Performance of Monetary Institutions: Comparative Evidence

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Abstract

This paper provides new evidence on the relative effectiveness of formal monetary institutions in achieving price stability. The institutions considered are, specifically, central bank independence (CBI), inflation targeting (IT), currency boards (CB) and monetary unions (MU). An empirical investigation is conducted to investigate their relative impacts on the average inflation performance, considering that often countries employ a combination of these institutional mechanisms. The evidence indicates that both IT and CB regimes have been associated with significantly lower rates of inflation during the past two decades, whereas CBI and MU do not appear significant in explaining low inflation rates.

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1. Introduction

This study presents empirical investigation of the performance of formal monetary institutions in the recent decades. Though it is well known that the informal aspects of institutions may often be at least as important as the formal ones in arriving at the intended goals of those institutions, the paper deliberately focuses on the formal, or legal, aspects of institutional mechanisms with the intension of deriving policy advice regarding the adoption of monetary institutions. Hence, the current study explores the relative effectiveness (from the standpoint of achieving price stability) of commonly employed institutional mechanisms of monetary policy, namely legal central bank independence, inflation targeting, currency board and monetary unions.

The breakdown of the (partial) gold standard, or the Bretton Woods system, in the 1970s, and the pursuant adoption of the flexible exchange rate system gave way to monetary policy independence in many countries. This, combined with the oil shocks in the 1970s led many countries to experience huge inflation spirals and, hence, to seek for nominal anchors to stabilize prices. In face of the rational-expectations revolution, adoption of some nominal anchor to control inflationary expectations became an essential tool for achieving price stability. Granting central banks independence from political pressures, inflation targeting and building institutional mechanisms of hard pegs, namely currency boards and currency unions, have hence been ascribed great importance to.

Though there has been significant improvements with regard to granting independence to central banks (see Cukierman, 2007), indices of central bank independence (CBI) still show significant variation across countries in the 2000s.[2] The

[2] See Arnone et al. (2007), for an update of CBI indices originally developed by Cukierman et al. (1992) and Grilli et al. (1991).

number of countries who adopted inflation targeting regime (IT) has also been rising, the number reaching to about 40 countries in 2008.[3] The number of countries that are members of currency unions has also remarkably increased with the establishment of the European Union.

While the success of all these institutional arrangements is likely to benefit from the lack of fiscal dominance and financial market development[4], the success of the hard peg mechanisms require even more stringent circumstances. Specifically, the benefits of currency boards (CB) exceed the costs of losing monetary policy independence usually when the country is small and it pegs its currency to the hard currency of the major trading partner. For monetary unions (MU), an extended set of conditions that define "optimal currency area" are viewed essential for net benefits from such arrangement to be reaped (Edwards, 2006). It should also be noted, that several countries have adopted a combination of these monetary institutions; specifically, currency unions and independent central banks have usually also adopted the IT regime.

In what follows, Section 2 presents the data and empirical analysis employed to explore the associations between CBI, CB, MU, IT, on the one hand, and inflation, on the other. Section 3 concludes.

2. Data, Methodology and Empirical Evidence

The Appendix reports the latest information available, to my best knowledge, on the CBI measures as well as the list of countries that currently employ IT, CB and MU. CBI is an index that ranges between 0 and 1, and CB, MU and IT are all accounted for by dummy

[3] See the Appendix.
[4] See Posen (1995) and Neyapti (2003).

variables that take the value of 1 or 0. The CBI data for 2003 have been made compiled by Arnone et al. (2007), based on the recent central bank laws, extending the original indexing methodologies of Cukierman et al. (1992) and Grilli et al. (1991). The main sources information for the coverage of the IT, CB and MU regimes are Petursson (2004) and Roger and Stone (2005), besides other IMF- and online resources. Table 1 shows that all of these monetary institutions, with the exception of CB, are positively correlated with the developed country dummy (DC). In addition, the CBI index and the MU dummy show notable positive associations with the IT dummy.

Table 1: Correlations among monetary institutions (CU, CB and IT are dummies)

	CBI	*MU*	*CB*	*IT*	*DC*
CBI	1				
MCU	0.40	1			
CB	0.04	-0.08	1		
IT	0.44	0.52	-0.13	1	
DC	0.51	0.51	-0.11	0.75	1

The data on CPI inflation (see Appendix) is obtained from World Development Indicators online, and is used in averages of 2000 to 2006, where the data is available. To avoid the estimation problems that may arise from the large variation in the inflation data, I follow Cukierman et al. (1992 and 2002) in constructing a transformed version of inflation: $D=[\Pi/(1+\Pi)]$, which reduces the range of the inflation data to between 0 to 1. Since the data on institutions considered here is available on a cross-section basis, inflation rates (D) are also used in averages of the period 2000-2006, where available. The number of observations of the cross-section sample used in the following analysis is 139, mainly constrained by availability of data on either inflation or CBI.[5]

[5] Angola, Belarus, Congo and Zimbabwe, which all had more than 100% inflation at least in one year during the 2000s, are excluded from the sample. Among them, only Zimbabwe had very high inflation rate as of 2006; the regressions are run only without Zimbabwe, but the results remain virtually the same as with the exclusion of all four.

Given the cross-sectional nature of the data, I investigate the impact of monetary institutions on inflation using a simple OLS regression, after correcting for possible heterogeneity in the error terms using the White-heteroskedasticity method. The basic regression estimated is as follows:

$$D_i = \alpha + \beta_1 MU_i + \beta_2 CB_i + \beta_3 CBI_i + \beta_4 IT_i + \varepsilon_i \quad ; \quad i=1...139 \qquad (1)$$

where α is the constant term, β_i's are the coefficient terms that are hypothesized to be negative, ε_i's are the random error terms; and *i* is the country indicator.

Table 2: Estimation results:

Dependent Variable: D
Method: OLS with robusterrors

	I	II	III	IV	V	VI
Constant	5.84 (14.38)***	5.54 (15.39)***	6.74 (5.78)***	5.82 (14.29)***	5.51 (4.75)***	6.23 (5.12)***
MU	-2.77 (-5.34)***				-1.24 (-1.30)	-0.54 (-0.55)
CB		-3.45 (-5.45)***			-4.27 (-4.07)***	-3.89 (-3.43)***
CBI			-1.95 (-1.06)		1.2 (0.98)	2.08 (1.03)
IT				-2.21 (-3.30)***	-2.89 (-3.27)***	-2.1 (-2.39)**
S (<5 million)						-1.98 (-2.88)***
DC						-2.13 (-1.89)*
De.of Freedom:	164	164	137	164	134	132
R-bar-Squared	0.055	0.03	0.0005	0.038	0.09	0.13

Following the discussion in the Introduction on the higher likelihood of success of CB in small countries, the regression is extended also to control for a dummy variable for small-countries (S). In addition, to account for other possible omitted variables, a dummy for developed countries (DC) is added. Table 2 reports these regression results, where the last column includes the extended version of Equation (1).

Table 2 presents the regressions of inflation (D) first on each of the institutions separately in columns I to IV and then together, as suggested in Equation (1), in column V. All of the estimation results reported in the table supports the hypothesis that each of the monetary institutions considered in this paper are associated with lower inflation rates, on average, than countries that either lack these regimes or have low CBI. This negative association remain statistically significant only for the IT and CB regimes, however, when all these institutions are jointly employed to explain inflation. The addition of the DC and S dummies, does not change this finding, though both S and DC are also found to have significant negative associations with inflation.

Several sensitivity tests are performed: When the regressions are repeated without excluding the countries with high inflation rate (listed in footnote 4) and with a dummy for Zimbabwe, then the R-bar-squared rises to 0.64 due to Zimbabwe's outlier position, where the findings reported above remain virtually the same. The regression model (Equation 1) is also expanded by using interactive terms, such as those between CB and S and between CBI and IT; these interactive variables are found to neither improve the fit of the regression nor are themselves significant, and therefore those results are not reported.

3. Conclusion

This paper explores the role of monetary policy institutions in achieving price stability in the 2000s. Based on a sample of 139 countries, the cross-sectional evidence indicates that countries that have adopted inflation targeting and currency board regimes have, on average, achieved significantly lower inflation rates than the rest of the countries.

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Appendix: Inflation and Monetary Institutions

	D	MU (1)	CB (1)	IT (2)	CBI	S	DC		D	MU	CB	IT	CBI	S	DC		D	MU	CB	IT	CBI	S	DC
Afghanistan	12.42	0	0	0	0.63	0	0	Germany	1.63	1	0	1	0.88	0	1	Niger	1.97	1	0	0	na	0	0
Albania	2.60	0	0	0	0.75	1	0	Ghana	16.49	0	0	0	0.5	0	0	Nigeria	11.03	0	0	0	0.44	0	0
Algeria	2.42	0	0	0	0.81	0	0	Gibraltar	na	0	1	0	na	0	0	Northern Mariana Islands	na	0	0	0	na	0	0
American Samoa	na	0	0	0	na	1	0	Greece	3.18	1	0	1	0.81	0	1	Norway	1.83	0	0	1	0.75	1	1
Andorra	na	0	0	0	na	1	0	Greenland	na	0	0	0	na	1	0	Oman	1.52	0	0	0	0.31	1	0
Angola	49.39	0	0	0	0.31	0	0	Grenada	2.32	0	1	0	na	1	0	Pakistan	5.41	0	0	0	0.5	0	0
Antigua and Barbuda	na	0	1	0	na	0	0	Guam	na	0	0	0	na	1	0	Palau	na	0	0	0	na	1	0
Argentina	8.16	0	0	0	0.75	0	0	Guatemala	6.52	0	0	0	0.63	0	0	Panama	1.57	0	1	0	0.38	1	0
Armenia	2.80	0	0	0	0.81	1	0	Guinea	na	0	0	0	0.63	0	0	Papua New Guinea	6.83	0	0	0	0.63	0	0
Aruba	3.55	0	0	0	0.56	1	0	Guinea-Bissau	2.74	1	0	0	na	1	0	Paraguay	8.03	0	0	0	0.5	0	0
Australia	3.09	0	0	1	0.63	0	1	Guyana	5.94	0	0	0	0.5	1	0	Peru	2.11	0	0	1	0.69	0	0
Austria	1.98	1	0	1	0.94	0	1	Haiti	14.63	0	0	0	0.5	0	0	Philippines	4.74	0	0	1	0.63	0	0
Azerbaijan	6.07	0	0	0	0.63	0	0	Honduras	7.57	0	0	0	0.5	0	0	Poland	3.32	0	0	1	0.88	0	1
Bahamas, The	2.00	0	0	0	0.31	1	0	Hong Kong, China	-0.82	0	1	0	0.38	0	0	Portugal	2.94	1	0	1	0.81	0	1
Bahrain	0.87	0	0	0	0.44	1	0	Hungary	6.00	0	0	1	0.94	0	1	Puerto Rico	na	0	0	0	na	1	0
Bangladesh	5.36	0	0	0	0.19	0	0	Iceland	4.48	0	0	1	0.75	1	1	Qatar	5.53	0	0	0	0.19	1	0
Barbados	3.10	0	0	0	0.38	1	0	India	4.32	0	0	0	0.5	0	0	Romania	15.81	0	0	0	0.69	0	0
Belarus	30.10	0	0	0	0.44	0	0	Indonesia	8.04	0	0	0	0.69	0	0	Russian Federation	12.46	0	0	0	0.44	0	0
Belgium	2.05	1	0	1	0.94	0	1	Iran, Islamic Rep.	12.46	0	0	0	0.38	0	0	Rwanda	6.53	0	0	0	0.56	0	0
Belize	2.42	0	0	0	0.38	1	0	Iraq	na	0	0	0	0.63	0	0	S. Cyprus	2.77	0	0	1	0.56	0	0
Benin	2.85	1	0	0	na	0	0	Ireland	3.85	1	0	1	0.81	1	1	Samoa	4.82	0	0	0	na	1	0
Bermuda	na	0	1	0	0.44	1	0	Isle of Man	na	0	0	0	na	1	0	San Marino	na	0	0	0	na	1	0
Bhutan	3.70	0	0	0	0.31	1	0	Israel	1.50	0	0	1	0.38	0	0	Sao Tome and Principe	na	0	0	0	0.31	1	0
Bolivia	3.99	0	0	0	0.75	0	0	Italy	2.27	1	0	1	0.81	0	1	Saudi Arabia	0.74	0	0	0	0.5	0	0
Bosnia & Herzegovina	na	0	1	0	0.88	1	0	Jamaica	9.02	0	0	0	0.38	1	0	Senegal	1.98	1	0	0	na	0	0
Botswana	7.68	0	0	0	0.44	1	0	Japan	-0.32	0	0	0	0.44	0	1	Serbia	23.13	0	0	0	na	0	0
Brazil	6.79	0	0	1	0.63	0	0	Jordan	2.96	0	0	0	0.38	0	0	Seychelles	3.08	0	0	0	0.25	1	0
Brunei Darussalam	0.33	0	1	0	na	1	0	Kazakhstan	7.79	0	0	0	0.75	0	0	Sierra Leone	6.22	0	0	0	0.56	0	0
Bulgaria	6.18	0	1	0	0.88	0	0	Kenya	8.43	0	0	0	0.44	0	0	Singapore	0.95	0	0	0	0.38	1	0
Burkina Faso	2.09	1	0	0	na	0	0	Kiribati	na	0	0	0	na	1	0	Slovak Republic	5.74	1	0	1	0.63	0	1
Burundi	8.62	0	0	0	0.38	0	0	Korea, Dem. Rep.	na	0	0	0	na	0	0	Slovenia	5.04	1	0	1	0.81	1	0
Cambodia	2.82	0	0	0	0.56	0	0	Korea, Rep.	2.87	0	0	1	0.56	0	1	Solomon Islands	7.75	0	0	0	0.38	1	0
Cameroon	2.12	1	0	0	na	0	0	Kuwait	2.39	0	0	0	0.31	1	0	Somalia	na	0	0	0	na	0	0
Canada	2.26	0	0	1	0.63	0	1	Kyrgyz Republic	6.43	0	0	0	0.88	0	0	South Africa	5.05	0	0	1	0.25	0	0
Cape Verde	1.51	0	0	0	0.5	1	0	Lao PDR	9.91	0	0	0	0.38	0	0	Spain	3.13	1	0	1	0.88	0	1
Cayman Islands	na	0	1	0	0.38	1	0	Latvia	4.72	0	0	0	1	1	0	Sri Lanka	9.76	0	0	0	0.56	0	0
Central African Rep.	2.33	1	0	0	na	1	0	Lebanon	na	0	0	0	0.5	1	0	St. Helena	na	0	1	0	na	0	0
Chad	2.59	1	0	0	na	0	0	Lesotho	6.92	0	0	0	0.44	1	0	St. Kitts and Nevis	2.04	0	1	0	na	1	0
Channel Islands	na	0	0	0	na	1	0	Liberia	na	0	0	0	0.5	1	0	St. Lucia	2.44	0	1	0	na	1	0
Chile	2.99	0	0	1	0.69	0	0	Libya	-3.02	0	0	0	0.44	0	0	St. Vincent & the Grenadines	1.66	0	1	0	na	1	0
China	1.60	0	0	0	0.56	0	0	Liechtenstein	na	0	0	0	na	1	0	Sudan	7.05	0	0	0	0.31	0	0
Colombia	6.03	0	0	1	0.5	0	0	Lithuania	1.82	0	1	0	0.81	1	0	Suriname	19.34	0	0	0	0.38	1	0
Comoros	na	0	0	0	0.44	1	0	Luxembourg	2.40	1	0	1	0.94	1	1	Swaziland	6.79	1	0	0	na	1	0
Congo, Dem. Rep.	61.04	0	0	0	na	0	0	Macao, China	1.03	0	0	0	0.44	1	0	Sweden	1.45	0	0	1	0.94	0	1
Congo, Rep.	2.14	1	0	0	na	1	0	Macedonia, FYR	2.82	0	0	0	0.88	0	0	Switzerland	0.94	0	0	1	0.94	0	1
Costa Rica	9.89	0	0	0	0.69	1	0	Madagascar	9.81	1	0	0	0.63	0	0	Syrian Arab Republic	3.65	0	0	0	0.44	0	0
Cote d'Ivoire	2.78	1	0	0	na	0	0	Malawi	13.55	0	0	0	0.38	0	0	Tajikistan	12.99	0	0	0	0.81	0	0
Croatia	2.83	0	0	0	0.88	1	0	Malaysia	1.94	0	0	0	0.5	0	0	Tanzania	4.50	0	0	0	0.38	0	0
Cuba	na	0	0	0	0.31	0	0	Maldives	5.14	0	0	0	0.38	1	0	Thailand	2.42	0	0	1	0.44	0	0
Czech Republic	2.52	0	0	1	0.88	0	1	Mali	1.78	1	0	0	na	0	0	Timor-Leste	4.90	0	0	0	0.69	1	0
Denmark	2.01	0	0	0	0.75	0	1	Malta	2.28	1	0	1	0.69	1	0	Togo	2.24	1	0	0	na	0	0
Djibouti	na	0	1	0	na	1	0	Marshall Islands	na	0	0	0	na	1	0	Tonga	8.18	0	0	0	0.31	1	0
Dominica	1.51	0	1	0	na	1	0	Mauritania	6.22	0	0	0	na	1	0	Trinidad and Tobago	5.20	0	0	0	0.44	1	0
Dominican Republic	12.91	0	0	0	0.56	0	0	Mauritius	5.64	0	0	0	0.5	1	0	Tunisia	2.87	0	0	0	0.69	0	0
Ecuador	17.07	0	0	0	0.94	0	0	Mayotte	na	0	0	0	na	1	0	Turkey	21.54	0	0	1	0.81	0	0
Egypt, Arab Rep.	5.36	0	0	0	0.38	0	0	Mexico	4.95	0	0	1	0.69	0	1	Turkmenistan	na	0	0	0	0.69	1	0
El Salvador	3.35	0	0	0	0.81	0	0	Micronesia, Fed. Sts.	na	0	0	0	na	1	0	Uganda	4.38	0	0	0	0.56	0	0
Equatorial Guinea	6.16	1	0	0	na	1	0	Moldova	11.87	0	0	0	0.75	1	0	Ukraine	10.18	0	0	0	0.81	0	0
Eritrea	na	0	0	0	0.5	1	0	Monaco	na	0	0	0	0.75	1	0	United Arab Emirates	na	0	0	0	0.44	1	0
Estonia	3.94	0	1	0	0.81	1	0	Mongolia	6.87	0	0	0	na	1	0	United Kingdom	2.74	0	0	1	0.69	0	1
Ethiopia	6.57	0	0	0	0.5	0	0	Montenegro	na	0	0	0	na	1	0	United States	2.70	0	0	0	0.75	0	1
Faeroe Islands	na	0	1	0	na	1	0	Morocco	1.76	0	0	0	0.5	0	0	Uruguay	8.14	0	0	0	0.63	1	0
Falkland Island	na	0	1	0	na	0	0	Mozambique	10.43	0	0	0	0.44	0	0	Uzbekistan	na	0	0	0	0.69	0	0
Fiji	2.77	0	0	0	0.38	1	0	Myanmar	18.67	0	0	0	0.38	0	0	Vanuatu	2.18	0	0	0	0.38	1	0
Finland	1.66	1	0	1	0.94	0	1	Namibia	4.83	1	0	0	0.38	1	0	Venezuela, RB	15.99	0	0	0	0.69	0	0
France	1.77	1	0	1	0.94	0	1	Nepal	4.44	0	0	0	0.5	0	0	Vietnam	4.38	0	0	0	0.44	0	0
French Polynesia	na	0	0	0	na	1	0	Netherlands	2.17	1	0	1	0.88	0	1	Virgin Islands (U.S.)	na	0	0	0	na	1	0
Gabon	1.24	1	0	0	na	1	0	Netherlands Antilles	2.59	0	0	0	0.44	1	0	West Bank and Gaza	3.33	0	0	0	na	1	0
Gambia, The	7.36	0	0	0	na	1	0	New Caledonia	na	0	0	0	na	1	0	Yemen, Rep.	10.80	0	0	0	0.44	0	0
Georgia	6.04	0	0	0	0.75	1	0	New Zealand	2.52	0	0	1	0.44	1	1	Zambia	15.53	0	0	0	0.44	0	0
								Nicaragua	7.32	0	0	0	0.56	0		Zimbabwe	97.10	0	0	0	0.44	0	0

(1) Fund Surveillance Over Members of Currency Unions, IMF, December 21, 2005.

(2) Petursson (2004), Roger and Stone (2005)