Economic performance under different monetary policy frameworks

Cobham, David and Macmillan, Peter and Mason, Connor and Song, Mengdi

Heriot-Watt University

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David Cobham (Heriot-Watt University, Edinburgh, Scotland UK)

Peter Macmillan (University of St Andrews, Scotland UK)

Connor Mason (formerly Heriot-Watt University, Edinburgh, Scotland UK)

Mengdi Song (New York University Abu Dhabi, United Arab Emirates),

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Abstract
We first outline the major trends in monetary policy frameworks, which are shifts towards inflation targeting and towards frameworks which offer higher degrees of monetary control. We then examine the economic performance (inflation and growth) associated with different frameworks, presenting unconditional and conditional analyses, running regressions weighted by GDP and population as well as by the number of countries, 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 but in part, and perhaps more strongly, reflects a more general trend towards better economic performance.

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Keywords: monetary policy framework, exchange rate targeting, inflation targeting, inflation, economic growth, weighted regressions

Contact: David Cobham, School of Social Sciences, Heriot-Watt Uni, Edinburgh EH1`4 4AS, Riccarton, Edinburgh, Scotland, UK; email d.cobham@hw.ac.uk ; tel. 0131 451 3495.

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, 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 et al. (2002) and Husain et al. (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.

In section 2 we identify the major trends revealed by the classification. In section 3 we examine the implications of weighting the frameworks by GDP and by population, rather than by the number of countries. In sections 4 and 5 we present first unconditional and then conditional analyses of the inflation and economic growth associated with different frameworks. Section 6 uses predictions of countries' MPFs based on Cobham and Song (2020) to allow for possible endogeneity. Section 7 concludes.

2 The classification and what it shows

In the classification we use here (explained in detail in Cobham, 2021, pp4-5, see also www.monetaryframeworks.org), MPFs are defined as "combinations of the objectives of the monetary authorities (including their understanding of the trade-offs between those objectives)

and the set of constraints and conventions – the former more binding, the latter more matters of established usage – within which specific (conjunctural) monetary policy decisions are made. The constraints and conventions which are relevant here include the rules or disciplines to which the authorities are subject (voluntarily or involuntarily), the nature of the financial and monetary markets and institutions in existence, the understandings (on the parts of the monetary authorities and of the society) of key macroeconomic relationships, and the political environment within which the monetary authorities operate."

The classification starts by asking if the MPF concerned has pre-announced objectives or targets; if so, what those targets are for; whether they are broad or narrow; whether they are stationary or converging; and whether they are attained. Where no such announced targets exist, or announced targets are not attained, the frameworks are divided between 'unstructured', 'loosely structured' and 'well structured' discretion, by reference to the effectiveness of the instruments available to the monetary authorities as well as their (unquantified, maybe even unarticulated) objectives. An important distinction is also made between an exchange rate 'fix', where the monetary authority dominates forex transactions and sets (typically very narrow) margins for transactions, and an exchange rate target where there is an autonomous forex market, and interest rates as well as market intervention are used to influence the rate. Two types of currency board are distinguished, while the category of 'multiple direct controls' is used to cover command economies with no real monetary policy. The key sources of information for the classifications are the reports and papers from the regular Article IV consultations of the IMF with its members.

On this basis 32 different frameworks are defined, but these are then aggregated along two different dimensions.[1] First, an aggregation by target variable (plus the three forms of

discretion) puts together, for example, 'loose' and 'full', stationary and converging, inflation targets. Second, an aggregation by degree of monetary control puts together, for example, all loose targeting arrangements in one category, and all full targeting arrangements in another. Full details of these aggregations, which reduce the number of frameworks to 9 in the first case and 4 in the second, are presented in Table 1.

Figures 1 and 2 show the results in terms of each of these two aggregations, for advanced and emerging economies together. Figure 1 uses the target variable aggregation and includes as a separate category countries with 'no national framework', that is countries which used another country's currency (Luxembourg, before 1999) or joined the European monetary union (EMU) in or after 1999 so that from then on they have had no national-specific framework, but the Euro area itself is included. What Figure 1 shows clearly is the growth over time of inflation targeting and the decline from the early 1990s of exchange rate targeting; those trends are stronger for the advanced countries but still significant for the emerging economies (see the visualisations at www.monetaryframeworks.org or the graphs in Cobham, 2018). Monetary targeting, on the other hand, is never very important[2] and disappears altogether in the mid-1990s, except where it coexists with exchange rate targeting or inflation targeting as countries tried to fulfil the Maastricht criteria for entry into EMU (all these cases, and the few cases of exchange rate plus inflation targeting, are classified as 'mixed targeting'). Of the three forms of discretion, unstructured is initially most important, but that loses ground to loosely structured which also later declines, while well structured discretion turns out to have very low incidence (possibly because countries with sufficiently coherent and well-organised objectives and instruments turn to inflation targeting instead).

Figure 2 shows the incidence of different frameworks on the degree of control (hereinafter DOC) aggregation (with no national framework excluded). What it makes clear is a consistent trend towards MPFs that offer a higher degree of control; this is also a trend which goes faster and further for the advanced countries but is strong for the emerging economies too. For the former there are no examples of 'rudimentary' control MPFs in the dataset, and by 2017 60% of countries have 'intensive' control MPFs; for emerging economies rudimentary MPFs continue for longer and by the end of the period about 40% have intensive MPFs while over 50% have 'substantial' MPFs.

Table 2 shows the number of episodes and their average duration for each of the aggregated frameworks and for the full sample, together with the incidence of frameworks in 1974, 1998 (the last year before EMU), 2008 (the year of the Global Financial Crisis, GFC) and 2017. Among the targeting frameworks, loosely structured discretion, inflation targeting, exchange rate targeting and unstructured discretion have the largest numbers of episodes, while exchange rate targeting, no national framework, inflation targeting, well structured discretion and loosely structured discretion have the highest durations. Among the DOC frameworks, substantial has the largest number of episodes and the highest duration. These numbers are consistent with and underline the two major trends identified in Figures 1 and 2, given that inflation targeting and intensive are prominent at the end of the period, so that their durations are probably continuing to rise (while the incidence of substantial is falling).[3]

3 Weighting the frameworks

The previous figures follow the standard procedure in that they report the percentage of countries in each category, in other words each country is weighted equally. Thus when EMU starts in 1999 eleven (later more) countries move into the 'no national framework' category

while the currency area, the Euro area, is counted as one country. But it might be more interesting to know what proportion of the world's population or what proportion of its GDP (rather than what proportion of its countries) are in each category.

Figures 3 and 4 present the two weightings for the target variable aggregation (for advanced and emerging economies together). Figure 3 indicates that when weighted by GDP the share of inflation targeting in the second half of the period is much higher, because inflation targeting is largely an advanced economy sport. Figure 4 shows that when the frameworks are weighted by population inflation targeting is much less important, and pride of place goes to loosely structured discretion, which is the framework for China (from 1994) and India (from 1974 to 2013, after which it moves to inflation targeting).

Figures 5 and 6 show the weightings for the DOC aggregation (excluding cases of no national framework). On the GDP weighting intensive and substantial frameworks account for roughly 50% each by the end of the period.[4] On the population weighting intensive frameworks are less than 20% and substantial around 80% by the end of the period, while rudimentary frameworks are over 30% in the first decade.

4 Inflation and growth: unconditional analysis

Table 3 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 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 target variable

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. 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 4 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.

5 Inflation and growth: conditional analysis

The unconditional outcomes identified in the previous section may reflect country-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, as well as, for both groups combined, using panel regressions weighted by (time varying) real GDP and population. Our regressions cover the full period 1974-2017.[5]

Inflation

Tables 5-7 present regression results for inflation using fixed effects estimation. Table 5 presents our main results for both the advanced and emerging economies in our sample, where we test the effect of the MPFs aggregated by target and DOC variables respectively.[6] 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.[7] 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).[8]

Amongst our control variables in Table 5 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).[9] However, our advanced economy results are in line with those of Husain *et al* (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,[10] that on the CBI Index is insignificant[11] and that on the terms of trade shock is positive but only significant for the emerging economies.

Of the MPF target variables in Table 5, 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 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.

Sensitivity: inflation regressions

Table 6 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 5 (A to D in Table 6), 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.[12] 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 5. 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. [13]

Weighted Inflation Regressions

Section 4 presented graphs of the trends in MPFs weighted by GDP and population, instead of by the number of countries. This raises the question of whether the econometric relationships are also affected by the weights used. We therefore re-run our tests using weighted regression techniques, making use of GDP and population as weights. Note that these weights are time-varying. While previous results tell us the average effect per country of different frameworks, these results will show the average effect per unit of economic activity or per unit of population. Table 7 replicates the results of Table 5 (our main inflation regressions for advanced and emerging economies using both target and DOC MPFs), where we run a weighted regression (using both GDP and population weights) over our full sample of countries.[14]

The results in Table 7 are broadly comparable to our previous findings when we look across the estimated coefficients on our control variables. Those on broad money growth, real GDP

growth and the CBI index are similar to our main results. However, we find evidence that the estimated coefficient on the terms of trade variable is significantly positive (in common with the emerging economies results). We now find the estimated coefficient for the government balance when we use target MPFs to be significantly negative. The estimated coefficients on openness remain insignificant although they are now negative when we apply GDP weights (and population weights using target MPFs). Across the target MPF variables we find some significant differences. Most noticeably MixedTs economies appear to have high inflation relative to the benchmark value, under both GDP and population weights. We also now find significantly positive estimated coefficients on both ERtarget and WSD under GDP weights, and no longer find evidence of positive estimated coefficients on ERFix or rudimentary. In common with our results for the emerging economies in Table 5, the estimated coefficient on UD is positive and significant while on ITs it is negative and significant under population weights. In line with the results in Table 5 we also find the estimated coefficients on MTs and MDC to be insignificant.

Growth

Table 8 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, population growth, level of schooling and terms of trade shocks.[15] 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 8 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.[16] 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.

Sensitivity: growth regressions

As with our inflation regressions we develop a basic sensitivity analysis by presenting, in Table 9, the results of regressions run on slightly modified versions of our four main regression equations (from Table 8). We present 4 modifications (models 1 to 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 8) 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.[17]

Weighted Growth Regressions

Table 10 presents the results of a weighted regression analysis of our growth variable for advanced and emerging economies together, again using both GDP weights and population weights for both target and DOC MPF variables. The results are broadly similar to those found

in the main regressions although there are some differences. In terms of the control variables, in common with the main results we find the estimated coefficients on the government balance to be positive and significant and on population growth to be negative and significant in all the weighted regressions. We also find the estimated coefficients on the investment ratio and terms of trade variable to be significant and positive. We no longer find the estimated coefficients on the tax ratio, population or schooling to be significant. In addition, we find that the signs on the estimated coefficients vary with the weighting scheme for openness, tax ratio and schooling, and that, contrary to our main results, the estimated coefficient on openness under population weighting and using DOC MPFs is negative.

The estimated coefficients on the MPF variables are also close to those in the main regressions in most cases. As with the main results, for the target variables, we find the estimated coefficients on MDC and ITs to be significant and those on ERtarget and ERfix to be insignificant. We find a positive estimated coefficient on MixedTs only when we use GDP weights and a significantly negative estimated coefficient on UD only under population weights. Contrary to the results in Table 8, we also find significantly positive coefficients on MTs and WSD under GDP weighting. For the DOC MPFs we find the estimated coefficients on rudimentary and intensive to be positive and significant as they were in the main regressions for emerging economies, and intermediate to have a negatively signed and insignificant estimated coefficient as was the case for the advanced economies.

6 Instrumental variables estimation 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 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 it from an instrumental variable (IV) perspective 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 target 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 Zvirydzenka, 2016), a capital account openness index (due to Chinn and Ito, 2008), the Garriga (2016) CBI index (as used in our main inflation regressions), an index of democracy indicators (Jaggers and 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.

We make use of a slightly modified version of that model[18] 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 11 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 12 provides a similar analysis for the emerging economies.

As between the main inflation regressions in Table 5 and the 'actual' results in Tables 11 and 12, 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 intensive. For the emerging economies the government balance becomes significant in Table 12. However, the crucial issue in Tables 11 and 12 is the similarity or otherwise between the actual and predicted MPF results in each case. In Table 11 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 12 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.[19] 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.[20] 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.

7 Discussion and conclusions

We have now presented a wide range of results on the economic performance associated with different monetary policy frameworks. Table 13 summarises the results, first from the unconditional analysis in Tables 3-4, then from the conditional analysis of inflation from Tables 5-7, supported by the IV approach in Tables 11-12, and finally from the conditional analysis for growth in Tables 8-10. 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 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.

We have shown that the standard results, implicitly weighted by the number of countries, are not radically different from those obtained when we weight by GDP or population: given the prevalence of the former procedure, this is reassuring. 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 and 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.[21] Indeed, from closer examination of Tables 3 and 4 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.

Notes

[1] Cobham (2018) suggests that users of the MPF data may wish to make their own aggregations along other dimensions.
[2] There are no examples in the dataset of (successful) monetary targeting in emerging economies, and few among the advanced countries. Several episodes of announced monetary targets, e.g. the UK 1977-87 and many emerging country cases, are not classified as monetary targeting because of the repeated failure to hit the targets.
[3] Cobham (2018) contains an analysis of durations by the full menu of frameworks and distinguishes between advanced and emerging economies.
[4] It should be noted that the Euro area is classified here as loose inflation targeting and therefore substantial.
[5] 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.
[6] Year dummies and a constant term are included in our regressions, reported t-statistics are calculated using cluster-robust standard errors.
[7] 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.
[8] 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.
[9] 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 and Miron, 1997; and Wynne and 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 et. al., 2012).
[10] 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, Ch10) 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.
[11] 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.
[12] 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.
[13] 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.
[14] We use the **areg** command in the *Stata* statistical software package.

[15] 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.
[16] 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.
[17] 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 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 on population growth (using both target and DOC MPFs).
[18] 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.
[19] The inverse of the differenced covariance variance matrix is not positive definite and this may limit the accuracy of the tests.
[20] 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.
[21] This improvement can be seen in the last row over the first three subperiods in Table 3, that is from 1974-84 through 1985-1998 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.

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APPENDIX

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)

Table A2: Number of observations by MPF

	Advanced			Emerging		
MPF	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

Tables for insertion into text

Table 1: Two aggregations of monetary policy frameworks

by target variable	**frameworks**
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
by degree of monetary control (DOC)	
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 (2018)

Table 2: Durations by aggregated frameworks (years), all countries

			incidence of frameworks			
by target variable	**episodes**	**average duration**	**1974**	**1998**	**2008**	**2017**
direct controls	7	10.0	7	0	0	0
exchange rate fixing	13	8.0	11	0	0	0
exchange rate targeting	29	17.3	11	19	8	5
monetary targeting	9	8.3	1	0	0	0
inflation targeting	35	14.9	0	12	25	28
mixed targets	11	8.8	0	6	1	0
unstructured discretion	27	8.7	10	2	0	1
loosely structured discretion	49	11.2	10	19	10	6
well structured discretion	1	12.0	0	0	1	1
no national framework	21	15.7	1	1	15	19
by DOC						
rudimentary	7	10.0	7	0	0	0
intermediate	38	9.2	21	2	0	1
substantial	58	21.3	19	40	28	19
intensive	32	15.8	3	16	17	21

Table 3: Economic performance by aggregated framework and period, advanced economies

	1974-84		1985-98		1999-2007		2008-2017	
	inflatn	**growth**	**inflatn**	**growth**	**inflatn**	**growth**	**inflatn**	**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.

Table 4: Economic performance by aggregated framework and period, emerging economies

	1974-84		1985-98		1999-2007		2008-2017	
	inflatn	**growth**	**inflatn**	**growth**	**inflatn**	**growth**	**inflatn**	**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.

Table 5: 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 6: Inflation - Summary Regressions

	(A)				(B)				(C)				(D)			
Economies	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.

Table 7: Inflation Regressions weighted by GDP and population

	(1)	(2)	(3)	(4)
Weight	GDP	GDP	Population	Population
Broad Money Growth	0.260*** (4.00)	0.272*** (3.95)	0.401*** (4.51)	0.434*** (4.78)
Real GDP Growth	-0.744*** (-5.80)	-0.797*** (-5.87)	-0.908*** (-6.01)	-0.962*** (-6.39)
Openness	-0.00363 (-0.19)	-0.000799 (-0.05)	-0.0138 (-0.63)	0.00125 (0.07)
Government balance	-0.171* (-1.74)	-0.129 (-1.21)	-0.302* (-1.85)	-0.186 (-1.09)
CBI Index	0.00171 (0.08)	-0.0167 (-0.86)	0.0359 (1.36)	0.0322 (1.22)
Terms of Trade	0.153** (2.48)	0.113* (1.72)	0.180*** (3.22)	0.109* (1.77)
MDC	0.0145 (0.56)		0.0260 (0.85)	
ERtargets	0.0218* (1.82)		-0.000984 (-0.08)	
ERfix	0.00147 (0.12)		-0.00737 (-0.48)	
MTs	-0.00695 (-0.90)		-0.0100 (-0.86)	
MixedTs	0.0586*** (2.63)		0.0543*** (2.93)	
ITs	-0.00790 (-1.55)		-0.0194** (-2.38)	
UD	0.157*** (3.54)		0.127*** (4.28)	
WSD	0.0486*** (2.93)		0.0234 (1.19)	
LSD	---		---	
rudimentary		0.00106 (0.04)		0.0234 (1.19)
intermediate		0.0911*** (2.92)		0.0623*** (3.05)
substantial		---		---
intensive		0.00137 (0.29)		-0.0123* (-1.88)
Observations	1328	1328	1328	1328
R-Squared	0.684	0.668	0.704	0.692

Notes: Figures in parentheses are t-statistics calculated using robust standard errors; *, ** and *** represent marginal significance levels of 0.1, 0.05 and 0.01 respectively.

Table 8: 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

Table 9: Growth - Summary Regressions

	(A)				(B)				(C)				(D)			
Economies	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.

Table 10: Per-Capita Real GDP Growth Weighted Regressions

	(1)	(2)	(3)	(4)
Weights	GDP	GDP	Population	Population
Investment Ratio	0.00124*** (3.57)	0.00126*** (3.63)	0.00110*** (2.97)	0.00106*** (2.98)
Openness	0.0101 (0.75)	0.00397 (0.31)	-0.0393 (-1.47)	-0.0425* (-1.80)
Tax Ratio	-0.0512 (-1.08)	-0.0590 (-1.20)	0.0455 (0.69)	0.0399 (0.60)
Government balance	0.138*** (3.77)	0.155*** (4.05)	0.221*** (3.64)	0.215*** (3.43)
Population Growth	-0.449* (-1.80)	-0.686*** (-2.77)	-0.768** (-2.36)	-0.883*** (-2.67)
Population	0.0205 (1.19)	0.0135 (0.83)	0.0149 (0.76)	0.0124 (0.71)
Schooling	-0.000329 (-0.20)	-0.000373 (-0.23)	0.000371 (0.13)	0.00112 (0.45)
Terms of Trade	0.109*** (4.98)	0.115*** (4.97)	0.0818*** (3.64)	0.0954*** (4.35)
MDC	0.0899*** (8.19)		0.0907*** (6.42)	
ERtargets	0.00199 (0.41)		-0.00281 (-0.43)	
ERfix	0.00880 (1.03)		0.00536 (0.65)	
MTs	0.00745* (1.79)		0.00553 (0.90)	
MixedTs	0.0155*** (3.25)		0.0109 (1.12)	
ITs	0.0116*** (4.61)		0.0126*** (3.34)	
UD	-0.0158 (-1.42)		-0.0170* (-1.82)	
WSD	0.0260* (1.66)		-0.000633 (-0.03)	
LSD	---		---	
rudimentary		0.0933*** (8.91)		0.0982*** (7.15)
intermediate		-0.0102 (-1.36)		-0.00574 (-0.96)
substantial		---		---
intensive		0.00734*** (3.04)		0.00713** (2.21)
Observations	1212	1212	1212	1212
R-Squared	0.587	0.577	0.492	0.482

Notes: See Table 7

Table 11: Inflation using actual and predicted MPFs (Advanced Economies, 1983-2017)

	(1)	(2)		(3)	(4)
MPF	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

Table 12: Inflation using actual and predicted MPFs (Emerging Economies, 1983-2017)

	(1)	(2)		(3)	(4)
MPF	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

Table 13: Summary of economic performance associated with each MPF

MPF	summary
unconditional analysis, inflation and growth (tables 3-4)	
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 5-7, 11-12)	
MDC	mostly zero (not significant)
UD	mostly higher
ERFix	mostly higher for advanced, not so for emerging or weighted
ERtargets	higher using GDP weighting, negative for emerging economies on the predicted MPFs, but zero otherwise
MTs	zero
ITs	mostly lower for emerging but not advanced; more clearly lower on population-weighted than GDP-weighted
MixedTs	mostly lower for emerging, but higher for both GDP and population weighting
LSD	(benchmark)
WSD	higher using GDP weighting but zero otherwise
rudimentary	some evidence higher for emerging
intermediate	mostly higher
substantial	(benchmark)
intensive	mostly lower advanced, not emerging, also lower pop-weighted but not GDP-weighted
conditional analysis, growth (tables 8-10)	
MDC	higher emerging and both weights
UD	lower emerging and population weighted only
ERFix	zero
ERtargets	zero
MTs	higher GDP-weighted only
ITs	higher advanced and emerging, and GDP weighted

MixedTs	higher for emerging and occasionally for advanced, higher for GDP weighted
LSD	(benchmark)
WSD	higher emerging and GDP weighted
rudimentary	higher emerging and both weights
intermediate	lower emerging only
substantial	(benchmark)
intensive	higher emerging and pop-weighted

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.

Figure 1: Classification by target variables, advanced and emerging economies

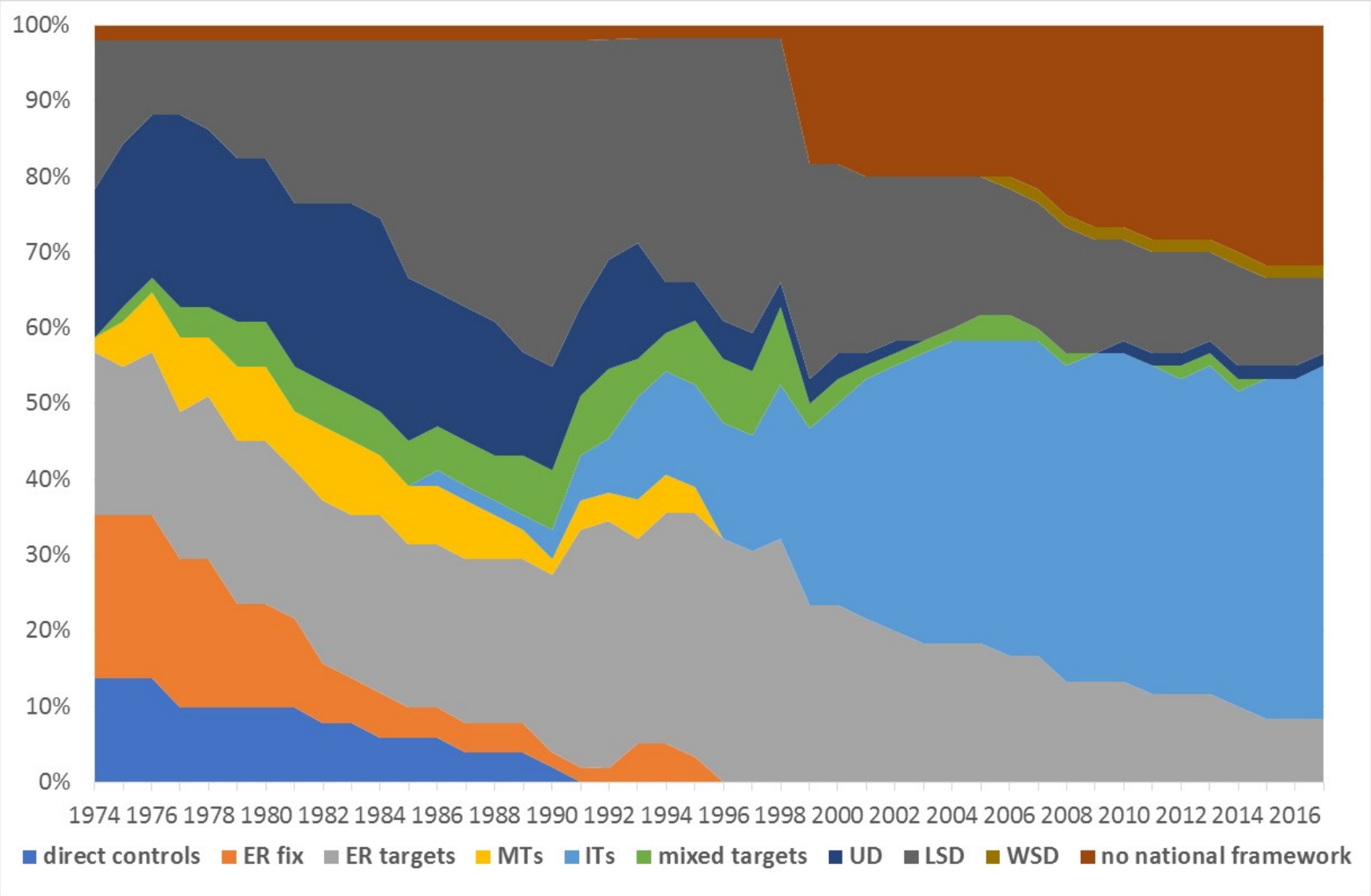

Figure 2: Classification by degree of monetary control, advanced and emerging economies, excluding no national framework

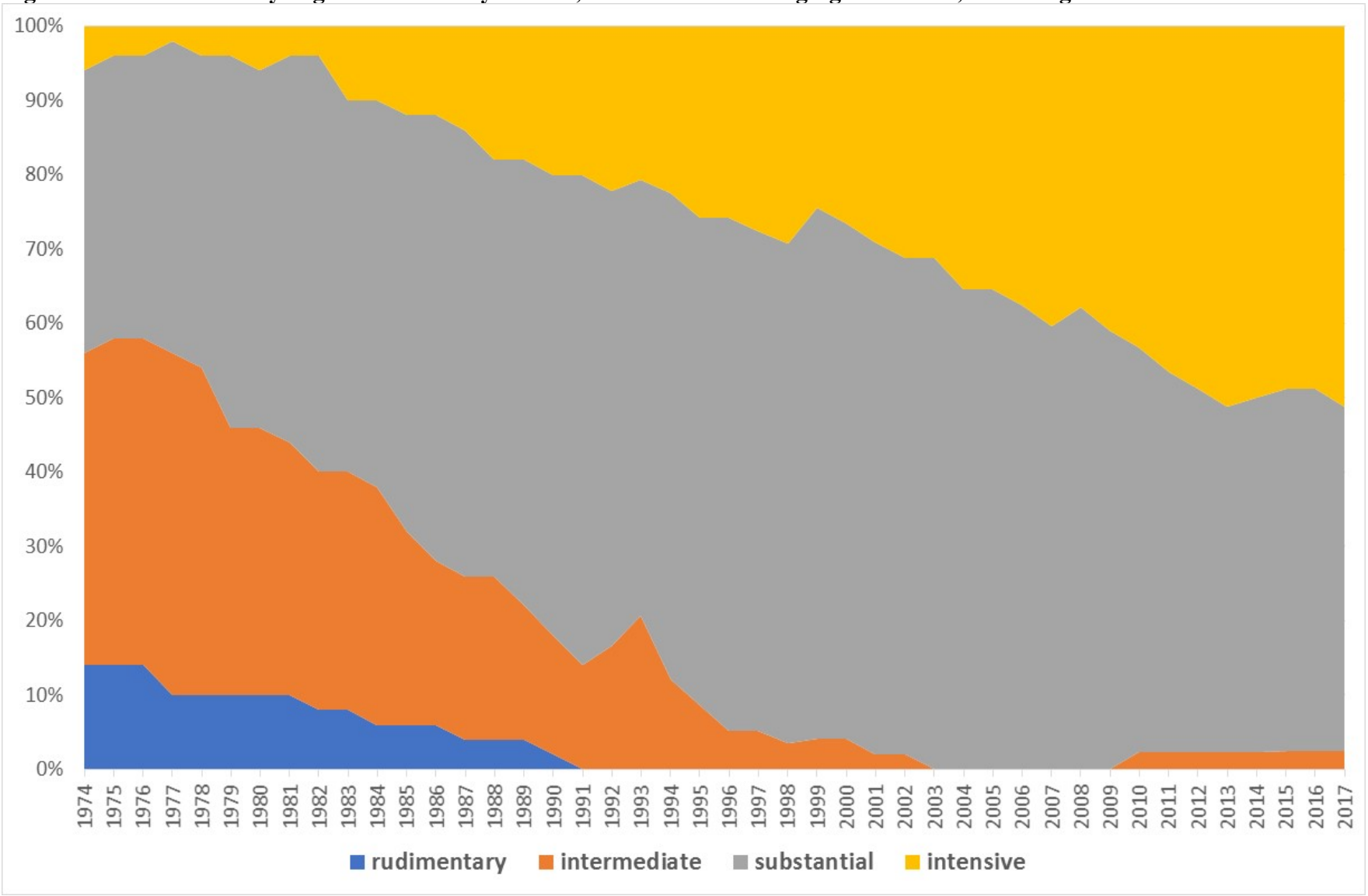

Figure 3: Classification by target variable, weighted by GDP, advanced and emerging economies

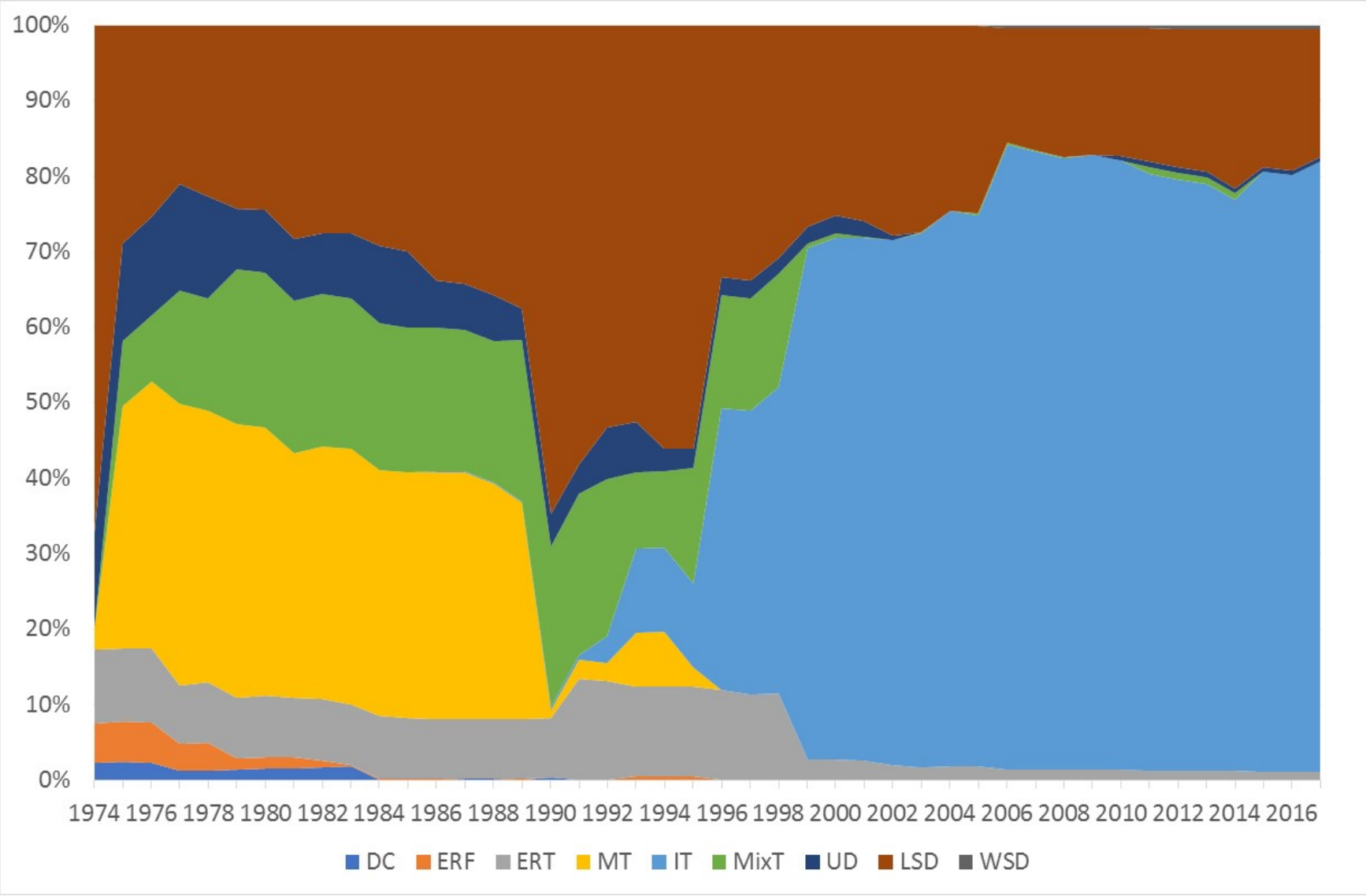

Figure 4: Classification by target variable, weighted by population, advanced and emerging economies

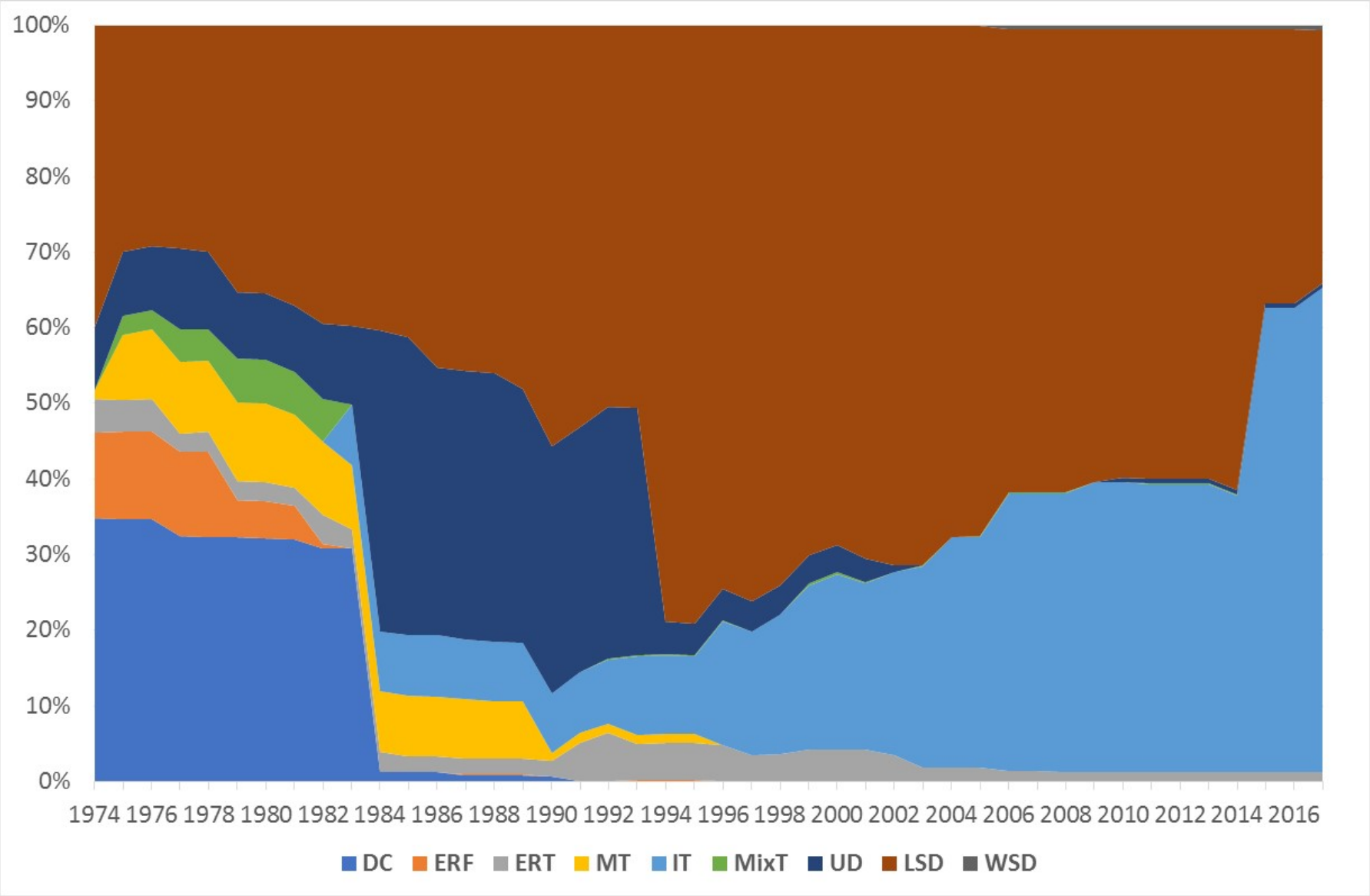

Figure 5: Classification by degree of monetary control, weighted by GDP, advanced and emerging economies

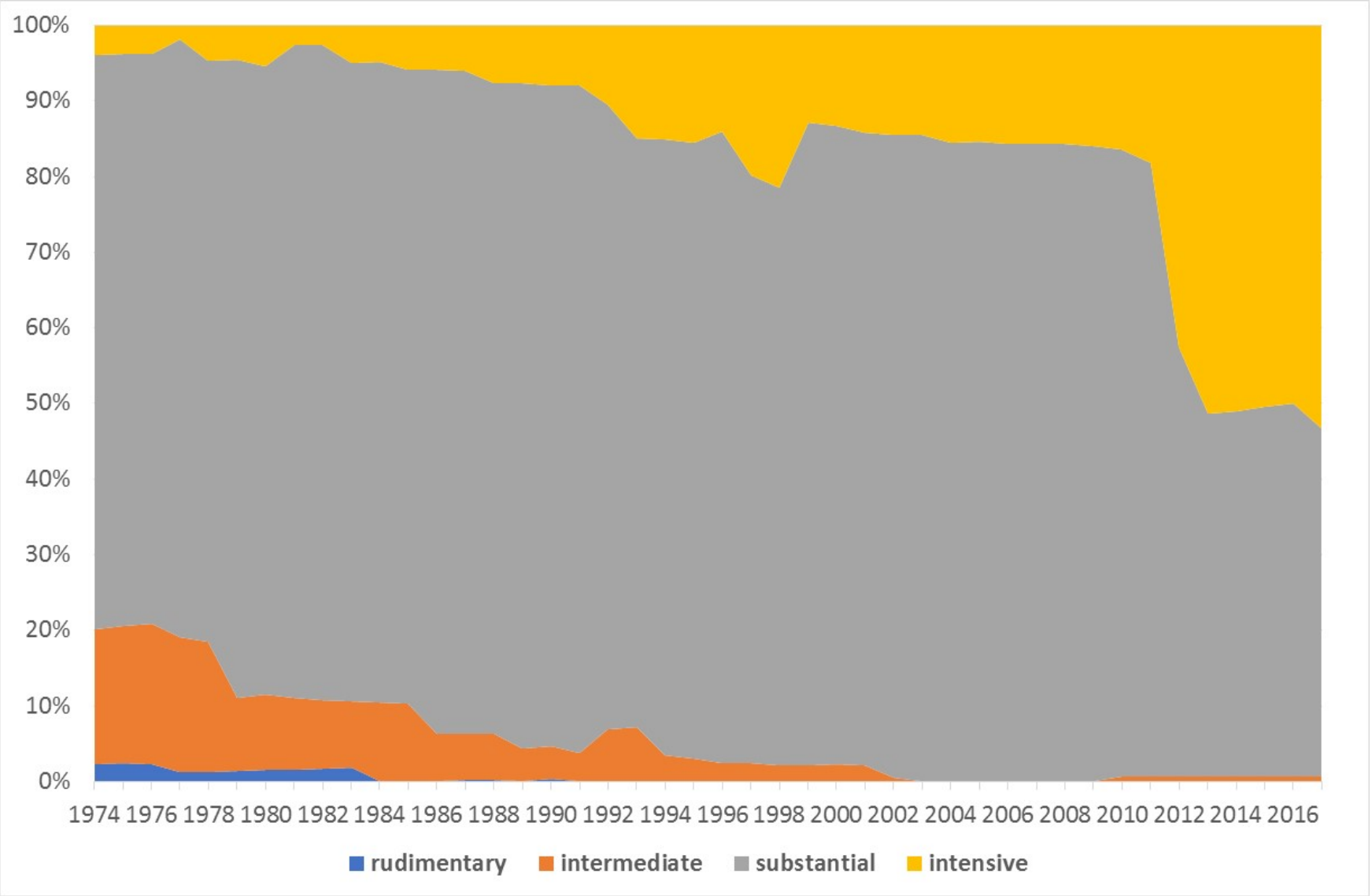

Figure 6: Classification by degree of monetary control, weighted by population, advanced and emerging economies