socialist economies and controlling for cumulative liberalization and other variables, find no relationship between inflation and CBI during the 90s'. Jacome and Vazquez (2008) explore the effects of CBI on inflation for a sample of 24 Latin American and Caribbean countries during the period 1985–2002. Their results confirm the negative relationship between CBI and inflation. Arnone et al. (2009) and Laurens et al. (2009), using the Grilli et al. (1991) CBI indices for a group of developing countries and emerging markets, show the important role played by a more independent central bank in keeping a lower inflation rate. Acemoglu et al. (2008) analyze changes in the central bank legislation of 52 countries, during the period 1989–2003 and confirm that CBI is associated with a significant decline in inflation in countries with a medium level of political constraints. However, these studies do not specifically analyze the effect of structural reforms, such as the Maastricht Treaty and the euro or the Reserve Bank of New Zealand Act 1989, which have been implemented in more advanced economies during the last two decades and might impact inflation rate dynamics.

In an effort to fill this gap, we reconstruct the evolution of CBI indices for 10 OECD countries, during the period 1972–2010. Our analysis relies on the CBI indices implemented by Grilli et al. (1991) (hereafter GMT). This methodology allows for the construction of indices able to capture the degree of political and economic independence of a central bank through the investigation of a wide number of characteristics concerning the organization and the activity of a central bank.

We stress the importance of dynamic CBI indices and the magnitude of their changes on inflation in two ways. First, we verify the real impact of central bank law reforms on the inflation rate dynamics. We identify endogenous structural breaks in the inflation rate through unit root tests and compare the obtained break dates with the years of the central bank law reforms.

Second, instead of measuring *de jure* CBI by a dummy variable that takes a value of one in every year after a major reform leading to increased independence (see Polillo and Guillén, 2005; Acemoglu et al., 2008), we employ dynamic CBI indices in our panel data analysis. Indeed, even if the dummy variable approach partially mitigates the weakness of constant CBI indices, the introduction of dynamic ones might overcome this problem even further. This is due to the fact that the inflation rate dynamics might not only be affected by the current degree of CBI, but also by the magnitude of a reform and the length of time it has been in effect.

The outline of the paper is as follows. Section 2 discusses the characteristics of the methodology adopted to compute CBI indices. The evolution of these indicators and the data are presented in Section 3, while Section 4 is dedicated to the study of the relationship between central bank law reforms and inflation rate dynamics. Our panel data analysis is presented and discussed in Section 5. Section 6 concludes.

2. Measuring central bank independence

This paper examines the relationship between legal CBI and inflation. We believe that de jure CBI indices are appropriate indicators of CBI for three main reasons. First, economists argue that the mere adoption of a legal statute guaranteeing central bank independence dampens inflationary expectations in the economy (Polillo and Guillén, 2005).

Second, these indices are preferred because they focus on specific claims contained in central bank statutes and, for this reason, they are not biased by the presence of possible subjective judgments.

The third reason in favor of the adoption of legal CBI indices is that the alternative de facto index, the turnover rate of the central bank governor (TOR), associates the independence of this institution to the autonomy of its governor. Thus, by not taking into consideration the independence of the other members of the board of directors, such an index might over or underestimate the degree of CBI. Moreover, it is important to notice that, to obtain a more accurate TOR index, it might be necessary to analyze the reasons of the departure, before the end of his/her term, of the central bank governor.

The CBI index used in this paper is the GMT index, which allows for the identification of a political and an economic independence index. The political index is based on a binary code assigned to 8 different characteristics that sum up the ability of monetary authorities to independently achieve the final *goals* of their policy. This index captures three main aspects of monetary regimes: the procedure for appointing the members of the central bank governing bodies, the relationship between these bodies and the government, and the formal responsibilities of the central bank. Starting from these three aspects, one point is assigned for each of the following criteria, if satisfied: the governor is appointed without government involvement, he/she is appointed for more than five years, the other members of the board of directors are appointed without government involvement, they are appointed for more than five years, there is no mandatory participation of government representatives in the board, there is no government approval of monetary policy formulation, there are statutory requirements that the central bank pursues monetary stability among its goals, and there are legal provisions that strengthen the central bank's position in the event of a conflict with the government.

The economic index summarizes the degree of independence of central banks in choosing their monetary policy *instruments*. Its two main aspects concern the influence of the government in determining how much to borrow from the central bank and the nature of the monetary instruments under the control of the central bank. Again, one point is assigned for each of the following satisfied criteria: there is no automatic procedure for the government to obtain direct credit facilities from the central bank, these facilities are extended at market interest rates, the credit supplied to the government is extended on a temporary basis, and for a limited amount, the central bank does not participate in the primary market for public debt, the central bank is responsible for setting the

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