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Does greater central bank independence really lead to lower inflation? Evidence from panel data ☆

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ABSTRACT

It has long been held that central bank independence (CBI) from political control is a necessary requirement to curb inflation. In recent times, however, this long held belief has been challenged. Using a recently compiled panel data set on central bank independence measures, the proposition that greater CBI leads to lower inflation is tested, using latent variable analysis. The use of this alternative econometric technique, along with two additional indicators that capture more appropriately the degree of *de facto* independence, leads to empirical results that are highly supportive of the negative relationship between CBI and inflation, thereby restoring faith in the conventionally held wisdom, that greater CBI is needed to lower inflation.

1. Introduction

Since the seminal work of Kydland and Prescott (1977) and Barro and Gordon (1983a, 1983b) on dynamic time inconsistency, the proposition that greater central bank independence (CBI) is required to achieve lower inflation is considered to be an institutional necessity for the efficient and credible application of monetary policy. Rogoff (1985) analytically models this proposition, by showing that a social loss function that weights the deviations of output and inflation from their optimal levels, gives rise to the problem of dynamic time inconsistency, leading to higher inflation that is socially suboptimal. This loss can be reduced over multiple periods, in which the central bank is allowed to develop a reputation that is free from any political control, or by entrusting the application of monetary policy to a "conservative and independent" central banker, who weights inflation deviations more heavily than that in the social loss function. Rogoff (1985) also shows that the use of a "conservative and independent" central banker leads to lower and more stable inflation than with a less "conservative and independent" central banker, but the resulting level of output is more erratic. Similarly, Walsh (1995) shows that greater independence can be attained by entrusting the application of monetary policy to a central bank board with strong incentives and an explicit mandate to control inflation.

As a direct result of these studies, the institutional characteristics of central banks has shifted, with many revising or adapting their objectives, governance, practices and structures, in order to achieve greater independence from political control and attain lower inflation. Many scholars have tested this proposition, and have found the inverse relationship between CBI and inflation to be a robust empirical regularity. Studies by, *inter alia*, Alesina (1988), Cukierman et al. (1992), Alesina and Summers (1993), Eijffinger and de Hann (1996), Loungani and Sheets (1997), Temple (1998), de Haan and Kooi (2000), Berger et al. (2001), and Panagiotidis and Triampella (2005), all report findings that are highly supportive of this proposition.

However, in recent times, a growing number of studies have concluded that there exists no such negative relationship between CBI and inflation. Indeed, many of these studies suggest that: 1) using different measures of CBI, such as the turnover rate, leads to a rejection of the proposition; 2) the significant negative relationship is driven only by (the small number of) high inflation countries that are added to the sample; 3) once more control variables are included, the apparent negative relationship disappears; 4) the relationship is positive; 5) the relationship is not causal, and 6) the central bank indices themselves only reflect the degree of inflation bias in the economy, so that the apparent negative correlation with inflation must hold by construction. Such studies include those by, *inter alia*, Cukierman (1992), Posen (1993), Fuhrer (1997), Campillo and Miron (1997), and Hayo and Hefeker (2002).

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One possible explanation why studies do not find a negative relationship between CBI and inflation has been put forward by Brumm (2000, 2002). He shows that accurate measures of CBI are dependent on many attributes that are not readily observable. Various measures of legal CBI, such as that developed by Alesina (1988), or the "legal variables aggregate weighted" (LVAW) and the "legal variables aggregate unweighted" (LVAU) indicators developed by Cukierman (1992) and Cukierman et al. (1992), are imperfect measures of underlying CBI. Indeed, the *de jure* measure of independence given by various indicators of legal CBI may differ substantially from the *de facto* independence, particularly in emerging and developing countries, where institutions are weak and the rule of law is not adhered to. Brumm (2000, 2002) argues that the difference between the *de jure* measure and the *de facto* independence is a measurement error, which unaccounted for, can lead to anomalous results. To show how the existence of measurement errors can lead to erroneous results, he applies latent variable analysis to the data and model employed by Campillo and Miron (1997). Brumm (2000, 2002) shows that when an appropriate econometric technique is used that explicitly takes into account the existence of measurement errors, and two alternative proxies for CBI are included in the analysis, the negative relationship between CBI and inflation is obtained across countries.

An alternative explanation has been proposed by Crowe and Meade (2007, 2008). They suggest, with the use of panel data, that the efficacy of CBI in lowering inflation cannot be determined by examining differences in independence across countries, but should be determined by analysing how changes in CBI affect changes in inflation within countries, thereby controlling for time-invariant omitted variables. Using a data set of 56 countries over two time periods, 1987–1991 and 2002–2006, Crowe and Meade (2007, 2008) are able to utilise simple panel data techniques to address this issue.[2] Among their more notable findings, Crowe and Meade (2007, 2008) show that legal CBI (measured by LVAW) and actual CBI (measured by the turnover rate) are significant determinants of inflation, with the predicted sign. Furthermore, they show that having a single, well-defined numerical target for inflation or the price level is the component in CBI most likely to deliver low inflation. However, the aforementioned problem regarding measurement error is not addressed in their paper.

This paper builds upon Brumm (2000, 2002) and Crowe and Meade (2007, 2008) in two respects. First, we do not follow the extant literature by running linear regressions, where inflation is regressed against some control variables and a measure of legal central bank independence, thereby falling into the trap of implicitly assuming that the conventional indicators used to measure legal CBI are perfect measures of actual CBI, without any errors. Instead, we follow the approach employed by Brumm (2000, 2002), acknowledging that there exists measurement errors in the conventional *de jure* measures of legal central bank independence and *de facto* independence. As Bentler (1980, 1983a, 1983b), Bentler and Weeks (1980), Aigner et al. (1984), Bollen (1989), Bentler and Wu (1995), and Bentler and Dudgeon (1996) have warned, models need to take into account the existence of such measurement errors, as their existence can alter the conclusions made from those models that do not take these errors into account drastically. Like the studies by Brumm (2000, 2002) and de Haan et al. (2003), we use latent variable analysis to explicitly deal with the issue of measurement errors.[3] Surprisingly, there is a distinct paucity of studies that directly employ this econometric technique in order to eliminate the perils of ignoring the influence of measurement errors.

Second, we build on Brumm (2000, 2002) by applying latent variable analysis to the comprehensive panel data set compiled by Crowe and Meade (2007, 2008). The use of this data set allows us to employ simple panel data techniques within a latent variable analysis framework. As such, we are able to determine how changes in CBI can potentially affect changes in inflation within countries, rather than across countries. This is a particularly important issue to address, as we focus on policy changes (CBI) and its effect on inflation, after controlling for omitted variables that are constant within countries, but may vary across them, which may generally lead to higher or lower levels of inflation, despite the level of independence of their central bank.

This paper is organised as follows. Section 2 presents a discussion of a model that is used in the extant literature, which we adapt to suit our needs within a latent variable framework. Section 3 presents the empirical results. Section 4 provides some concluding remarks.

2. Model specification

Brumm (2000, 2002) and Crowe and Meade (2007, 2008) initially use OLS to estimate various specifications of inflation models. One such general specification is:

$$\mathrm{INFL}_t = \beta_0 + \beta_1 \mathrm{OPENNESS}_t + \beta_2 \mathrm{GDPCAP}_t + \beta_3 \mathrm{EXRATE}_t + \beta_4 \mathrm{P2DUMMY}_t + \beta_5 \mathrm{CBI}_t + \varepsilon_t \quad (1)$$

where INFL_t is the average annual inflation rate for period $t = 1$ or 2, where period 1 refers to the years of 1987–1991, and period 2 to 2002–2006, $\mathrm{OPENNESS}_t$ is expressed as the sum of exports and imports divided by GDP, GDPCAP_t is the level of GDP per capita, EXRATE_t is a measure that scores the degree of flexibility in the *de facto* exchange rate regime, $\mathrm{P2DUMMY}_t$ is a dummy variable that takes the value of 1 when period 2 inflation values are included, and 0 otherwise, CBI_t is a *de jure* measure of central bank independence from political control, and ε_t is a stochastic term that embodies all of the usual properties.[4]

In much of the extant literature, the variable, CBI, is set equal to some *de jure* measure of independence, usually LVAW. This, however, assumes that LVAW is a perfect measure of CBI. As Bentler (1983a, 1983b) and Bollen (1989) show, CBI is a latent variable — it is either a formal representation of a theoretical construct that is measured with error, or is inherently unobservable, rendering the use of OLS or other simple linear regressions inappropriate. In this study, an alternative econometric approach is employed, one that directly takes the existence of measurement errors into account. This approach is known as latent variable or covariance structure analysis.

We employ a latent variable model similar to that of Brumm (2000, 2002), although we use a panel data framework with data from Crowe and Meade (2007, 2008). The model consists of the following four equations:

$$\mathrm{INFL}_{i,t} = \beta_1 \mathrm{OPENNESS}_{i,t} + \beta_2 \mathrm{GDPCAP}_{i,t} + \beta_3 \mathrm{EXRATE}_{i,t} + \beta_4 \mathrm{POLITY}_{i,t} + \beta_6 \mathrm{CBI}_{i,t} + \varepsilon_{i,t} \quad (2)$$

$$\mathrm{LVAW}_{i,t} = \gamma_1 \mathrm{CBI}_{i,t} + \nu_{1i,t} \quad (3)$$

$$\mathrm{TURNOVER}_{i,t} = \gamma_2 \mathrm{CBI}_{i,t} + \nu_{2i,t} \quad (4)$$

$$\mathrm{POL\_TRANS}_{i,t} = \gamma_3 \mathrm{CBI}_{i,t} + \nu_{3i,t} \quad (5)$$

where $\mathrm{POLITY}_{i,t}$ is the democracy score compiled by Marshall and

[2] This is achieved mainly by using a first-differenced estimator. We discuss this point to a greater extent below.

[3] The study by de Haan et al. (2003) uses a latent variables approach to analyse the degree to which various CBI indicators measure the same unobservable concept, that being the degree of CBI. They do not directly address the issue of measurement errors like Brumm (2000, 2002) does.

[4] We follow the nomenclature used by Crowe and Meade (2008, p. 773) in assigning period 1 for the years of 1987–1991, and period 2 for the years of 2002–2006. This data set includes a variety of advanced economies and emerging markets, consisting of 96 countries. For more information about the data, its construction and sources, see Appendix A in Crowe and Meade (2008, p. 773–775).