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Journal of Policy Modeling 44 (2022) 431–449



www.elsevier.com/locate/jpm

Economic performance under different monetary policy frameworks

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Abstract

We examine the economic performance (inflation and growth) associated with different monetary policy frameworks, presenting unconditional and conditional analyses, and using predictions of countries' monetary policy framework choices to address the issue of endogeneity. We find some differences in performance associated with the different monetary policy frameworks, together with a general improvement over time which is explained in part by the trends towards inflation targeting and more precise monetary control, that is from changes in the choice of framework, but in part, and perhaps more strongly, reflects a more general trend towards better economic performance related to changes in decision-making within the frameworks. Our results suggest that the choice of MPF is an important, but by no means the only, determinant of economic performance, and therefore not the only consideration for policymakers looking to improve economic performance. © 2022 The Authors. Published by Elsevier Inc. on behalf of The Society for Policy Modeling..

JEL Classification: E52; E61; F41

Keywords: Monetary policy framework; Exchange rate targeting; Inflation targeting; Inflation; Economic growth

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1. Introduction

In this paper we explore the economic performance associated with different monetary policy frameworks (MPFs) in advanced and emerging economies, using the classification developed by Cobham (2021). That classification brings together both external (exchange rate) and domestic (money, inflation, possibly GDP) targets, on the one hand, and both announced objectives and realised outcomes, on the other. It has been implemented so far for 26 'advanced' economies, the Euro currency area, 33 'emerging' economies, and developing countries in some, but not all, regions, from 1974 to 2017. Its availability naturally suggests questions about the different levels of economic performance associated with each type of MPF. While there is a significant literature examining the inflation and growth associated with different exchange rate regimes – notably Ghosh, Gulde, and Wolf (2002) and Husain, Mody, and Rogoff (2005) – and a separate literature investigating the effect of inflation targeting – e.g. Ball (2010), Walsh (2009) – there is little systematic research across the whole range of monetary policy frameworks, taking in both domestic and external dimensions, so we provide that here. We find some differences in performance associated with the different monetary policy frameworks, together with a general improvement over time which is explained in part by the trends towards inflation targeting and more precise monetary control. Our results suggest that the choice of MPF is an important, but by no means the only, determinant of economic performance, and therefore not the only consideration for policymakers looking to improve economic performance.

The classification of monetary policy frameworks has a 'full menu' of 32 MPFs, but we use the two aggregations of MPFs suggested in Cobham (2021), that is, (a) the aggregation by target variable (TV) where, for example, 'loose' and 'full', stationary and converging, types of inflation targets are all combined in a single category; and (b) the aggregation by degree of monetary control (DOC) which puts together all loose targeting arrangements in one category, and all full targeting arrangements in another. Details of these aggregations, which reduce the number of frameworks from the 32 on the full menu to 9 in the first case and 4 in the second, are presented in Table 1. The main trends revealed (see, for example, the graphs in the working paper version of this paper, Cobham, Macmillan, Mason and Song, 2021, here in after CMMS, 2021) are (a) that monetary and to a lesser extent exchange rate targeting have declined in favour of inflation targeting, though loosely structured discretion remains important, and (b) that countries have gravitated over time towards MPFs which offer substantial and intensive degrees of monetary control (and away from rudimentary or intermediate). These trends can be found both in advanced economies and, though to a lesser extent, in emerging economies.

In sections 2 and 3 we present first unconditional and then conditional analyses of the inflation and economic growth associated with different frameworks. Section 4 uses predictions of countries' MPFs based on Cobham and Song (2020) to allow for possible endogeneity. Section 5 concludes.

2. Inflation and growth: unconditional analysis

Table 2 sets out the economic performance in terms of inflation and per capita income growth associated with the different frameworks in different subperiods, for the advanced countries. The subperiods cover 1974–84, before the Great Moderation; 1985–98, the Great Moderation pre-EMU; 1999–2007, Great Moderation + EMU; and 2008–17, the Global Financial Crisis (GFC) and its aftermath. The final row of the table shows that average inflation declined over the first three subperiods, while average growth rose in the second but fell sharply in the fourth. In terms of the

Table 1

Two aggregations of monetary policy framework.

target variable (TV) MPFs	frameworks (on the full menu) included
direct controls (MDC)	multiple direct controls (command economy)
exchange rate fixing (ERfix)	pure and augmented exchange rate fix; pure currency board
exchange rate targeting (ERtargets)	augmented currency board; full and loose, stationary and converging, exchange rate targeting
monetary targeting (MTs)	full and loose, stationary and converging, monetary targeting
inflation targeting (ITs)	full and loose, stationary and converging, inflation targeting
mixed targeting (MixedTs)	all combinations of monetary, exchange rate and inflation targeting
unstructured discretion (UD)	unstructured discretion
loosely structured discretion (LSD)	loosely structured discretion
well structured discretion (WSD)	well structured discretion
no national framework	membership of currency union, use of another sovereign's currency
degree of monetary control (DOC) MPFs	frameworks (on the full menu) included
rudimentary	multiple direct controls, pure exchange rate fix
intermediate	augmented exchange rate fix, pure currency board, unstructured discretion
substantial	augmented currency board, all loose targeting, all converging targeting, all mixed targeting, loosely structured discretion
intensive	full exchange rate/monetary/inflation targeting, well structured discretion

For further details and precise definitions see [tables 1–4 of Cobham \(2021\)](#).

Table 2

Economic performance by aggregated framework and period, advanced economies.

	1974–84		1985–98		1999–2007		2008–2017	
	inflation	growth	inflation	growth	inflation	growth	inflation	growth
MDC	..	..	..	..	..	..	..	..
ERfix	16.66	4.55	..	..	..	..	..	..
ERtargets	10.14	2.19	4.12	2.60	0.84	3.02	2.38	1.12
MTs	10.50	4.47	4.55	4.08	..	..	..	..
ITs	..	..	1.96	2.58	2.07	2.72	1.69	0.96
MixedTs	9.35	2.15	3.93	2.38	2.90	3.09	-0.31	0.61
UD	24.25	0.51	17.72	0.97	..	..	..	..
LSD	8.89	0.54	6.13	1.93	1.23	1.80	7.85	-1.12
WSD	..	..	..	..	..	..	..	..
no nat MPF	7.49	2.86	2.18	4.13	2.36	2.44	1.37	0.18
rudimentary	..	..	..	..	..	..	..	..
intermediate	23.09	1.86	17.72	0.97	..	..	..	..
substantial	10.16	1.74	5.07	2.55	1.51	2.70	2.17	0.97
intensive	7.61	0.93	2.93	2.55	2.14	2.69	1.80	0.87
all MPFs	12.25	2.40	4.36	2.58	2.06	2.58	1.69	0.59

Note: the all frameworks row shows the average inflation and growth under all frameworks, including no national framework.

TV aggregation, in the first two subperiods unstructured discretion is associated with much worse performance (higher inflation and weaker growth), exchange rate fixing does poorly on inflation but well on growth, and monetary targeting does better than the average on both counts.

Table 3
Economic performance by aggregated framework and period, emerging economies.

	1974–84		1985–98		1999–2007		2008–2017	
	inflation	growth	inflation	growth	inflation	growth	inflation	growth
MDC	32.29	4.18	4.41	4.30	..	..	..	..
ERfix	10.67	4.55	4.11	4.25	..	..	..	..
ERtargets	7.77	3.98	12.63	4.27	2.96	4.62	3.03	0.80
MTs	..	..	..	..	..	..	..	..
ITs	..	..	10.42	4.45	4.15	3.64	3.69	2.39
MixedTs	..	..	10.74	3.29	5.00	5.25	4.60	5.54
UD	91.07	1.35	342.66	0.15	40.89	2.19	79.26	-0.31
LSD	17.29	1.84	78.73	2.01	10.09	4.09	8.31	2.44
WSD	..	..	..	..	2.82	5.54	2.58	2.81
no nat MPF	..	..	..	..	3.61	6.35	1.43	1.87
rudimentary	32.29	4.18	4.41	4.30	..	..	..	..
intermediate	49.20	2.92	277.03	1.12	40.89	2.19	79.26	-0.31
substantial	14.68	2.40	60.92	2.64	6.97	4.11	6.06	2.19
intensive	18.23	2.23	7.56	3.49	2.67	4.34	2.73	2.11
all MPFs	37.75	2.88	112.15	2.25	6.63	4.13	5.77	2.07

Note: the all frameworks row shows the average inflation and growth under all frameworks, including no national framework.

Performance under inflation targeting is superior in the second subperiod (lowest inflation but growth below monetary targeting and just below exchange rate targeting). In the third subperiod it is also better on inflation but not so good on growth relative to exchange rate and mixed targeting, and less good on inflation but better on growth than loosely structured discretion. In terms of the DOC aggregation, intermediate does poorly on inflation, while intensive does mostly better than substantial frameworks on inflation but not on growth.

Table 3 provides similar data for the emerging economies, with the average inflation rising between the first and second subperiods but much lower after that, while growth is best in the third subperiod. Direct controls (and therefore rudimentary frameworks) and exchange rate fixing have high inflation but better than average growth in the first two subperiods (but then disappear), while exchange rate targeting has better inflation and comparable growth. Unstructured and loosely structured discretion have much higher inflation and lower growth in the first two subperiods, but loosely structured discretion is closer to the average, particularly on growth, in the later subperiods. Inflation and mixed targeting do better in the two later subperiods but are not always better than exchange rate targeting. Intermediate and substantial frameworks have high inflation in the second subperiod but lower after that, especially substantial. Intensive frameworks do better on inflation and mostly better on growth than substantial frameworks from the second subperiod onwards.

3. Inflation and growth: conditional analysis

The unconditional outcomes identified in the previous section may reflect country-specific or time-specific factors rather than any effect of the frameworks. In this section we therefore report the results for panel regressions of both inflation and real GDP per capita growth upon a set of dummies for the monetary policy frameworks together with a set of standard control variables.

We do this separately for both advanced and emerging economies using fixed effects estimation. Our regressions cover the full period 1974–2017.¹

3.1. Inflation

Tables 4–5 present regression results for inflation using fixed effects estimation. Table 4 presents our main results for both the advanced and emerging economies in our sample, where we test the effect of the MPFs aggregated by TV and DOC variables respectively.² Our control variables are broad money growth, real GDP growth, trade openness, the government fiscal balance (surplus), an index of Central Bank Independence (CBI) and a terms of trade shock.³ We use loosely structured discretion (LSD) as our benchmark target variable MPF and substantial as our benchmark DOC variable MPF. Preliminary regression results for the emerging economies were strongly influenced by a relatively small number of episodes where countries had experienced high levels of inflation alongside high broad money growth. For this reason, we also applied a filter to our regressions that removed observations where broad money growth was equal to or exceeded 100% (per annum).⁴

Amongst our control variables in Table 4 we find, as anticipated by theory, positive and significant estimated coefficients on broad money growth as well as negative and significant estimated coefficients on real GDP growth. We find the estimated coefficient on openness to be positively signed although insignificant. Standard theory suggests a negative relationship (see Romer, 1993).⁵ However, our advanced economy results are in line with those of Husain et al.

¹ We have also run unreported regressions for the subperiods 1974–1984, 1985–2007 and 1999–2017. These subperiods correspond respectively to the first and second, the second and third, and the third and fourth of the subperiods used in Tables 3 and 4. A particular problem is that when a country's MPF does not change through a period, its effect is taken into the (collinear) country fixed effect. We report only the full period results to mitigate this issue. Although this issue influences subperiod results there is a reasonable correspondence between them and our full period results.

² Year dummies and a constant term are included in our regressions, reported t-statistics are calculated using cluster-robust standard errors.

³ Note that the inflation variable used in our regression is $\ln(1+pi)$, where pi is the inflation rate, and we similarly transform the broad money growth variable. Our terms of trade shock is the standard deviation of the previous 5 years of exports as a capacity to import. The choice of control variables broadly follows existing literature on the impact of the exchange regime upon inflation, such as Ghosh et al. (2002) and Husain et al. (2005). Our data for both the inflation and growth regressions comes from *World Development Indicators (WDI)*, except for the CBI index variable which comes from Garriga (2016). Our broad money growth data in the main comes from *WDI*, but is supplemented by data from *International Financial Statistics* and central banks including the *ECB*. See Table A1 in the appendix for variable definitions. Note we have extended the endpoint of the Garriga data from 2012 to 2017 by assuming no changes in the index she calculates beyond 2012. Table A2 in the appendix shows the number of observations for each MPF in each subperiod.

⁴ The filter removes 62 observations from our data, 2 from the advanced economies and 60 from the emerging economies. The bulk of missing observations are from South American economies (e.g. episodes of very high money growth in Argentina, Brazil, Chile and Peru) and in some instances from ex-communist economies (such as Poland, Bulgaria and Romania). The main impact upon our inflation results of not using the filter is in the emerging economies, where the estimated coefficients on broad money growth increase to close to unity and those on real GDP growth fall to less than negative unity. We include the impact of not including this filter in our sensitivity analysis later in the paper. Full results are available on request from the authors.

⁵ Available empirical evidence is mixed: where researchers use long-term averages, the relationship is usually found to be negative (see *inter alios* Lane, 1997; Campillo & Miron, 1997; and Wynne & Kersting, 2007), but where researchers make use of annual data with standard time series or panel estimation techniques, a positive relationship is often established (see *inter alios* Alfaro, 2005, and Samimi, Ghaderi, Hosseinzadeh, & Nademi, 2012).

Table 4
Inflation - Main Regressions.

	(1)	(2)	(3)	(4)
Economies	Advanced	Advanced	Emerging	Emerging
Broad Money Growth	0.0587** (2.12)	0.0616** (2.17)	0.394*** (4.63)	0.437*** (5.19)
Real GDP Growth	-0.346*** (-4.33)	-0.337*** (-4.29)	-0.579*** (-3.45)	-0.679*** (-4.38)
Openness	0.0168 (1.09)	0.0134 (0.96)	0.0354 (1.21)	0.0307 (0.84)
Government balance	-0.0206 (-0.34)	-0.00790 (-0.15)	-0.420 (-1.58)	-0.347 (-1.39)
CBI Index	-0.0146 (-0.78)	-0.00647 (-0.44)	0.00908 (0.13)	0.00449 (0.07)
Terms of Trade	0.0357 (0.46)	0.0467 (0.62)	0.229*** (3.50)	0.212** (2.76)
MDC			0.0558 (1.33)	
ERtargets	-0.00464 (-0.64)		-0.0145 (-0.68)	
ERfix	0.0346** (2.28)		0.0162 (0.75)	
MTs	-0.00115 (-0.14)			
MixedTs	-0.0155 (-1.65)		-0.0523*** (-3.03)	
ITs	-0.00653 (-1.20)		-0.0367** (-2.07)	
UD	0.00894 (0.62)		0.105** (2.53)	
WSD			0.0309 (1.43)	
LSD rudimentary	—	—	—	0.0800* (1.79)
intermediate		0.0237* (1.76)		0.0811** (2.45)
substantial intensive		— -0.0145** (-2.48)		— -0.0134 (-0.79)
Observations	694	694	634	634
R-Squared	0.737	0.742	0.686	0.668

Notes: Figures in parentheses are t-statistics calculated using robust standard errors (clustered by country); *, ** and *** represent marginal significance levels of 0.1, 0.05 and 0.01 respectively; R-squared refers to the within R-squared under fixed effects estimation; — indicates the benchmark MPF variable. Dependent and control variables are defined in [Table A1](#), MPF variables in [Table 1](#).

Table 5
Inflation - Summary Regressions.

Economies	(A)				(B)				(C)				(D)			
	Advanced				Advanced				Emerging				Emerging			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Broad Money Growth	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
Real GDP Growth	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Openness	+	+	-	+	+	+	-	+	-	+	+	+	-	+	+	+
Government balance	-	-	-	-	-	+	-	+	+	-	-	-	+	-	-	-
CBI Index	-	-	-	-	-	-	-	-	+	-	-	-	+	-	-	-
Terms of Trade	+		+	+	+		+	+	+		+	+	+		+	+
MDC									+	+	+	+				
ERtargets	-	-	-	+					-	-	-	-				
ERfix	+	+	+	+					+	-	+	-				
MTs	-	-	-	+												
MixedTs	-	-	-	-						-	-	-				
ITs	-	-	-	-					-	-	-	-				
UD	+	+	+	+					+	+	+	+				
WSD									-	+	+	+				
LSD	B	B	B	B					B	B	B	B				
rudimentary													+	+	+	+
intermediate					+	+	+	+					+	+	+	+
substantial					B	B	B	B					B	B	B	B
intensive					-	-	-	-					-	-	-	-

Notes: +/- denotes the sign of the estimated coefficient in the relevant regression, * represents significance at the 10% significance level (or better), B represent the benchmark MPF variable. Dependent and control variables are defined in Table A1, MPF variables in Table 1.

(2005), who find a small positive but insignificant relationship between the variables over 1970–99. We find the estimated coefficient on the government balance is negatively signed but insignificant,⁶ that on the CBI Index is insignificant⁷ and that on the terms of trade shock is positive but only significant for the emerging economies.

Of the MPF target variables in Table 4, we find the estimated coefficient on ERfix to be positive and significant for advanced, which provides some evidence that over this period inflation was high (in advanced economies) where monetary authorities pursued ERfix relative to those advanced countries which pursued LSD (our benchmark MPF variable). We similarly find some evidence for emerging, but not advanced, economies that MixedTs and ITs are associated with inflation lower than benchmark, and evidence of inflation above benchmark under UD. We

⁶ Standard theory predicts a negative relationship here. Husain et al. also find a negative but insignificant coefficient for advanced economies – although significant and negative for emerging. Blanchard and Fischer (1989) and Drazen and Helpman (1990) suggest a model where there might be a positive relationship. This is because the relationship between a fiscal deficit and inflation is influenced by the impact of today’s deficit upon expected money growth. High deficits may lead to the expectation of high future inflation or indeed low future inflation depending upon the future response of government.

⁷ While earlier work found that inflation was negatively related to CBI, at least for industrial countries, doubts arose about this in later work, e.g. Crowe and Meade (2007). Garriga (2016) found a significant negative relationship for some but not all samples, in panel regressions which included fixed effects but no other control variables.

find no significant effects for ERTs, MTs or WSD. For the DOC MPF variables we find MPFs classified as intermediate control have higher inflation relative to those classified as substantial control (the benchmark) across both advanced and emerging economies, and that advanced (but not emerging) economies MPFs classified as intensive control experience lower inflation relative to the benchmark.

3.2. Sensitivity: inflation regressions

Table 5 presents a basic sensitivity analysis for our findings, by presenting summary results of four regression models which are slight modifications of our chosen specification. For each of our regression models reported in Table 4 (A to D in Table 5), we run four regression models. First, in Model (1) we exclude the broad money growth filter from the data. Second, in Model (2) we remove the terms of trade shock variable from our chosen specification. Third, to mitigate the possibility of endogeneity in our regressions, Model (3) includes control variables lagged one period rather than using contemporaneous variables, while Model (4) similarly lags our MPF variables by one period.⁸ We return to the issue of possible endogeneity with a different approach in the following section. For these modified models, the significance and the signs on the estimated coefficients are broadly similar to those in Table 4. With respect to the MPF target variables, when we introduce lagged control variables (Model 3) for the advanced economy regressions, we find that the estimated coefficient on ERfix is no longer significant while that on ITs becomes significantly negative. We also find that under Model (4) with lagged MPFs the estimated coefficient on UD becomes significant. For emerging economies, we no longer find the estimated coefficient of rudimentary to be significant in any of our four models, and dropping the broad money growth filter results in a loss of significance on the estimated coefficients for MixedTs and UD.⁹

In the above regressions each country counts equally, whatever its size, so the results tell us the average effect of different frameworks per country. In CMMS (2021) we report panel regressions for advanced and emerging economies together, weighted by (time varying) real GDP and population, which show the average effect per unit of economic activity or per unit of population. There are some minor differences in the coefficients for both the control variables and the MPFs, but in general the results are consistent with those reported here.

3.3. Growth

Table 6 presents our main regression results for growth. Our dependent variable is percentage growth in per capita GDP, our control variables are the ratio of investment to GDP, openness, tax to GDP ratio, government balance as a percentage of GDP, (log of) population,

⁸ Note that for the advanced economies, since there are only two observations where broad money growth exceeds 100%, the results of regression model (1) (in columns A and B) are very close to those presented in columns (1) and (2) of Table 5.

⁹ We also find some minor changes regarding the significance of the control variables. In particular, use of lagged control variables influences the significance of the estimated coefficient on (a) real growth for advanced economies and (b) the government balance in emerging economies. The use of lagged target MPFs also results in a significant estimated coefficient on government balance for emerging economies and the terms of trade estimated coefficient becomes insignificant for emerging economies (again using target MPFs) if we drop the broad money growth filter.

Table 6
Per Capita Real GDP Growth - Main Regressions.

	(1)	(2)	(3)	(4)
Economies	Advanced	Advanced	Emerging	Emerging
Investment Ratio	0.0598 (1.52)	0.0144 (0.32)	0.242 *** (4.75)	0.254 *** (4.89)
Openness	0.0482 *** (4.77)	0.0443 *** (4.15)	0.0194 (0.93)	0.00903 (0.52)
Tax Ratio	-0.0723 (-0.86)	-0.0519 (-0.60)	0.0510 (0.83)	-0.0299 (-0.46)
Government balance	0.0943 * * (2.60)	0.0990 * * (2.63)	0.253 *** (4.04)	0.250 *** (3.97)
Population Growth	-0.584 * (-2.03)	-0.498 (-1.50)	-0.826 * (-1.72)	-0.933 * (-1.76)
Population	-0.0227 (-0.98)	-0.0240 (-1.20)	0.181 *** (3.92)	0.151 *** (3.37)
Schooling	-0.00549 * * (-2.16)	-0.00603 * * (-2.78)	0.0162 *** (3.81)	0.0199 * * * (4.52)
Terms of Trade	0.0240 (0.62)	0.0336 (0.86)	-0.0190 (-0.95)	-0.00782 (-0.34)
MDC			0.675 *** (4.60)	
ERtargets	0.00256 (0.90)		0.00153 (0.19)	
ERfix	0.0221 (1.26)		-0.00973 (-1.00)	
MTs	0.00932 (0.92)			
MixedTs	0.00904 (1.25)		0.0286 * * * (3.39)	
ITs	0.00867 * * (2.40)		0.00758 * * * (2.22)	
UD	-0.00474 (-0.50)		-0.0334 * * * (-4.30)	
WSD			0.0143 (1.38)	
LSD rudimentary	-		-	0.0712 * * * (4.19)
intermediate		-0.00341 (-0.42)		-0.0249 * * * (-3.56)
substantial intensive		-		-
		0.000748 (0.21)		0.00967 * * (1.85)
Observations	637	637	575	575
R-Squared	0.391	0.376	0.461	0.450

Notes: See [Table 5](#)

population growth, level of schooling and terms of trade shocks.¹⁰ We use the same benchmark MPF variables as we did in the inflation regressions and continue to apply our broad money growth filter.

The signs and significance of the estimated coefficients on the control variables in Table 6 are broadly in line with theory. Surprise findings for the advanced (but not emerging) economies are that the estimated coefficients on the investment ratio are not significantly positive, those on schooling are negative and those on population are not significantly positive.¹¹ Looking at the target MPFs we find evidence in emerging economies that MixedTs, ITs and MDC economies enjoy growth higher than the LSD benchmark, but UD economies experience relatively lower growth. For advanced economies we also find evidence that ITs economies enjoy higher growth relative to the LSD benchmark. For the DOC MPFs we find evidence within the emerging economies that rudimentary and intensive have growth higher than the substantial benchmark, and that intermediate economies have lower than benchmark growth. We find no evidence of similar effects in the advanced economies.

3.4. Sensitivity: growth regressions

As with our inflation regressions we develop a basic sensitivity analysis by presenting, in Table 7, the results of regressions run on slightly modified versions of our four main regression equations (from Table 6). We present 4 modifications (models 1–4) that correspond to those we made to our inflation regressions. Again, if we focus on the MPF variables we can see most of the results of our main growth regressions (Table 6) hold across our four alternative models. Significant differences apply to the advanced economies under model (3), where the significance of the estimated coefficients on both MixedTs and ITs changes, and to the emerging economies under model (4), where the estimated coefficients on MixedTs, ITs and WSD become insignificant.¹²

¹⁰ As was the case with our inflation regressions our choice of control variables is strongly influenced by existing literature such as Ghosh et. al (2002) and Husain et. al (2005). Note we do not include a convergence or ‘catch-up’ variable such as the ratio of a country’s starting GDP relative to that in the US. This is because such a variable will be constant across time within a given country and therefore excluded (subsumed into the fixed effect) from the fixed effect regression. Note that all the data used in this regression come from the World Bank, except for the schooling data which comes from the Barro and Lee updated dataset (<http://www.barrolee.com>). Note the latter data end in 2010, although by centring we extend the data to 2012. This means our effective sample runs from 1974 to 2012. See Table A1 in the Appendix for further detail on the variable definitions.

¹¹ A standard finding in empirical work is that schooling has a positive impact upon per-capita growth rates (see *inter alios* Barro, 2013). Husain et. al. find a negative but insignificant coefficient for advanced economies, while Ghosh et. al. find results that are dependent upon their model specification. Population, since it picks up ‘large country’ effects might be expected to be positive, although Husain et. al. find a significant and negative coefficient for advanced countries and Ghosh et. al. find results are sensitive to model specification. Husain et. al. find a negative relationship between the investment ratio and growth.

¹² The results of our sensitivity analysis have a greater impact upon our control variables. Use of model (3) results in changes to the significance of the estimated coefficients on the investment ratio, openness and government balance in both advanced economy regressions as well as those on population in the DOC regressions. It also results in significant changes to estimated coefficients for the emerging economy regressions (using target MPFs) on the investment ratio, terms of trade and openness, as well as on the investment ratio and terms of trade using DOC MPFs. Model (4) also leads to a change in the estimated coefficient on population growth in the emerging economies and on the investment ratio in advanced economies (using target MPFs). We can also see that removing the broad money growth filter (model 1) has some impact upon our emerging economies results, estimated coefficients on population and schooling change (using DOC MPFs) as well as those on population growth (using both target and DOC MPFs).

Table 7
Growth - Summary Regressions.

Economies	(A)				(B)				(C)				(D)			
	Advanced				Advanced				Emerging				Emerging			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Investment Ratio	+	+	-*	+*	+	+	-*	+	+*	+*	-	+*	+*	+*	+	+*
Openness	+*	+*	+	+*	+*	+*	+	+*	+	+	+*	+	-	+	+	+
Tax Ratio	-	-	+	-	-	-	+	-	+	-	+	+	-	-*	-	-
Government balance	+*	+*	-	+*	+*	+*	-	+*	+*	+*	+*	+*	+*	+*	+*	+*
Population Growth	-*	-*	-	-*	-	-	-	-	-	-*	-*	-	-	-*	-*	-
Population	-	-	-	-	-	-	-	-	+*	+*	+*	+*	+	+*	+*	+*
Schooling	-*	-*	-*	-*	-*	-*	-*	-*	+*	+*	+*	+*	+*	+*	+*	+*
Terms of Trade	+		+	+	+		+	+	+		-*	+	+		-*	-
MDC									+*	+*	+*	+*				
ERtargets	+	+	+	+					+	+	+	-				
ERfix	+	+	+	+					-	-	-	-				
MTs	+	+	+	+												
MixedTs	+	+	+*	+					+*	+*	+*	+				
ITs	+*	+*	+	+*					+*	+*	+*	+				
UD	-	-	+	-					-*	-*	-*	-*				
WSD									+*	+*	+*	+				
LSD	B	B	B	B					B	B	B	B				
rudimentary													+*	+*	+*	+*
intermediate					-	-	-	-					-*	-*	-*	-*
substantial					B	B	B	B					B	B	B	B
intensive					+	+	+	+					+*	+	+	+

Notes: +/- denotes the sign of the estimated coefficient in the relevant regression, * represents significance at the 10% significance level (or better), B represent the benchmark MPF variable. Dependent and control variables are defined in Table A1, MPF variables in Table 1.

In CMMS (2021) we report panel regressions for advanced and emerging economies together weighted by (time varying) real GDP and population, which show the average effect per unit of economic activity or per unit of population. There are some minor differences in the coefficients for the control variables and very minor differences in the coefficients for the MPFs, and in general the results are consistent with those reported here.

4. A proxy variable analysis of inflation performance

As noted in our sensitivity analysis above, it is possible there is an endogeneity issue with our inflation regressions. In particular, countries with low and stable inflation could choose to announce inflation targets and so become classified as ITs. In this case, the MPF variables are influenced by the contemporaneous inflation rate, rather than the prior choice of the ITs framework leading to better inflation performance. Similarly, poor inflation performance might encourage a country not to declare inflation targets in which case it would be more likely to be classified as loosely structured discretion. In our inflation regressions the endogeneity issue is likely to be mitigated by the low variance of the MPF variables: if MPFs do not change frequently, they are less likely to be influenced by short-term changes in inflation. Moreover, it is hard to tell a convincing story as to why the choice of frameworks other than ITs and LSD

Table 8
Inflation using actual and predicted MPFs (Advanced Economies, 1983–2017).

MPF	(1)	(2)	(3)	(4)
	actual	predicted	actual	predicted
Broad Money Growth	0.056 ** (2.321)	0.042 * (2.028)	0.055 ** (2.180)	0.049 ** (2.402)
Real GDP Growth	-0.272 ** (-2.259)	-0.249 ** (-2.083)	-0.285 ** (-2.404)	-0.244 ** (-2.538)
Government balance	0.013 (0.419)	0.005 (0.124)	0.014 (0.410)	-0.028 (-0.742)
Terms of Trade	0.015 (0.388)	-0.014 (-0.319)	0.009 (0.224)	0.005 (0.128)
ERtargets	0.005 (0.578)	-0.002 (-0.288)		
MixedTs	-0.011 (-0.792)	-0.006 (-0.473)		
ITs	-0.007 (-1.505)	-0.003 (-0.466)		
UD	0.038 (1.164)	0.072 *** (5.960)		
WSD				
LSD	–	–		
intermediate			0.059 (1.361)	0.072 *** (3.190)
substantial			–	–
intensive			-0.009 (-1.430)	-0.005 (-0.903)
Observations	532	499	532	520
R-Squared	0.534	0.576	0.531	0.551

Notes: See [Table 7](#)

should be ‘caused’ by their inflation performance, and even harder to tell comparable stories for growth performance.

Nevertheless, the issue remains a potentially important one. We address this by replacing the actual MPFs with predicted MPFs, where the predictions are derived from the model of [Cobham and Song \(2020\)](#). Cobham and Song make use of a multinomial logit model (MNL) to predict a country’s choice of MPF (both TV and DOC), utilising a number of explanatory variables, over the period 1983–2014. These variables include measures of a country’s economic size, trade openness, trade anchor network (the ratio to GDP of a country’s trade with its highest currency network), a financial market depth index (due to [Svirydzenka, 2016](#)), a capital account openness index (due to [Chinn & Ito, 2008](#)), the [Garriga \(2016\)](#) CBI index (as used in our main inflation regressions), an index of democracy indicators ([Jagers & Marshall, 2009](#)) and dummy variables to capture whether a country has historically suffered high levels of inflation, whether it is an emerging economy and whether it is a fuel exporter; none of these variables are likely to be caused by current inflation. They find their model is able to predict 75% of countries’ MPF choices. See [Cobham and Song \(2020\)](#) for further details and motivation.

Table 9
Inflation using actual and predicted MPFs (Emerging Economies, 1983–2017).

MPF	(1)	(2)	(3)	(4)
	actual	predicted	actual	predicted
Broad Money Growth	0.339*** (4.182)	0.376*** (4.259)	0.370*** (4.751)	0.396*** (4.036)
Real GDP Growth	-0.503*** (-3.899)	-0.536*** (-4.468)	-0.608*** (-5.080)	-0.550*** (-4.986)
Government balance	-0.533* (-1.958)	-0.581* (-1.810)	-0.548** (-2.076)	-0.539 (-1.623)
Terms of Trade	0.238*** (3.181)	0.129 (0.965)	0.225** (2.712)	0.104 (0.835)
ERtargets	-0.005 (-0.193)	-0.021* (-1.813)		
MixedTs	-0.039*** (-3.215)	0.017 (0.613)		
ITs	-0.035** (-2.306)	-0.032** (-2.758)		
UD	0.110*** (2.796)	0.077** (2.104)		
WSD	0.019 (0.789)	-0.015 (-0.997)		
LSD	—	—		
intermediate			0.059 (1.425)	0.024 (0.589)
substantial intensive			0.010 (0.550)	-0.002 (-1.112)
Observations	580	548	580	548
R-Squared	0.627	0.571	0.598	0.543

Notes: See [Table 7](#)

We make use of a slightly modified version of that model¹³ to generate predicted MPFs over a slightly extended data sample (1983–2017). Note we are unable to extend the period further back due to unavailability of data. This smaller sample size, relative to that used in [section 5](#), limits the number of observations, and for this reason we do not attempt to generate predictions for MDC, ERfix, MTs and rudimentary. We also remove the CBI Index and Openness from our set of controls as these variables are strongly correlated (in the case of the CBI Index perfectly collinear) with the explanatory variables used to generate our predicted MPFs. [Table 8](#) shows the results of re-running our main inflation regressions for the advanced economies over the sample together with those obtained by replacing our MPF variables with those predicted by our version of the Cobham and Song model. [Table 9](#) provides a similar analysis for the emerging economies.

As between the main inflation regressions in [Table 4](#) and the ‘actual’ results in [Tables 8](#) and [9](#), there are few sharp differences. For the advanced economies there are no differences of sign or significance for the control variables and differences of significance only for intermediate and

¹³ The method used by Cobham and Song requires the setting of benchmark MPF variables to generate point estimates. Their benchmarks are ERtargets and intermediate. In keeping with our earlier analysis we use LSD and substantial as our benchmarks here.

intensive. For the emerging economies the government balance becomes significant in Table 9. However, the crucial issue in Tables 8 and 9 is the similarity or otherwise between the actual and predicted MPF results in each case. In Table 8 for the advanced economies, the results are generally very close, as between columns (1) and (2) and between columns (3) and (4). Coefficient estimates are typically not significantly different from each other, and the only differences in intrinsic significance are for UD and intermediate, which are each insignificant for the actual but significant for the predicted case. ITs, the most obvious candidate for endogeneity, are insignificant (and negative) for both actual and predicted MPFs. In Table 9 the similarities are slightly less: the terms of trade control variable is significant for the actual but insignificant for the predicted MPFs for both target and DOC MPFs, and this holds also for government balance in the DOC case. For the MPF variables ERtargets is insignificantly negative for the actual but significantly so for the predicted MPFs, while MixedTs is significantly negative for the actual but insignificant and positive for the predicted MPFs. The ITs coefficients are significantly negative in both cases, and very close.

We adopt the Hausman test to evaluate the consistency of the estimators by comparing the regression models using the actual MPFs with the corresponding models using the predicted MPFs. The test results suggest that the coefficients of the actual MPFs are consistent and efficient in most models.¹⁴ However, we reject the null that the coefficients of actual MPFs by target variable are consistent for advanced economies. The major differences in coefficients for the model seem to arise from UD given that the coefficient is twice as large and only statistically significant in the model with predicted MPFs. There are three incidences of UD predicted as ERTs: Hong Kong in 1983 and New Zealand in 1983 and 1984. It seems the incidences are due to temporary lags in MPF transition rather than endogeneity. The major concern of reverse causality arises from ITs. Thus, we examined the major differences in the predicted and actual ITs. There are no major differences in actual and predicted IT in the advanced economies. Among the emerging countries actually doing ITs, Chile was predicted to do LSD from 1991 to 2001; Hungary was predicted to do ERTs from 2001 to 2017 except for the period from 2006 to 2011; Thailand was predicted to do ERTs from 2007 to 2010 as well as in 2016 and 2017. These countries do not have particularly high inflation during these periods.¹⁵ Thus, reverse causality should not be a serious concern for ITs in emerging economies. Overall, at this stage we think it is reasonable to assume from these results that there is not a serious endogeneity problem here.

5. Discussion and conclusions

We have now presented a wide range of results on the economic performance associated with different monetary policy frameworks. Table 10 summarises the results, first from the unconditional analysis in Tables 2–3, then from the conditional analysis of inflation from Tables 4–5, supported by the IV approach in Tables 8–9, and finally from the conditional analysis for growth in Tables 6–7. These findings are of considerable interest.

For the target variables it is clear, first of all, that multiple direct controls (MDC), exchange rate fixing (ERfix) and unstructured discretion (UD) have poor inflation records. What is

¹⁴ The inverse of the differenced covariance variance matrix is not positive definite and this may limit the accuracy of the tests.

¹⁵ The average inflation rates in those episodes are 9% in Chile from 1991 to 2001, 6% in Hungary from 2001 to 2005, 2% from 2012 to 2017, 3% in Thailand from 2007 to 2010 and 0.4% from 2016 to 2017.

Table 10
Summary of economic performance associated with each MPF.

MPF	summary
unconditional analysis, inflation and growth (tables 2–3)	
MDC	poor on inflation, good on growth
UD	poor on both
ERFix	poor on inflation, good on growth
ERtargets	for advanced, poor on inflation 1st subperiod, better later, near average on growth; for emerging, good on inflation, mostly good on growth
MTs	okay on inflation, above average on growth
ITs	good on inflation, mostly good on growth
MixedTs	for advanced economies poorer than average, but less so in later subperiods; for emerging mostly better than average
LSD	mostly good on inflation, mostly good on growth
WSD	good on inflation, mostly good on growth
rudimentary	not bad on inflation, good on growth
intermediate	poor on inflation, poor on growth
substantial	for advanced, mostly okay on inflation and growth; for emerging, okay on growth, less good on inflation
intensive	for advanced, good on inflation, okay on growth; for emerging, mostly good on inflation, mostly okay on growth
conditional analysis, inflation (tables 4–5, 8–9)	
MDC	mostly zero (not significant)
UD	mostly higher
ERFix	mostly higher for advanced, not so for emerging
ERtargets	negative for emerging economies on the predicted MPFs, but zero otherwise
MTs	zero
ITs	mostly lower for emerging but not advanced
MixedTs	mostly lower for emerging
LSD	(benchmark)
WSD	zero
rudimentary	some evidence higher for emerging
intermediate	mostly higher
substantial	(benchmark)
intensive	mostly lower advanced, not emerging
conditional analysis, growth (tables 6–7)	
MDC	higher emerging
UD	lower emerging
ERFix	zero
ERtargets	zero
MTs	zero
ITs	higher advanced and emerging
MixedTs	higher for emerging and occasionally for advanced
LSD	(benchmark)
WSD	higher emerging
rudimentary	higher emerging
intermediate	lower emerging only
substantial	(benchmark)
intensive	higher emerging

Notes: these are summaries in each case of a considerable number of results as indicated by the table numbers; for the unconditional analysis the judgments are relative to the (advanced/emerging) averages, for the conditional analysis the judgments are on significance relative to the benchmarks.

perhaps surprising is that MDC and ERfix are mostly associated with relatively good growth: it seems that planning and controls do (sometimes) deliver. Second, we find that exchange rate targeting (ERtargets) has a mixed record: there is some evidence of good performance for emerging economies on the unconditional analysis but this disappears in the conditional results. Third, monetary targeting (MTs) is not particularly good for inflation, but not bad for growth, while mixed targeting (MixedTs) seems good for growth, but less clearly good on inflation. Fourth, inflation targeting (ITs) is mostly associated with lower inflation, more clearly for emerging than for advanced economies, and generally with higher growth. Fifth, loosely structured discretion (LSD) does relatively well on the unconditional analysis, and in the conditional analysis, where it is the benchmark, it remains superior to many of the frameworks (but not always to ITs or MixedTs), while well structured discretion (WSD) is mostly associated with lower inflation and higher growth.

For the degree of control variables, which are wider and more heterogeneous, rudimentary MPFs are associated with relatively good inflation and growth. Intermediate MPFs are associated with higher inflation and lower growth. Intensive MPFs mostly but not always do better than substantial MPFs.

There are few large differences between the unconditional and conditional results on economic performance, and our use of MPFs predicted by the [Cobham and Song \(2020\)](#) model suggests that there are no serious issues of endogeneity.

In general these findings confirm that the monetary policy frameworks which are conventionally regarded as 'better' are associated with somewhat better inflation and growth outcomes, while 'worse' frameworks are associated with poorer outcomes. One exception to this is that some of the poor frameworks do well on growth. It should also be noted that inflation targeting does not consistently score more highly than other 'better' frameworks, a finding which is broadly in line with the conclusion reached by [Ball \(2010\)](#) on the basis of his own work and the work he surveys (see also [Cobham & Song, 2021](#)). Furthermore there is a clear general improvement in performance, at least up to the GFC, which also means that the benchmarks used in the regression analysis are improving over time.¹⁶ Indeed, from closer examination of [Tables 2](#) and [3](#) it is arguable that this general improvement outweighs the smaller differences between ITs and the other 'better' frameworks.

To sum up, then, we have identified in this paper the economic performance, in terms of inflation and growth, associated with different monetary policy frameworks. There are clear improvements over time in the general performance, at least up to the GFC, which are partly related to the trend towards inflation targeting but also, perhaps more strongly, reflect the improving performance associated with other frameworks, notably the loosely structured discretion and substantial MPFs that we use as benchmarks. The effects of ITs on inflation are more significant among the emerging economies. For policymakers wondering how to improve their countries' economic performance, the differences between the various MPFs suggest that choosing the right MPF can have an important effect on performance. However, the fact that these differences are in some cases relatively small or even insignificant suggests that changing a country's MPF is not the only thing that matters: policymakers should take care to focus on their own monetary policy decisions, taken within given MPFs, as well.

¹⁶ This improvement can be seen in the last row over the first three subperiods in [Table 3](#), that is from 1974–84 through 1985–98 to 1999–2007, and from the second to the third of these in [Table 4](#). The average scores for the benchmarks – LSD and substantial – are also given there.

See Appendix [Table A1](#) and [Table A2](#).

Table A1

Data definitions.

Variable	Definition	Source
Unconditional analysis		
Inflation	Annual percentage change in CPI	WDI
Growth	Percentage growth rate in real per-capita GDP, annual data (constant 2010 US\$)	WDI
Conditional analysis (dependent variable)		
Inflation	Natural logarithm of 1 plus the annual percentage change in CPI.	WDI
Growth	Percentage growth rate in real per-capita GDP, annual data (constant 2010 US\$)	WDI
Conditional analysis (control variables)		
Broad Money Growth	Natural logarithm of 1 plus annual percentage change in broad money growth.	WDI, IFS, ECB
Real GDP Growth	Percentage growth rate in real GDP, annual data (constant 2010 US\$)	WDI
Openness	Exports plus imports as a percentage of GDP.	WDI
Government fiscal balance	Net lending / borrowing as a percentage of GDP.	WDI
CBI Index	Updated version of the Cukierman, Webb and Neyapti index. We use the unweighted version.	https://sites.google.com/site/carogarriga/cbi-data-1
Terms of Trade	Five year standard deviation of exports as a capacity to import. Exports as capacity to import equals the current price value of exports of goods and services deflated by the import price index.	WDI
Investment Ratio	Gross fixed capital formation as a percentage of GDP.	WDI
Tax Ratio	Tax revenue as a percentage of GDP	WDI
Population	Logarithm of population	WDI
Population growth	Annual percentage change in population	WDI
Schooling	Average years of schooling of the population aged 25 years and over (centred).	Barro and Lee (updated), http://www.barrolee.com

Note: WDI is *World Development Indicators* (World Bank), IFS is *International Financial Statistics* (IMF), ECB is European Central Bank.

Table A2

Number of observations by MPF.

MPF	Advanced			Emerging		
	1974–1998	1985–2007	1999–2014	1974–1998	1985–2007	1999–2014
MDC	0	0	0	70	13	0
ERtarget	142	72	34	91	160	123
ERFix	8	0	0	96	21	0
MTs	67	24	0	0	0	0
MixedTs	22	6	6	6	17	12
Its	201	284	185	12	100	184
UD	57	6	0	160	89	11
WSD	6	6	0	0	2	9
LSD	112	79	17	241	295	156
rudimentary	0	0	0	70	13	0
intermediate	65	6	0	256	110	11
substantial	388	265	111	328	485	337
intensive	162	206	131	22	89	147
Totals	615	477	242	676	697	495

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