Surprising Similarities:

Recent Monetary Regimes of Small Economies

Andrew K. Rose*

Abstract

In contrast to earlier recessions, the monetary regimes of many small economies have not changed in the aftermath of the global financial crisis. This is due in part to the fact that many small economies continue to use hard exchange rate fixes, a reasonably durable regime. However, most of the new stability is due to countries that float with an inflation target. Though a few have left to join the Eurozone, no country has yet abandoned an inflation targeting regime under duress. Inflation targeting now represents a serious alternative to a hard exchange rate fix for small economies seeking monetary stability. Are there important differences between the economic outcomes of the two stable regimes? I examine a panel of annual data from more than 170 countries from 2007 through 2012 and find that the macroeconomic and financial consequences of regime-choice are surprisingly small.   Consistent with the literature, business cycles, capital flows, and other phenomena for hard fixers have been similar to those for inflation targeters during the Global Financial Crisis and its aftermath.

Contact: Andrew K. Rose, Haas School of Business,
                University of California, Berkeley, CA 94720-1900
                Tel: (510) 642-6609
                Fax: (510) 642-4700
                E-mail: arose@haas.berkeley.edu
                URL: http://faculty.haas.berkeley.edu/arose

1. Introduction

The global financial crisis (hereafter "GFC") of 2007-9 began and was felt most keenly in the rich

Northern countries. Nevertheless, much of its effect was felt abroad; the great recession of 2008-09

was a global affair. Small economies were indirectly affected as the shock waves spilled out from New

York and London, most dramatically in the form of contractions in the international flow of capital and

trade. My interest in this paper is comparing how the outcomes for small economies varied by their

choice of monetary regime. I am particularly interested in contrasting two monetary regimes: hard

exchange rate fixes, and floating with an inflation target. Both are well-defined monetary regimes that

are widely used by small economies around the world. The two regimes are also quite different,

potentially providing a sharp comparison. Did one monetary regime provide more insulation from the

GFC than the other?

The Great Recession associated with the GFC was the most dramatic macroeconomic event in

generations; as Imbs (2010) convincingly demonstrates, it was also the first truly global recession in

decades. Historically, recessions have frequently caused monetary upheaval; change in monetary

regime has been strongly counter-cyclic. Yet this time has been different, at least for the two monetary

regimes of concern here. Most countries with hard fixed exchange rates in 2006 (before the onset of

the GFC) still retained them in 2012. More striking though was the performance of the inflation

targeters; while the tactics of flexible inflation targeting regimes have varied with quantitative easing,

forward guidance and the rest, the fundamental monetary strategy has not; no country abandoned

inflation targeting.[1]

Interest in academic studies of currency crises (typically when a fixed exchange rate is

abandoned) has greatly diminished over the last fifteen years. A number of small economies whose

experiences spawned important academic research are now sufficiently stable as to be boring, including

(at the very least) Brazil, Chile, Korea, Mexico, Sweden, Thailand, and Turkey. The common element in the transition from newsworthy to stability is the adoption of a monetary regime of a floating exchange rate with an inflation target. While before 2007 there were legitimate questions about the durability of inflation targeting, it has now withstood a substantial trial by fire.[2] Between the hard fixes and inflation targeters, most of the international monetary system has withstood the pressures of the GFC and its aftermath in at least one critical aspect: it has preserved itself.

My analysis in this paper is broad in the sense that I analyze a number of macroeconomic phenomena for more than 170 small economies. My focus is also narrow: I am most interested in the period since 2006, and I am interested in the effects of the *monetary* regime, primarily on the way international capital flows were handled.[3] My quantification of the monetary regime relies on a comprehensive classification of *de facto* behavior, gathered by the IMF.

I have two major results. First, monetary regimes have remained stable and unchanged during the GFC and its aftermath for a large number of countries, those of hard fixers and inflation targeters. The recent finding of monetary stability contrasts with earlier periods; historically, countries have switched their regimes counter-cyclically, that is especially during recessions. Since there are now two reasonably stable monetary regimes available to small economies which appear to be starkly different, it is natural to ask which has performed better, especially during the turbulent period since 2006. In practice this question is hard to answer: while both hard fix and inflation targeting countries have experienced (for instance) lower inflation than other countries, the business cycles, capital flows, current accounts, government budgets, real exchange rates, asset prices and so forth do not seem to vary significantly between the two regimes. Thus my second major result is that the recent macroeconomic and financial performance of small countries with hard fixed exchange rates is similar to that for countries which float with an inflation target. At first blush, this seems surprising, since a hard

commitment to an exchange rate fix seems quite different from the constrained discretion of an inflation target. However, the result is actually quite consistent with the literature which has been generally unable to find strong consequences of the regime, except for exchange rate volatility.

2. A Broad Data Set on the Monetary Regime

One of my goals in this work is to be as comprehensive as possible. I begin with the entire sample of countries available in the World Bank's *World Development Indicators*. In all, I have at least some data for 214 countries (though there are many gaps).[4] However, the focus of this study is on small economies; accordingly, for much of the analysis which follows I simply remove large economies. Adopting the taxonomy of the IMF's *Spillover Report*s, I exclude from the sample the five systematically important economies of China, the Euro-zone, Japan, the UK, and the USA.

One key variable of interest missing from the *WDI* is the national monetary regime. In the past, researchers have resorted to using the formal *de jure* exchange rate regime as declared by the national monetary authorities. This information was provided in the IMF's *Annual Report on Exchange Arrangements and Exchange Restrictions* (AREAER), and was thus available for all members of the Fund. It is now widely accepted that *de facto* measures of what national authorities actually do are of greater relevance; Rose (2011) provides more detail. Two of the most popular *de facto* classifications are those of Levy-Yeyati and Sturzenegger (2003, hereafter "LYS"), and Reinhart and Rogoff (2004, "RR"). One issue with both classifications is the limited span of the data set. RR has now been extended through 2010, leaving one year of data for the aftermath of the great recession; LYS has only been extended through 2004. In any case, there is a more serious problem; both LYS and RR are *exchange rate regime* classifications rather than a classification of *monetary regimes*. While a fixed exchange rate constitutes

a well-defined monetary policy, a float does not. If the central bank doesn't fix the exchange rate, it has to do something else … what?

This problem has long been recognized, and can be solved by classifying countries by their monetary regime. Stone and Bhundia (2004, "SB") propose a taxonomy of monetary regimes by the choice and clarity of the nominal anchor. I have access to their classification and use it below; it covers 85 countries, though only unfortunately from 1990 through 2005.

What I need is a classification of the monetary regime available throughout the aftermath of the GFC. To its credit, the IMF long ago switched to a *de facto* classification of monetary regimes in *AREAER*. The fund provides an official series available back through 2001 for each of its members; I take full advantage and use this *de facto* monetary regime classification through 2012.[5] The IMF divides country-years into an exhaustive taxonomy with 44 cells which vary by exchange rate rigidity, the orientation of the fix (most countries peg to either the dollar or the euro), and the objective of floating rate regimes (countries target either inflation or a monetary aggregate, though some also use 'other' frameworks). I use this monetary classification extensively below; for sensitivity and historical analysis, I also employ the LYS, RR, and SB schemes.

3. Monetary Regimes During and in the Aftermath of the Global Financial Crisis

Monetary regimes have remained remarkably stable from the run-up to the GFC through its aftermath.

First a few words about the recent monetary regimes of the big fish. There are five large economies: China, Japan, the EMU, the UK, and the USA.[6] The recent history of their monetary regimes is tabulated in Table 1. Four maintained the same monetary regime throughout the period, as judged by

the IMF: the EMU, Japan and the USA floated throughout the period with an "other" framework, while the UK floated with an inflation target.[7] These economies are … large; they accounted for over half of global GDP in 2001 and still accounted for 43% in 2012. China is the exception – albeit a large and important one – having switched its monetary regime three times in the period.

The focus of this paper is on the remaining economies, which I define as small, and on the onset and aftermath of the GFC. A contention of this paper is that the monetary regimes of small economies have – like those of large economies – exhibited stability since before the GFC. This stability is new, and contrasts with the historical (counter-) cyclicality of monetary regime switches.[8] The stability is also remarkable compared with the size of recent macroeconomic and financial shocks.[9]

Table 2 groups the small economies by monetary regimes in 2006 (the calm immediately before the breaking of the financial crisis in 2007-08) and 2012 (the most recent period available for most data). I focus on two extreme monetary regimes of particular interest. In 2006, 26 countries were classified by the IMF as economies that floated with an inflation target; only one of these had switched regime by 2012 (when Slovakia left to join EMU). Clearly, inflation targeting has shown its resilience through a trying period of macroeconomic turmoil; it is manifestly a durable monetary regime. No country has ever dropped out of an inflation targeting regime under stress; the only exiters have adopted the Euro. This is not true only using the IMF's classification. Mishkin (2004) lists five components of inflation targeting (a medium-term numerical target for inflation; an institutional commitment to price stability as primary goal of monetary policy; an information-inclusive strategy to set instruments; central bank transparency; and central bank accountability). Mishkin's criteria would lead to the same conclusion.

By way of contrast, 83 small economies maintained a hard fix in 2006. I define a hard fix as a monetary regime with either: a) no separate legal tender, b) a currency board arrangement, or c) a conventional peg.[10] 60 of these fixes were maintained continuously through the end of the sample in

2012, and were thus also proven to be durable; these will be of special interest to me below.[11] The 2012

monetary regimes for the other 23 countries are listed in Table 2; a number left to join the Euro, but

most switched to less rigorous monetary regimes.[12]

The last group of countries collectively maintains a variety of other monetary regimes. These

include: a) soft fixes (the IMF has a number of variants, including: stabilized arrangement, crawling peg,

crawling band, and pegged exchange rate within horizontal bounds); b) floating with a monetary target

(again, there are variants including crawl-like, managed, or free floats); and c) floating with an 'Other'

framework (like their large counterparts, EMU, Japan, and the US). I will refer to these other regimes

collectively as the 'sloppy center'. 32 countries remained in the sloppy center continuously between

2006 and 2012; 30 that began in the sloppy center had switched out at least once by 2012. Even this

overstates the degree of stability in the sloppy center, since it is a coarse, ill-defined grouping,

containing dozens of finer IMF *de facto* monetary regimes. Seventeen of the 32 countries that remained

in the sloppy center throughout still switched their IMF *de facto* monetary regime between 2006 and

2012. Table 3 provides some evidence of *de facto* IMF monetary regime changes for the sloppy center;

the magnitude of the regime changes is striking. The transient nature of monetary regimes for the

sloppy center means that it provides a natural comparison to the more durable fixes and IT floats.

Another interesting feature of Table 3 is the (counter-) cyclic nature of the regime changes for

the sloppy center. This is apparent visually in Figure 1, which plots the number of countries in hard

fixes, inflation-targeting floats and other regimes, year by year. For reference, Figure 1 also includes a

measure of real global GDP growth, provided by the IMF's *World Economic Outlook*. The great recession

is clearly visible, and coincides with a shift from fixed exchange rate regimes towards the sloppy center; I

pursue this issue further below.

Simply counting countries understates the stability of monetary regimes through this period of time. While the number of inflation targeters is considerably smaller than those in other regimes, they are, on average, larger and richer. In 2011, inflation targeting countries represented some 20% of global output.[13] By way of contrast, the more numerous stable fixers are small, poor, or both; they represent only 4% of 2011 global GDP, while the sloppy center constituting some 7% of the world's output. This is clearly visible in Figure 2, which is the analogue to Figure 1 but portrays the fraction of global GDP in each of my three monetary regimes (rather than their un-weighted number). It is striking how large and stable the fraction of global GDP resides in inflation targeting regimes, even through the GFC and its aftermath.

Table 4 summarizes the stability of the monetary regimes for small countries between 2006 and 2012. Fully 96% of the countries that targeted inflation in 2006 were still doing so in 2012; almost three quarters of the hard fixes also survived. By way of contrast, less than a quarter of the sloppy center maintained the same monetary regime during the GFC and its aftermath.

4. The (Counter-) Cyclic Nature of Monetary Regime Shifts: Historical Evidence

Monetary regimes for many economies, both large and small, have been stable through the GFC and its aftermath. This stability is a relatively new phenomenon, as I now document.

Historically, turnover in monetary regimes has been frequent during recessions. The monetary turmoil during the Great Depression of the 1930s is well known and helped motivate the creation of the postwar Bretton Woods system.[14] Still, it is hard to quantify the cyclicality of monetary regimes because, as discussed above, the profession does not have long-lived measures of monetary regimes. The SB classification only goes back to 1990. Both LYS and RR go further back in time, but to repeat: they classify *exchange rate* rather than *monetary* regimes.[15]

Table 5 presents historical data analogous to that of Table 4, but for two important historical episodes: the global slowdown of the early 1970s and that of the early 1980s. Where Table 4 compares *monetary* regimes six years apart (2006-12), Table 5 compares *exchange rate* regimes six years apart (for 1970-76 and 1980-86); both tables exclude large economies. Just over half of small economies remained in the same exchange rate regime continuously between 1970 and 1976 according to RR, though these only constitute an eight of global GDP.[16] Since all the large economies switched their exchange rate regimes during this period, the 1970s are appropriately remembered as a period of international monetary turbulence. Small economies experienced more stability in the 1980s according to the RR classification, with over a quarter of global GDP being produced in small economies with stable monetary regimes. However, the LYS analogue is lower by a factor of three. Both schemes agree that fixed exchange rates failed in at least a quarter of fixed exchange rate regimes, and that the stable fixers produce only a little of global output.

More rigorous evidence on the counter-cyclicality of regime shifts is provided in Table 6. I am interested in whether a country is more likely to switch its monetary regimes during bad times. Rather than rely on a single flawed measure of the monetary regime, I use all three available (SB, LYS and RR). I measure the business cycle as the deviation from trend of the natural logarithm of real PPP-adjusted *WDI* GDP. To ensure the robustness of my results, I de-trend output using five techniques: a) Baxter-King filtering; b) Christiano-Fitzgerald filtering; c) Hodrick-Prescott filtering; d) annual growth rates; and e) residuals from a linear time trend.[17] I also use the unemployment rate as a measure of the business cycle. I then regress a dummy variable (one for a switch in regime, zero otherwise) successively on these six measures of the business cycle; I estimate my coefficients with panel logit regressions with fixed time and country effects.

The Stone-Bhundia measure of monetary regimes is the most appropriate for my purposes, though it suffers from a limited span of time. Five of the six SB coefficients indicate that monetary regimes are counter-cyclic in a statistically significant sense. Turnover in both LYS and RR exchange rate regimes is also counter-cyclic, though rarely different from zero at standard significance levels. All eighteen point estimates in Table 6 imply that monetary regimes switch more during bad times.[18]

I conclude from this analysis that monetary regime transitions have historically been counter-cyclic. The stability of national monetary regimes is not only a recent phenomenon, it is unexpected given the size of the Great Recession.

5. Differences between Monetary Regimes: Determinants

I am primarily interested in the *consequences* of monetary regimes, but it is probably necessary to spend a little time beforehand on how countries choose their monetary regimes. Remarkably little is known on this topic; recent survey material is available in Klein and Shambaugh (2010) and Rose (2011).

The first impression is that it is difficult to compare the durable hard fixers with the inflation targeters, since they seem to be different beasts. Table 7 tabulates some simple descriptive statistics for key features of the monetary regime, split into hard fixes, inflation targeters and the remaining sloppy center. I take advantage of the Stone-Bhundia data set, which ends in 2005 and so pre-dates the GFC.

Hard fixers are, on average, both smaller and poorer than inflation targeters; in both cases the difference is statistically significant as shown by the t-test presented in the right-hand column. Fixers are also less democratic, more open to international trade, and less open to international finance.[19] Judging the latter is always difficult, so I use a variety of measures. I use the popular Chinn-Ito measure of *de jure* openness to capital flows, as well as both investment and financial freedom taken from the

Economic Freedom of the World database.[20] By all three measures, small fixers are more closed to

capital flows than inflation targeters. However, their financial depth is essentially the same, as

measured by either M2 or domestic credit (both as percentages of GDP).

Figure 3 provides the visual analogue to Table 7; it compares the distribution of four key

characteristics for hard fixers and inflation-targeters in 2011 (the last year for which *WDI* data are

available). Consider the top-left chart, which graphs the quantiles of log real GDP per capita for fixers in

2011 (on the y-axis) against comparable data for inflation targeters (on the x-axis).[21] A diagonal line is

provided for reference; if income were similarly distributed across the two regimes, the data would be

plotted along the diagonal. In fact, the data are below the diagonal; fixers tend to be poorer than

inflation targeters, consistent with the message of Table 7. But the differences can be over-stated; real

income is similar for many hard fixers and inflation targeters, and indeed the richest fixers enjoy more

income than the inflation targeters. Similarly, the differences in openness to trade (portrayed in the

bottom-right) do not seem great. Dramatic differences are immediately and pervasively apparent for

population and polity.

While the *univariate* cross-regime differences present in Table 7 seem encouraging, there is no

guarantee that they will stand up under greater econometric scrutiny, especially given the graphical

evidence of Figure 3. I present some *multivariate* statistical results in Table 8. Each column contains

estimates from a different multinomial logit regression.[22] The top panel presents coefficient estimates

of the effects of various determinants on the choice of a hard fix, while the middle panel is the analogue

for inflation targeting. The omitted regime is the sloppy center so that, for instance, the negative effect

of log population in the top row implies that small countries are more likely to choose a hard fix than to

choose the sloppy center; similarly, the positive effect of log population in the middle panel implies that

larger countries are more likely to choose an inflation target. A variety of diagnostics are collected in the bottom panel.

Few of the results in Table 8 are surprising. Small countries are more likely to fix, while large and rich countries are somewhat more likely to float with an inflation target. The most striking difference between the two regimes is political; democracies are significantly more likely to target inflation, while autocracies are more likely to fix. But the effects of openness, both real and financial, are negligible.[23] The equations fit poorly; it is hard to model the determination of monetary regimes.[24]

6. Effects of Monetary Regimes

<u>Statistical Evidence</u>

I now examine the recent consequences of monetary regimes for small economies. One might reasonably expect floating with an inflation target to be a diametrically opposed monetary regime compared with a durable hard fix, especially for handling the shockwaves that spilled out from the large economies as a consequence of the GFC. How did actual performance under the two regimes differ?

Since my chief interest is in comparing the characteristics of recent stable monetary regimes, I split my sample into three groups which I will use for the analysis that follows: a) inflation targeters (such as Brazil, Korea, Mexico, and Canada); b) the sixty small economies that maintained hard fixes continuously in 2006-12 (Saudi Arabia, Hong Kong, and Denmark), and c) the observations from the remaining sloppy center (India, Russia, and Iran).[25] The first two of these monetary regimes are long-lived and durable, often pre-dating the crisis significantly. As shown above, it is also difficult to find systematic determinants of the monetary regime. Above and beyond the persistent effects of size and democracy, monetary regimes seem to be almost random. Accordingly, in the analysis below I initially

treat the choice of monetary regime as plausibly exogenous, so as to be able to estimate the effects of the monetary regime on outcomes of interest without further econometric hassles. I ask: should we care about which monetary regime a small country chooses? Has the monetary regime made a substantial difference to the macro-economies of small economies in the period since the onset of the GFC?

Tables 9 and 10 contain regression evidence for 2007-12. Each row presents results from a panel regression of the regressand (in the left column) on dummy variables for both hard fix and inflation targeting regimes. The omitted regime is the sloppy center so that the coefficients in the inflation targeting column represent the difference between inflation targeters and the sloppy center. Test results for two hypotheses of interest are tabulated at the right; a) the hypothesis that the hard fix and inflation targeting regimes have the same effect (compared with the sloppy center), and b) that the two regimes have no effect. The equations are estimated via least squares with fixed time- and random country-specific effects.[26] While there is little reason to believe that hard fix and IT regimes are chosen endogenously for reasons of relevance to the variables of interest, I address this issue more directly below with two more sophisticated econometric techniques.

I examine a number of variables so as to be able to examine a range of consequences of capital flows from large economies. I look at output consequences, the capital flows themselves, and the mechanisms through which a small economy can adjust to capital flows.

At the top of Table 9, I look at business cycle effects, as measured by real GDP de-trended in the five ways discussed earlier; this is one of the most important consequents of policy choice. Since this paper is concerned with the effects of monetary regimes on small economies through the tumultuous period of the GFC, it is almost as important to examine capital flows.[27] I take advantage of the series as carefully constructed by Forbes and Warnock (2011), and examine gross capital inflows and outflows, as

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well as net capital flows.[28] Since the volatility of capital flows is of interest, I also construct the country-specific standard deviation of both inflows and outflows (over time) so as to be able to examine the effect of monetary regimes on the cross-country variation of capital flows.[29]

When capital starts to flow into a small economy, it can be handled in a variety of different ways.[30] These include: a) encouraging an offsetting change in the current account; b) restricting capital inflows or promoting outflows; c) accumulating reserves (possibly implying an increase in the money supply); d) fiscal contraction; or e) real exchange rate appreciation. Real appreciation, in turn, can be achieved via nominal exchange rate if the latter is flexible, or inflation induced by a monetary expansion.[31] Since I am interested in how economies in different monetary regimes have reacted to the capital flows since 2007, I examine measures for each of these channels. I include the current account and the growth of exports and imports (all relative to GDP). Capital inflows can be countered by capital controls, so I look at the Chinn-Ito measure of capital mobility as well as the EFW's measures of financial and investment freedom. Towards the bottom, I also look at different measures of policy: the growth of international reserves and broad money, the government's budget position (relative to GDP), and how the budget has changed. Table 10 is an analogue to Table 9, but examines prices. I include two conventional measures of goods and services domestic inflation (CPI and GDP), as well as the real effective exchange rate and its change. The effect of the monetary regime on asset prices is the subject of much recent debate. Accordingly, I examine three important assets: the yield on the long bond, and the growth in both stock and property prices.[32] Jointly, these variables cover a wide range of potential responses to international capital inflows.

What do the data show about the consequences of monetary regime choice?   Very little. Perhaps most importantly, Table 9 shows that the magnitude of the business cycle does not seem to have varied significantly between inflation targeters and hard fixers over the period since 2007; there is

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weak evidence that countries in both regimes suffered somewhat worse than the sloppy center (I do not

dwell on this results since it does not stand up to further econometric scrutiny, as I show below). This

weak result is consistent with the fact that capital flows and their volatility seem not to vary across

monetary regimes; the exception is that inflation targeting regimes received larger net capital flows.

Neither the current account nor the growth of either exports or imports varies consistently with the

monetary regime. Inflation targeting regimes increased the ability of their residents to invest freely, but

the other two measures of capital mobility show no significant differences across regimes. Perhaps

most strikingly, there are also no significant differences across regimes in the growth of international

reserves, the money supply, or broad measures of fiscal policy.

It turns out that the weak results in Table 9 does not stem from the methodology or the fact

that the data set is limited to six annual observations (admittedly for up to 167 countries). As Table 9

shows, both CPI and GDP inflation are about 5% lower for *both* hard fixes and inflation targeters,

compared with the sloppy center, an economically and statistically significant result.[33] Since one of the

chief tasks of a monetary regime is to deliver low inflation, this is an important and comforting result.

Interestingly, both the level and the rate of change in real exchange rates over this period are lower

(more depreciated) for *both* hard fixers and inflation targeters compared with the sloppy center, though

these results are only on the verge of statistical significance.   Stock prices have fallen more for hard

fixers than the sloppy center. The growth of property prices and bond yields is insignificantly different

across monetary regimes.[34]

The Visual Story

A visual version of the weak results of Tables 9-10 is presented in Figures 4-6. These are

quantile plots, analogous to Figure 3, which compare the distribution of some of the most important

variables from Tables 9-10 for hard fixers and inflation-targeters. Thus the top-left chart of Figure 4

graphs the quantiles of real GDP growth for fixers since 2007 (on the y-axis) to growth over the same period for inflation targeters (on the x-axis). With the exception of a few outliers at both ends of the distribution, most of the data are scattered close to the diagonal line, consistent with the notion that growth for most hard fixers is similar to that for inflation targeters (though hard fixers experience more outliers, both positive and negative). The pattern for CPI inflation and the government budget are similar, while the distribution of the current accounts is more extreme for hard fixers. In general though, the distributions for key variables seem similar across monetary regimes for capital in- and outflows, international reserve growth, the change in the real effective exchange rate, and asset price changes. One exception is net capital flows, which are systematically higher for inflation targeters.

Sensitivity Analysis

Since monetary regimes are not randomly distributed across economies, the results in Tables 9-10 may be subject to simultaneity bias. I try to handle that in Tables 11-12, analogues estimated with instrumental variables. As instrumental variables, I use the log of population and polity, the two variables which showed consistent non-trivial differences across monetary regimes above. Comfortingly, the IV results are broadly similar to those estimated with least squares. Inflation is lower for both inflation targeters and hard fixers than for the sloppy center, and by about the same amount; there is also weaker evidence of a negative exchange rate effect. Hard fixers experienced bigger stock-market declines, while inflation targeters received more capital inflows and increased their investment freedom more. The only (admittedly marginal) LS results that are not verified by IV are those for business cycle; the IV results show no significant real effects of the monetary regime on the magnitude of business cycles.

As another sensitivity check, I estimate the effects of monetary regimes using a matching methodology. This can, in principle, handle the fact that countries may not choose their monetary

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regimes randomly, and the technique may also be valuable if the relationship between the monetary regime and the variables of interest is not linear. I use a common technique, matching together individual "treatment" observations, each consisting of a country-year observation from one monetary regime, to "control" observations from a different monetary regime. To implement the technique, I use the propensity score of Rosenbaum and Rubin, the conditional probability of assignment to a treatment given a vector of observed covariates. Absent any effect of the monetary regime, the variables of interest are then expected to be similar for treatment and control observations. For the covariates of the propensity score, I choose the size of government spending (relative to GDP) and the unemployment rate.[35] I use the popular "nearest neighbor" matching technique, comparing each treatment observation to its five closest neighbors from the control group.

Happily, the matching results mostly confirm those from more conventional estimation techniques. Net capital flows are higher for inflation targeters, as is the change in investment freedom. The evidence on output effects is weak, statistically significant only for the most unreliable de-trending technique. Both hard fixers and inflation targeters experience lower inflation and more depreciated real exchange rates.   A few of the asset price results are different (there is no longer a significant effect on stock markets, but bond yields seem lower for both inflation targeters and hard fixers).

Summary

On the whole, all three statistical techniques deliver similar results. One of these results is of particular interest: there is rarely any significant difference on the variables I examine between the effects of inflation targeting and hard fixes. There are three exceptions: net capital flows, the change in investment freedom, and stock prices (though none of the differences is statistically significant for matching estimation). This is a striking result that essentially runs throughout the statistical analysis. It seems, initially, to be implausible; after all, these monetary regimes differ radically. Hard fixers have

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severely limited monetary autonomy, while inflation targeters are not directly constrained by the exchange rate. Hard fixers with open capital markets would seem to have substantially less ability than inflation targeters to insulate themselves from the spillover effects of foreign capital flows. Still, this finding is actually quite consistent with the literature, which has been unable to find strong effects of the monetary (or, more commonly, the exchange rate) regime on much. Rey (2013, pp19-20) has recently written (italics added):

> "… analyses suggest monetary conditions are transmitted from the main financial centre to the rest of the world through gross credit flows and leverage, *irrespective of the exchange rate regime*. This puts the traditional "trilemma" view of the open economy into question. *Fluctuating exchange rates cannot insulate economies from the global financial cycle*, when capital is mobile."[36]

The notion that the monetary regime matters surprisingly little is not new; see e.g., the recent book by Klein and Shambaugh (2010) and references therein.[37] The abstract of Baxter and Stockman (1989) includes "Aside from greater variability of real exchange rates under flexible than under pegged nominal exchange-rate systems, we find little evidence of systematic differences in the behavior of macroeconomic aggregates or international trade flows under alternative exchange-rate systems."[38] While an absence of any large detectable differences across monetary regimes might seem bizarre to a monetary economist, it is almost folk wisdom inside international finance.

To summarize: small economies that float with an inflation target have, in many respects, behaved similarly to hard fixers over the post-bubble period. This might be an artifact of the econometric methodology I have employed (though I have used a few), or of the size of the data set (though there are over 160 countries in the sample). But that seems unlikely. The literature has been unable to find many significant differences across monetary regimes; perhaps there simply are few. It seems that the tradeoffs between hard fixers and inflation targeters lie more in the operation of monetary policy than in their manifestations in real economic outcomes.

I conclude that small economies interested in stable monetary regimes now have a real alternative to a hard fix. Floating with an inflation target seems to have few quantifiable macroeconomic or financial tradeoffs for small economies compared to a hard fix, and is at least as durable.[39]

7. Conclusion

Bulgaria is a small open emerging market, with membership in the EU, reasonable and improving institutions and GDP per capita of around $12,000. Its neighbor Romania is roughly comparable in size, income, institutions, and openness. Bulgaria prides itself on having rigorously maintained a fixed nominal exchange rate since 1997 through its currency board arrangement. Romania, on the other hand has operated an inflation targeting regime with a flexible exchange rate since 2005. Manifestly, similar economies choose different approaches to monetary policy. Denmark has stayed fixed to the Euro (earlier, the Deutschemark) at the same rate since 1987; Sweden has changed its regime a number of times since then, and installed an inflation targeting regime with a flexible exchange rate in 1993. Yet Denmark and Sweden are broadly comparable in size, income, institutions, and openness. The examples are legion: Ecuador, El Salvador, Cote d'Ivoire and Bosnia-Herzegovina are hard fixers while their neighbors Colombia, Guatemala, Ghana and Albania are similar in many respects but target inflation. Roughly similar countries are happy to maintain radically different monetary regimes. In this paper, I have found that this decision has been of little consequence for a variety of economic phenomena, at least lately. Growth, the output gap, inflation, and a host of other phenomena have been similar for hard fixers and inflation targeters in the period of and since the global financial crisis. That is, the "insulation value" of apparently different monetary regimes is similar in practice. Since the international finance literature has found few substantive macroeconomic

differences across monetary regimes, I expect this result to be banal for some. Since this stylized fact is

not well known outside international economics, I expect it to seem implausible to others.

For small economies interested in monetary stability, there are now two options: a hard

exchange rate fix and inflation targeting. The alternative to the rigors of a hard fix used to be limited,

essentially consisting of muddling along in a 'sloppy center' of crawling bands, adjustable pegs,

monetary targets, and/or considerable discretion. But two monetary regimes have withstood the rigors

of the Global Financial Crisis and its aftermath. The fact that the constrained discretion of inflation

targeting poses no quantifiable tradeoff vis-à-vis a hard fix is a theoretical puzzle but is quite consistent

with the literature.

It is natural to think that a big shock – like the Global Financial Crisis and the Great Recession –

will put the system to the test and reveal which is the best monetary regime. We've now had the big

shock and it appears that now – as opposed to the Great Depression or the early 1970s – the current

system can indeed survive a serious crisis. That said, the shock has not provided any clear guidance as

to which monetary regime is preferable for small economies; the experiences of countries in hard fixes

during and after the GFC have been similar to those of inflation targeters.

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Table 1: Large Economies: IMF *De Facto* Classification

	China	Euro	Japan	UK	USA
2001-12		Floating, Other	Floating, Other	Inflation Target Float	Floating, Other
2001-06	Conventional Peg (US$)				
2007-08	Crawling Peg (US$)				
2009-10	Stabilized Arrangement (US$)				
2011-12	Crawl-Like Arrangement, Monetary Target				

Table 2: Small Economies Split by Monetary Regime, 2006-12

Inflation Targeting continuously between 2006 and 2012 (25)

Armenia	Australia	Brazil	Canada	Chile
Colombia	Czech Republic	Guatemala	Hungary	Iceland
Indonesia	Israel	Korea, Rep.	Mexico	New Zealand
Norway	Peru	Philippines	Poland	Romania
South Africa	Sweden	Switzerland	Thailand	Turkey

Inflation Targeter in 2006, exited by 2012 (1)

	2012 Regime
Slovak Republic	Euro

Hard Fixers continuously between 2006 and 2012 (60)

Antigua & Barb.	Aruba	Bahamas	Bahrain	Barbados
Belize	Benin	Bhutan	Bosnia & Herzeg.	Brunei
Bulgaria	Burkina Faso	Cameroon	Cape Verde	Cen. African Rep.
Chad	Comoros	Congo, Rep.	Cote d'Ivoire	Denmark
Djibouti	Dominica	Ecuador	El Salvador	Equatorial Guinea
Eritrea	Fiji	Gabon	Grenada	Guinea-Bissau
Hong Kong	Jordan	Kiribati	Latvia	Lesotho
Libya	Lithuania	Mali	Marshall Islands	Micronesia
Montenegro	Morocco	Namibia	Nepal	Niger
Oman	Palau	Panama	Qatar	Samoa
San Marino	Saudi Arabia	Senegal	St. Kitts and Nevis	St. Lucia
St. Vinc. & Gren.	Swaziland	Timor-Leste	Togo	United Arab Emir.

Hard Fixers in both 2006 and 2012, but not in between continuously (3)

Kuwait	Turkmenistan	Venezuela

Hard Fixers in 2006 that had left by 2012 (20)

	2012 Regime			2012 Regime
Azerbaijan	Float, Other		Mauritania	Float, Other
Belarus	Float, Other		Pakistan	Float, Mon Targ
Cyprus	Euro		Seychelles	Float, Mon Targ
Egypt	Float, Other		Slovenia	Euro
Estonia	Euro		Solomon Islands	Float, Other
Honduras	Soft Fix		Syria	Soft Fix
Lebanon	Soft Fix		Trinidad & Tobago	Soft Fix
Macedonia	Soft Fix		Ukraine	Float, Mon Targ
Maldives	Soft Fix		Vanuatu	Soft Fix
Malta	Euro		Vietnam	Soft Fix

Sloppy Center continuously between 2006 and 2012 (32)

Afghanistan	Algeria*	Botswana	Burundi*	Cambodia*
Congo, Dem Rep.*	Costa Rica*	Gambia, The	Guinea*	Haiti*
India	Iraq*	Jamaica*	Kenya	Kyrgyz Republic*
Lao PDR*	Liberia*	Madagascar	Malaysia	Mauritius*
Mozambique	Myanmar*	Nicaragua	Pap. New Guinea*	Paraguay*
Singapore*	Somalia	Sudan*	Tanzania	Tonga
Uganda	Zambia			

* indicates switched IMF *de facto* monetary regime between 2006 and 2012.

Sloppy Center in both 2006 and 2012, but not in between continuously (21)

Angola	Argentina	Bangladesh	Bolivia	Croatia
Ethiopia	Guyana	Iran	Kazakhstan	Malawi
Mongolia	Nigeria	Russia	Rwanda	Sierra Leone
Sri Lanka	Suriname	Tajikistan	Tunisia	Uzbekistan
Yemen				

Sloppy Center in 2006 that had left by 2012 (9)

	2012 Regime
Albania	Inflation Target
Dominican Repub.	Inflation Target
Georgia	Inflation Target
Ghana	Inflation Target
Moldova	Inflation Target

Sao Tome and Principe	Hard Fix
Serbia	Inflation Target
Uruguay	Inflation Target
Zimbabwe	Hard Fix

Table 3: Monetary Regime Changes: Small Economies in the Sloppy Center

	# Shifts in IMF *De Facto* Monetary Regime	Global Real GDP Growth
2002	27	2.9
2003	8	3.7
2004	7	5.0
2005	9	4.6
2006	7	5.3
2007	11	5.4
2008	28	2.8
2009	37	-0.6
2010	7	5.2
2011	21	4.0
2012	8	3.2

Correlation Coefficient = -.84

Table 4: Durability of Monetary Regimes, Small Economies

Monetary Regime in 2012	--- Monetary Regime in 2006 ---		
	Inflation Targeting (26)	Hard Fix (83)	Sloppy Center (62)
Inflation Targeting	25	0	7
Hard Fix	0	63[1]	2
Sloppy Center	0	16	53[2]
EMU Entrants	1	4	0
% continuously in same regime since 2006	96%	72%	23%
(% 2011 Global GDP)	20%	4%	7%

Excludes China, EMU, Japan, UK, USA

Table 5: Durability of Monetary Regimes, Small Economies: Historical Evidence

	All Countries	Fixers
% continuously in same Reinhart-Rogoff regime, 1970-76	55%	59%
(% 1976 Global GDP)	12.3%	6.4%

	All Countries	Fixers
% continuously in same Reinhart-Rogoff regime, 1980-86	60%	75%
(% 1986 Global GDP)	28.4%	3.3%

	All Countries	Fixers
% continuously in same Levy-Yeyati-Sturzenegger regime, 1980-86	53%	58%
(% 1986 Global GDP)	9.1%	9.1%

Excludes Germany, Japan, UK, USA

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[1] Three of these countries both started and ended in hard fixes but strayed in between 2006 and 2012. The Netherlands Antilles exited the sample upon its split.

[2] 21 of these countries both started and ended in the sloppy center but strayed in between 2006 and 2012. Of the 32 countries that remained continuously in the sloppy center, 18 changed their *de facto* IMF Monetary Arrangement, leaving only 14 in the same monetary regime throughout.

Table 6: Cyclicality of Monetary Regimes

Monetary/Exchange Rate Regime Measure (sample)	---------------------Business Cycle De-Trending Technique-------------------					
	GDP: Hodrick-Prescott	GDP: Baxter-King	GDP: Christiano-Fitzgerald	GDP Growth Rates	GDP: Linear Time Trend	Unemp. Rate
Stone and Bhundia (1990-2005)	-14.9** (4.0)	-16.7** (4.2)	-12.9** (4.0)	-.04 (.02)	-5.3** (1.7)	.13* (.05)
Levy-Yeyati and Sturzenegger (1974-2004)	-1.6 (1.2)	-2.0 (1.2)	-2.1 (1.2)	-.01 (.01)	-1.4** (.4)	.04 (.03)
Reinhart and Rogoff (1970-2006)	-1.7 (1.1)	-1.9 (1.1)	-2.0 (1.1)	-.003 (.007)	-1.1** (.4)	.07* (.03)

Coefficients displayed are those on deviation from trend of log real GDP, detrended as shown in column headers. Each cell is taken from a different panel logit regression with fixed time and country effects; the regressand is a dummy variable, one for change in monetary/exchange rate regime, zero otherwise. Standard errors in parentheses; coefficients significantly different from zero at .05 (.01) marked with one (two) asterisk(s).

Table 7: Characteristics Across Monetary Regimes: Univariate Evidence

Averages:	Sloppy Center	Hard Fix	Inflation Target	Hard Fix = Inflation Target (t-test)
Log Population	16.5	15.5	16.6	-8.3**
Log Real GDP p/c	8.9	9.4	9.7	-4.6**
Polity	5.7	3.1	9.4	-10.1**
Trade %GDP	84.5	88.8	68.7	5.0**
Chinn-Ito Capital Openness	.4	.7	1.3	-4.3**
Investment Freedom, EFW	59.8	57.4	66.4	-5.2**
Financial Freedom, EFW	52.9	57.5	66.5	-4.8**
M2 %GDP	52.6	59.9	67.3	-2.1*
Domestic Credit % GDP	198.8	186.5	90.9	1.0

Stone-Bhundia classification of monetary regime. 76 small economies, 1990-2005.

Table 8: Determinants of Monetary Regimes: Multivariate Evidence

Coefficient Estimates: Hard Fix

Log Population	-.33*	-.50**	-.58**	-.53**	-.60**	-.48**
	(.14)	(.16)	(.18)	(.19)	(.17)	(.16)
Log Real GDP p/c	.52	.68*	.33	.33	.30	.59
	(.34)	(.32)	(.36)	(.36)	(.32)	(.32)
Polity	-.07*	-.09**	-.07	-.09*	-.10**	-.09**
	(.04)	(.03)	(.04)	(.04)	(.03)	(.03)
Trade %GDP		-.01	-.007	-.008	-.008	-.009
		(.01)	(.005)	(.005)	(.006)	(.005)
Chinn-Ito Capital Openness		-.04				
		(.13)				
Investment Freedom, EFW			-.01			
			(.01)			
Financial Freedom, EFW				.01		
				(.01)		
M2 %GDP					.00	
					(.01)	
Dom Cred % GDP						-.00006
						(.00004)

Coefficient Estimates: Inflation Target

Log Population	.60*	.50	.92**	.87**	.77*	.51
	(.26)	(.33)	(.33)	(.30)	(.36)	(.33)
Log Real GDP p/c	.86*	.79*	.75*	.63	.96*	.95**
	(.37)	(.35)	(.38)	(.41)	(.39)	(.37)
Polity	.67**	.63**	.98**	.95**	.88**	.66**
	(.22)	(.22)	(.29)	(.27)	(.30)	(.22)
Trade %GDP		-.01	-.006	-.01	-.01	-.003
		(.01)	(.008)	(.01)	(.01)	(.009)
Chinn-Ito Capital Openness		.17				
		(.18)				
Investment Freedom, EW			.03			
			(.02)			
Financial Freedom, EFW				.03		
				(.02)		
M2 %GDP					.01	
					(.01)	
Dom Cred % GDP						-.0006
						(.0008)

P-Values for Hypothesis Tests

Population=0	.00**	.00**	.00**	.00**	.00**	.00**
Income=0	.06	.03*	.14**	.29	.05*	.03*
Polity=0	.00**	.00**	.00**	.00**	.00**	.00**
Trade=0		.24	.27	.22	.38	.25
Fin'l Openness=0		.56	.37	.28	.75	.20
Both Openness=0		.37	.34	.34	.59	.15
Fix=IT	.00**	.02*	.00**	.00**	.00**	.01*

Diagnostics

Observations	1108	1043	713	713	998	1074
Pseudo R^2	.18	.20	.25	.25	.25	.19

Coefficients/tests displayed represent deviations from sloppy center. Robust standard errors in parentheses (clustered by country); coefficients significantly different from zero at .05 (.01) marked with one (two) asterisk(s). Each column estimated via multinomial logit; intercepts included but not recorded, Regressand derived from Stone-Bhundia measure of monetary regime. 76 small economies, 1990-2005.

Table 9: Effects of Monetary Regimes 2007-12: Regression Evidence

Regressand	Inflation Targeting	Hard Fix	IT = H Fix? (P-value)	IT = H Fix = 0? (P-value)
BK-Filtered GDP	.006 (.004)	-.003 (.004)	.04*	.10
HP-Filtered GDP	-.002 (.001)	-.004* (.001)	.13	.04*
CF-Filtered GDP	-.02 (.02)	-.00 (.04)	.77	.76
Demeaned Growth	-1.9* (.8)	-1.4 (.8)	.56	.04*
Time-Detrended GDP	-.04 (.03)	-.08** (.02)	.16	.01**
Gross Capital Inflows	3.2 (3.2)	-4.1 (6.4)	.90	.57
Gross Capital Outflows	-.0 (3.2)	-3.2 (6.7)	.61	.87
Net Capital Flows	3.2 (1.9)	.8 (1.6)	.03*	.09
Std Dev Capital Inflows (c/s)	5.5 (4.2)	5.5 (6.9)	1.0	.38
Std Dev Capital Outflows (c/s)	5.1 (4.2)	7.0 (7.4)	.82	.36
Current Account	1.6 (1.4)	3.4 (5.5)	.73	.49
Export Growth	.01 (.01)	.00 (.01)	.70	.85
Import Growth	-.00 (.01)	.00 (.01)	.76	.94
Chinn-Ito Capital Mobility	-.1 (.4)	-.5 (.3)	.41	.24
Financial Freedom Change	.01 (.01)	.00 (.01)	.16	.16
Investment Freedom Change	.03** (.01)	.01 (.01)	.01**	.01**
M2 Growth (%GDP)	-.01 (.01)	.00 (.01)	.18	.41
International Reserve Growth	-.4 (.4)	-.5 (.4)	.26	.44
Government Budget	.3 (.8)	.7 (.9)	.70	.74
Change in Budget	.5 (.7)	-.4 (.5)	.30	.57

Coefficients displayed for monetary regime dummy variables on regressand; default regime is sloppy center. Standard errors in parentheses; coefficients significantly different from zero at .05 (.01) marked with one (two) asterisk(s). Each row estimated by panel least squares estimation with fixed time and random country effects (except for cross-sections). Annual data spanning 2007-2012, 167 countries (with gaps).

Table 10: Effects of Monetary Regimes 2007-12: Regression Evidence

Regressand	Inflation Targeting	Hard Fix	IT = H Fix? (P-value)	IT = H Fix = 0? (P-value)
CPI Inflation	-4.4** (.7)	-5.2** (.6)	.15	.00**
GDP Inflation	-4.7** (.8)	-5.2** (.7)	.41	.00**
Real Effective Exchange Rate	-15.0 (9.8)	-20.1* (9.6)	.13	.05*
Change in Real Effect Exchange Rate	-3.9 (3.4)	-5.4 (3.5)	.06	.07
Growth in Stock Prices	-4.5 (3.5)	-11.8** (3.3)	.01**	.00**
Bond Yields	-1.0 (.8)	-1.0 (1.0)	.96	.43
Growth in Property Prices	2.3 (4.8)	-1.1 (5.1)	.35	.63

Coefficients displayed for monetary regime dummy variables on regressand; default regime is sloppy center. Standard errors in parentheses; coefficients significantly different from zero at .05 (.01) marked with one (two) asterisk(s). Each row estimated by panel least squares estimation with fixed time and random country effects (except for cross-sections). Annual data spanning 2007-2012, 78 countries (with gaps).

Table 11: Effects of Monetary Regimes 2007-12: Instrumental Variables

Regressand	Inflation Targeting	Hard Fix	IT = H Fix? (P-value)	IT = H Fix = 0? (P-value)
BK-Filtered GDP	.06* (.03)	.0 (.03)	.89	.13
HP-Filtered GDP	.01 (.02)	.01 (.02)	.87	.82
CF-Filtered GDP	.06 (.62)	-.18 (.39)	.45	.42
Demeaned Growth	.94 (3.3)	2.0 (3.6)	.55	.78
Time-Detrended GDP	-.04 (.08)	-.01 (.08)	.34	.58
Gross Capital Inflows	9.8 (.6)	-18. (15.)	.06	.14
Gross Capital Outflows	1.6 (6.8)	6.9 (12.)	.64	.84
Net Capital Flows	10. (9.0)	-12. (12.)	.04*	.11
Std Dev Capital Inflows (c/s)	7.3 (9.9)	6.5 (18.)	.97	.75
Std Dev Capital Outflows (c/s)	3.5 (11.)	13. (19.)	.64	.79
Current Account	-17. (16.)	-5.2 (19.)	.17	.21
Export Growth	-.02 (.04)	-.04 (.05)	.44	.59
Import Growth	.00 (.04)	-.01 (.05)	.52	.81
Chinn-Ito Capital Mobility	25. (51.)	11. (24.)	.64	.88
Financial Freedom Change	-.05 (.05)	-.09 (.06)	.17	.26
Investment Freedom Change	.21* (.08)	.14 (.09)	.08	.01*
M2 Growth (%GDP)	-.01 (.06)	.03 (.05)	.06	.15
International Reserve Growth	-2.1 (2.7)	-1.4 (2.7)	.57	.67
Government Budget	-4.9 (4.6)	2.7 (6.0)	.01**	.00**
Change in Budget	1.2 (2.5)	-1.2 (3.9)	.27	.32

Coefficients displayed for monetary regime dummy variables on regressand; default regime is sloppy center. Standard errors in parentheses; coefficients significantly different from zero at .05 (.01) marked with one (two) asterisk(s). Each row estimated by panel least squares estimation with fixed time and random country effects (except for cross-sections). Instrumental variables: polity and log population. Annual data spanning 2007-2012, 167 countries (with gaps).

Table 12: Effects of Monetary Regimes 2007-12: Instrumental Variables

Regressand	Inflation Targeting	Hard Fix	IT = H Fix? (P-value)	IT = H Fix = 0? (P-value)
CPI Inflation	-14.** (4.9)	-15.** (4.9)	.57	.01**
GDP Inflation	-16.** (6.1)	-17.6** (6.3)	.70	.02*
Real Effective Exchange Rate	-924. (2946.)	-867. (2888)	.85	.95
Change in Real Effect Exchange Rate	-131. (487.)	-147. (504.)	.67	.91
Growth in Stock Prices	-30. (25.)	-52. (31.)	.04*	.10
Bond Yields	-10. (10.)	-16. (18.)	.51	.59
Growth in Property Prices	-17. (48.)	-36. (59.)	.23	.42

Coefficients displayed for monetary regime dummy variables on regressand; default regime is sloppy center. Standard errors in parentheses; coefficients significantly different from zero at .05 (.01) marked with one (two) asterisk(s). Each row estimated by panel least squares estimation with fixed time and random country effects (except for cross-sections). Instrumental variables: polity and log population. Annual data spanning 2007-2012, 78 countries (with gaps).

Table 13: Effects of Monetary Regimes 2007-12: Evidence from Matching Estimation

Regressand	IT (treat) vs. SC (control)	HF (treat) vs. SC (control)	IT (treat) vs. HF (control)	IT or HF (treat) vs. SC (control)
BK-Filtered GDP	-..001 (.004)	.003 (.005)	-.005 (.004)	.001 (.004)
HP-Filtered GDP	-.001 (.005)	.003 (.006)	-.007 (.006)	-.000 (.005)
CF-Filtered GDP	-.04 (.04)	.01 (.04)	-.04 (.04)	-.03 (.03)
Demeaned Growth	-1.1 (.8)	-.4 (1.0)	-1.1 (1.1)	-.9 (.7)
Time-Detrended GDP	-.06** (.02)	-.06** (.02)	-.01 (.02)	-.07** (.02)
Gross Capital Inflows	3.9 (2.8)	3.8 (4.2)	1.6 (4.1)	3.6 (2.8)
Gross Capital Outflows	.9 (2.9)	-1.2 (4.8)	.3 (4.1)	.8 (3.0)
Net Capital Flows	4.8** (1.5)	2.5 (1.9)	1.9 (1.3)	4.5** (1.5)
Std Dev Capital Inflows (c/s)	5.0 (5.8)	4.3 (6.3)	-.5 (7.4)	4.7 (5.4)
Std Dev Capital Outflows (c/s)	5.2 (6.0)	5.9 (6.6)	-1.9 (7.9)	5.3 (5.5)
Current Account	-.6 (1.1)	-3.7* (1.7)	2.6 (1.3)	-1.7 (1.2)
Export Growth	.01 (.01)	.02 (.02)	.01 (.01)	.01 (.01)
Import Growth	.02 (.01)	.02 (.02)	-.00 (.02)	.02 (.01)
Chinn-Ito Capital Mobility	.8** (.2)	.6** (.2)	.1 (.2)	.8** (.2)
Financial Freedom Change	.02 (.02)	.00 (.02)	.01 (.01)	.01 (.01)
Investment Freedom Change	.05** (.02)	.03 (.02)	-.01 (.02)	.03 (.02)
M2 Growth (%GDP)	-.00 (.01)	.01 (.01)	-.01 (.01)	-.00 (.01)
International Reserve Growth	.03 (.03)	-.00 (.04)	.02 (.04)	.02 (.03)
Government Budget	.3 (.6)	.4 (.7)	.1 (.7)	.4 (.5)
Change in Budget	.2 (.9)	-.2 (.9)	.5 (1.1)	.04 (.8)

Coefficients displayed for average treatment effect of "treatment" monetary regime compared to "control" monetary regime on regressand. Standard errors in parentheses; coefficients significantly different from zero at .05 (.01) marked with one (two) asterisk(s). Nearest neighbor matching (five matches) on government size (% GDP) and unemployment rate. Annual data spanning 2007-2012, 167 countries (with gaps).

Table 14: Effects of Monetary Regimes 2007-12: Evidence from Matching Estimation

Regressand	IT (treat) vs. SC (control)	HF (treat) vs. SC (control)	IT (treat) vs. HF (control)	IT or HF (treat) vs. SC (control)
CPI Inflation	-3.9**	-3.7**	-.2	-3.9**
	(.6)	(.8)	(.5)	(.6)
GDP Inflation	-3.6**	-4.3**	.7	-3.9**
	(.8)	(1.1)	(8)	(.8)
Real Effective Exchange Rate	-7.0*	-13.5**	4.9	-9.6**
	(2.8)	(3.6)	(2.6)	(2.6)
Change in Real Effect Exchange Rate	.4	-3.1*	1.9	-.8
	(1.3)	(1.4)	(1.3)	(1.2)
Growth in Stock Prices	-6.2	-12.9	7.2	-8.9
	(6.7)	(8.6)	(6.3)	(6.7)
Bond Yields	-1.9**	-1.9*	-.0	-1.8**
	(.7)	(.9)	(.5)	(.7)
Growth in Property Prices	3.7	2.1	2.8	3.0
	(5.3)	(6.0)	(5.0)	(5.2)

Coefficients displayed for average treatment effect of "treatment" monetary regime compared to "control" monetary regime on regressand. Standard errors in parentheses; coefficients significantly different from zero at .05 (.01) marked with one (two) asterisk(s). Nearest neighbor matching (five matches) on government size (% GDP) and unemployment rate. Annual data spanning 2007-2012, 78 countries (with gaps).

Figure 1: Monetary Regimes by the Numbers: Counting Countries

Grouping Small Economies by Monetary Regime
Large Economies excluded: China, EMU, Japan, UK, and US
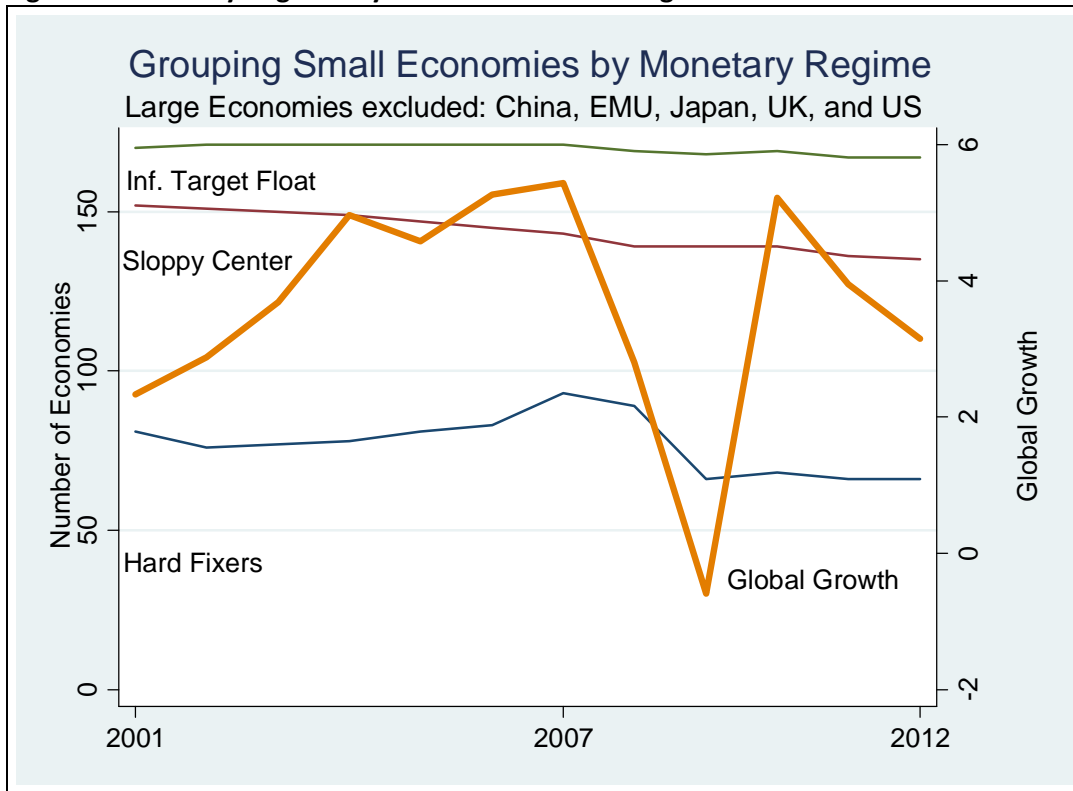
Figure 2: Monetary Regimes by the Numbers: Sizing Up the Economies

Global GDP of Small Economies by Monetary Regime
Large Economies excluded: China, EMU, Japan, UK, and US
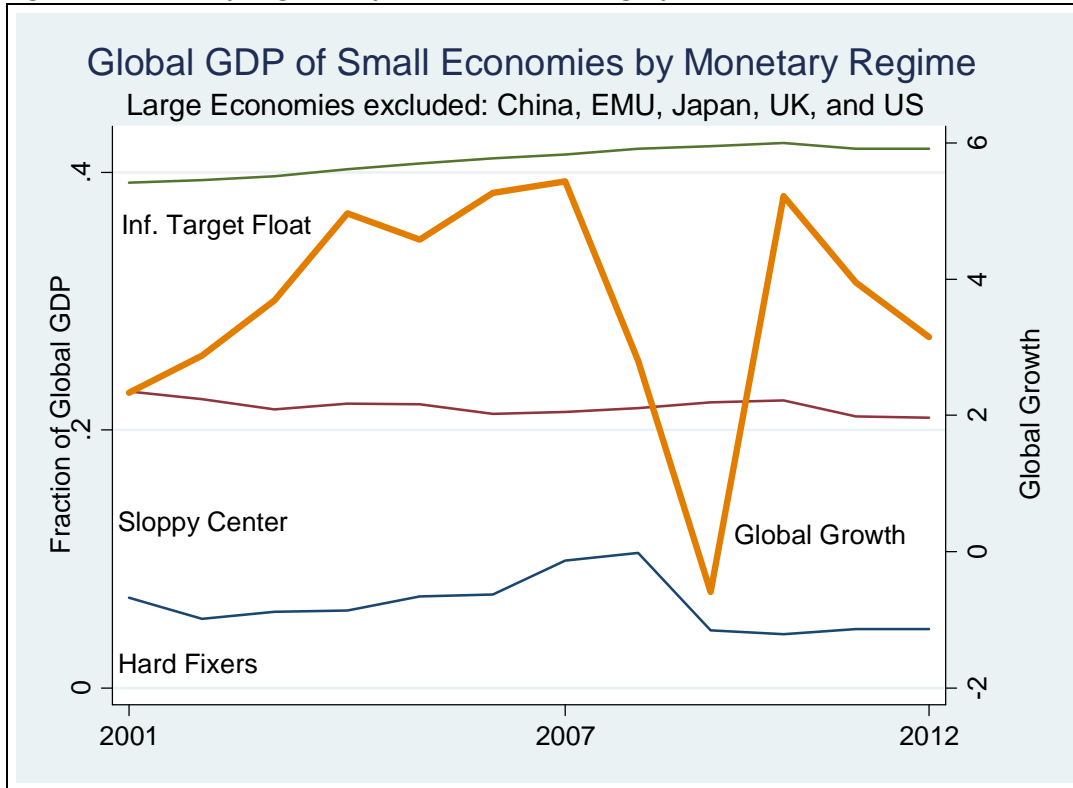
Quantile Plots for Small Economies, 2011

Log Real GDP p/c

Log Population

Polity

Trade, %GDP
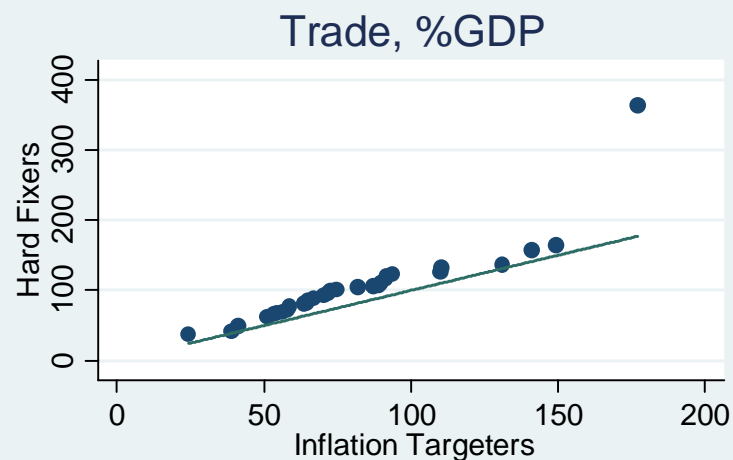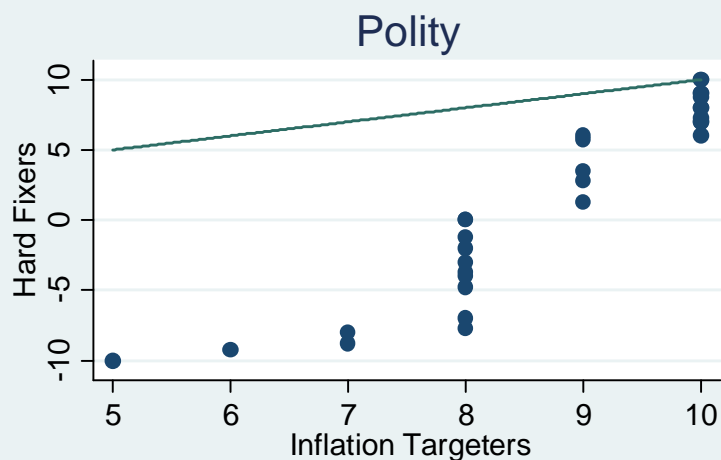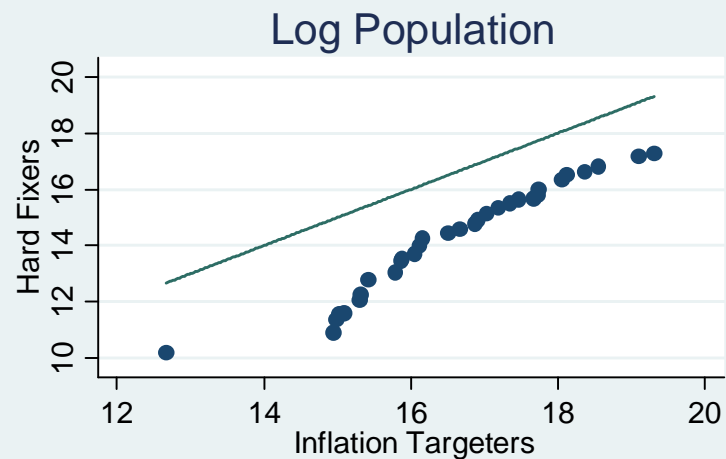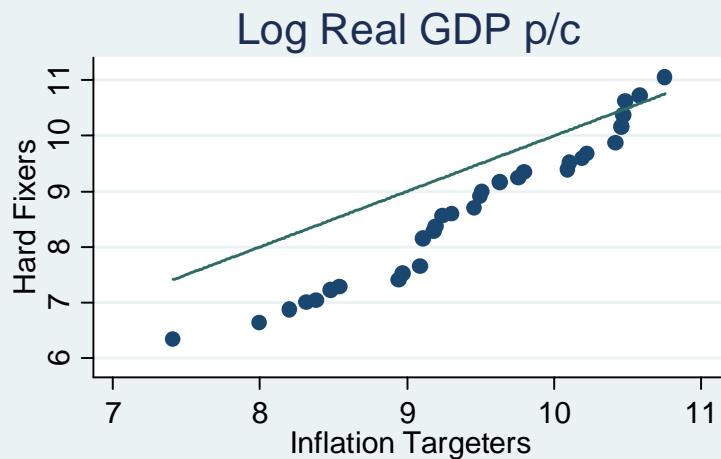
Figure 4: Key Differences Across Monetary Regimes

Quantile Plots for Small Economies, 2007-2012
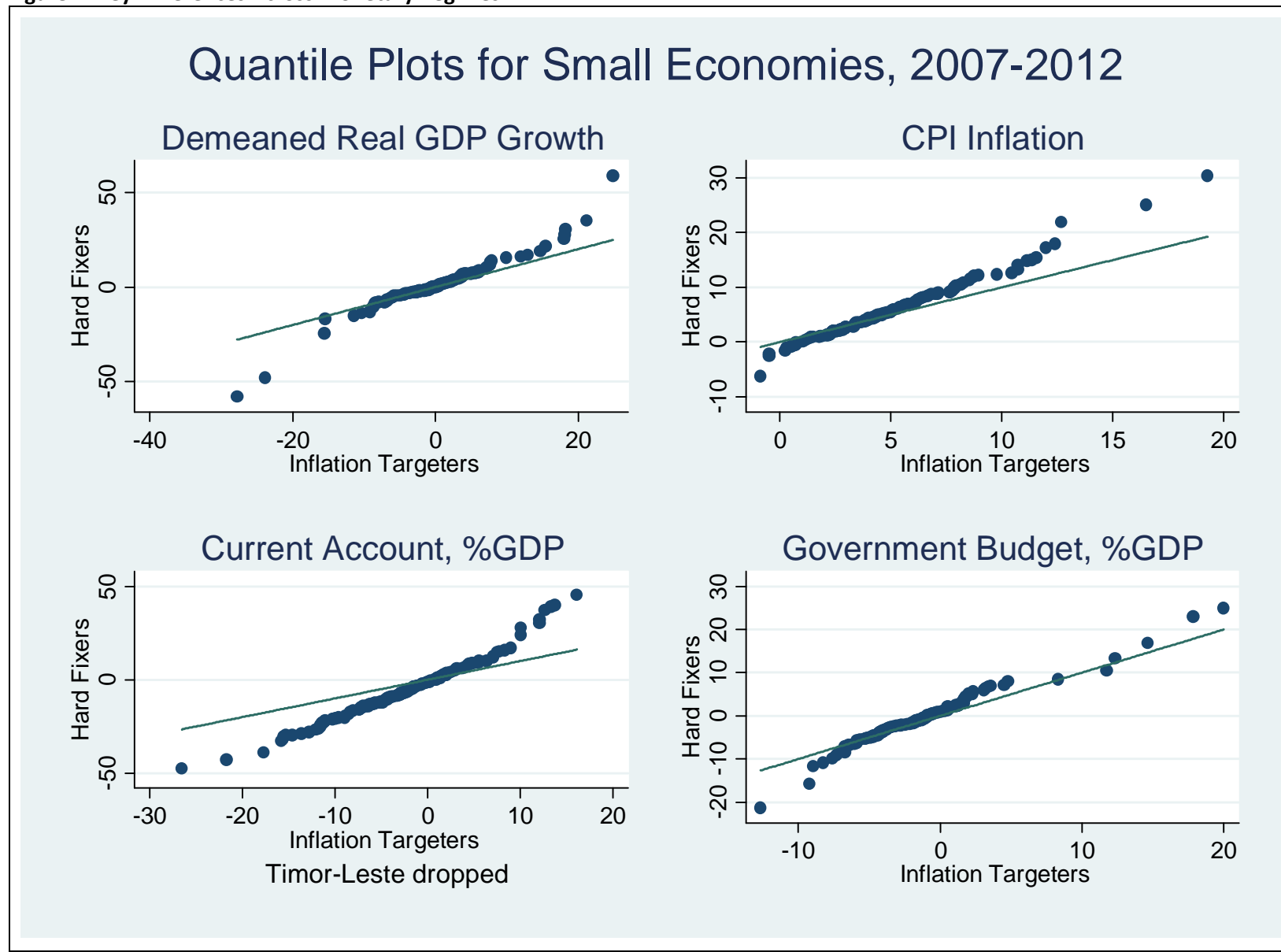
Figure 5: Key Differences Across Monetary Regimes
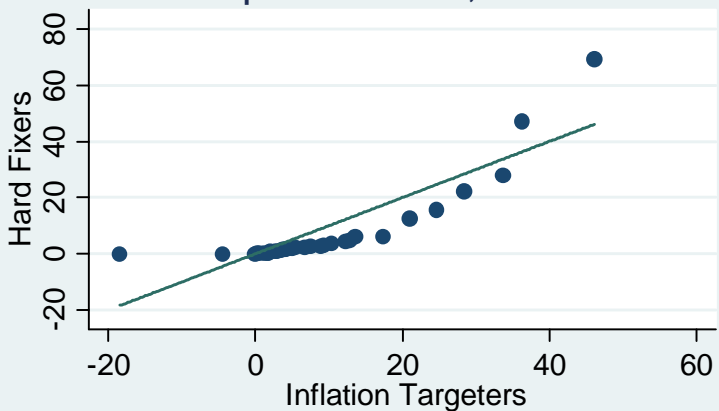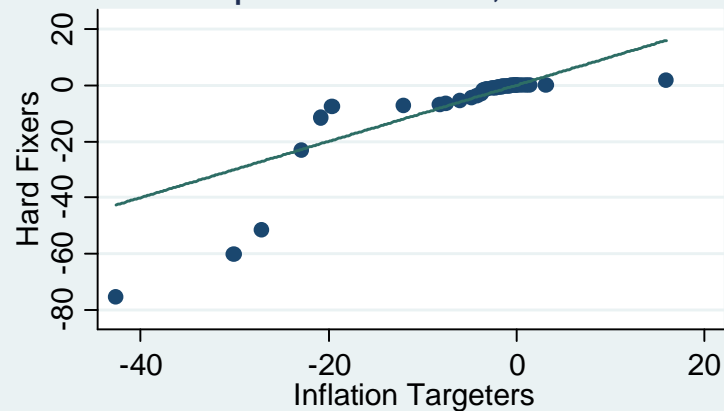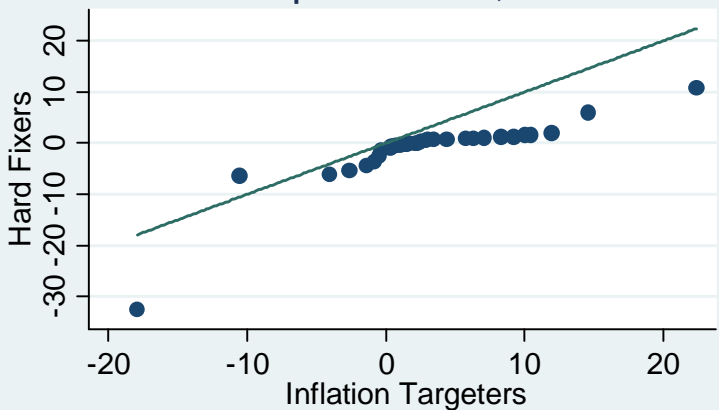
Quantile Plots for Small Economies, 2007-2012
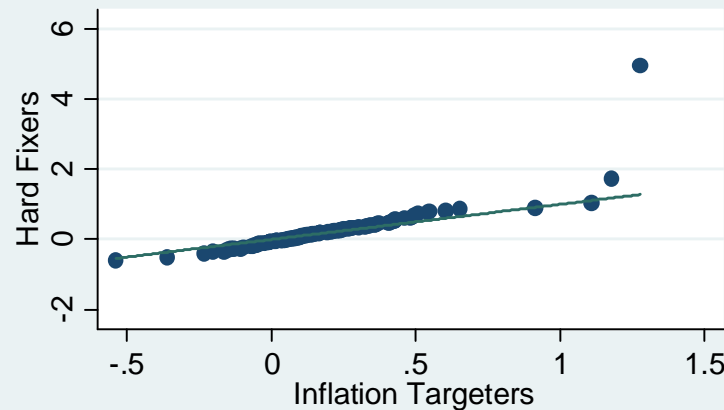
Figure 6: Key Differences Across Monetary Regimes

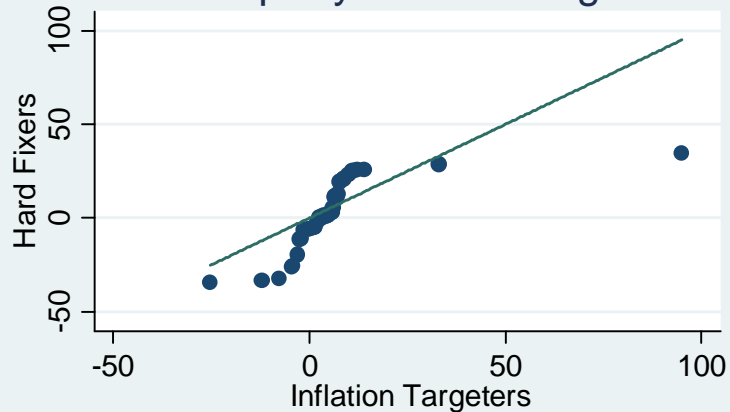Quantile Plots for Small Economies, 2007-2012
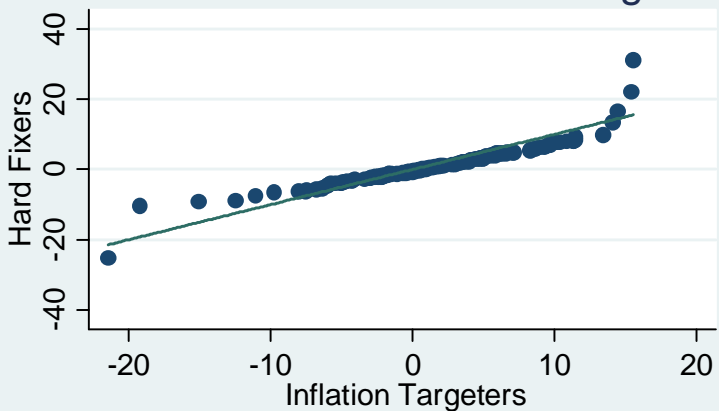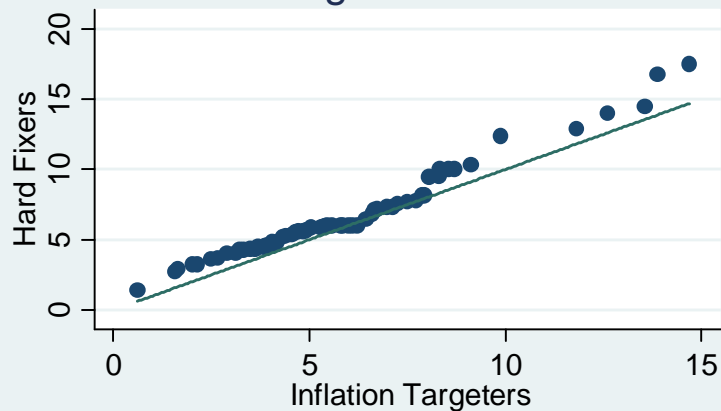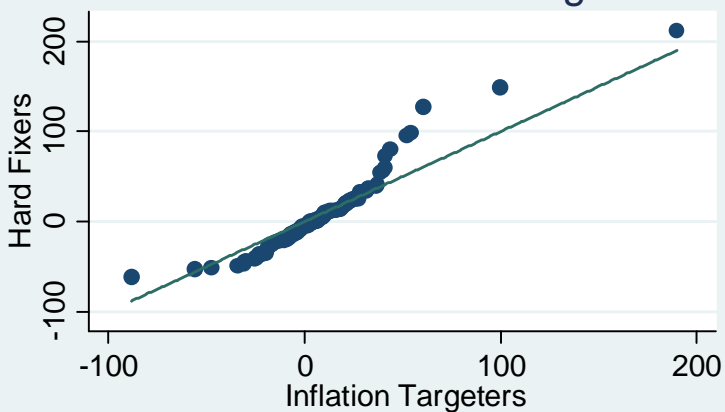
Table A1: Effects of Monetary Regimes 2007-12: Regression Evidence Without Conventional Pegs

Regressand	Inflation Targeting	Hard Fix	IT = H Fix? (P-value)	IT = H Fix = 0? (P-value)
BK-Filtered GDP	.007 (.004)	.008 (.006)	.92	.15
HP-Filtered GDP	-.001 (.001)	-.001 (.002)	.96	.77
CF-Filtered GDP	-.01 (.02)	-.07 (.05)	.30	.42
Demeaned Growth	-1.8* (.9)	-2.8* (1.4)	.46	.04*
Time-Detrended GDP	-.04 (.03)	-.14** (.03)	.00**	.00**
Gross Capital Inflows	3.3 (3.4)	6.3 (9.8)	.75	.57
Gross Capital Outflows	-1.2 (2.9)	-7.0 (9.9)	.55	.75
Net Capital Flows	2.1 (2.0)	-.7 (1.7)	.02*	.06
Std Dev Capital Inflows (c/s)	5.2 (4.4)	7.1 (10.5)	.86	.44
Std Dev Capital Outflows (c/s)	5.3 (4.3)	9.1 (11.3)	.74	.38
Current Account	1.3 (1.4)	7.4 (14.1)	.66	.59
Export Growth	.01 (.01)	.01 (.01)	.78	.67
Import Growth	-.00 (.01)	.00 (.01)	.87	.99
Chinn-Ito Capital Mobility	-.09 (.41)	.63 (.37)	.11	.16
Financial Freedom Change	.01 (.01)	-.01 (.01)	.00**	.01**
Investment Freedom Change	.03** (.01)	.02 (.02)	.47	.03*
M2 Growth (%GDP)	-.01 (.01)	-.01 (.01)	.62	.32
International Reserve Growth	-.55 (.48)	-.64 (.52)	.13	.31
Government Budget	.34 (.70)	.43 (1.1)	.87	.83
Change in Budget	.49 (.74)	.51 (1.0)	.99	.75

Coefficients displayed for monetary regime dummy variables on regressand; default regime is sloppy center. Standard errors in parentheses; coefficients significantly different from zero at .05 (.01) marked with one (two) asterisk(s). Each row estimated by panel least squares estimation with fixed time and random country effects (except for cross-sections). Annual data spanning 2007-2012, 167 countries (with gaps).

Table A2: Effects of Monetary Regimes 2007-12: Regression Evidence Without Conventional Pegs

Regressand	Inflation Targeting	Hard Fix	IT = H Fix? (P-value)	IT = H Fix = 0? (P-value)
CPI Inflation	-4.2** (.7)	-5.3** (.7)	.09	.00**
GDP Inflation	-3.9** (.8)	-6.1** (.7)	.00**	.00**
Real Effective Exchange Rate	-14. (9.)	-19.* (10.)	.31	.12
Change in Real Effect Exchange Rate	-4.4 (3.1)	-4.9 (3.3)	.58	.32
Growth in Stock Prices	-2.7 (3.1)	-9.6** (3.6)	.06	.03*
Bond Yields	.77 (.71)	-.72 (.89)	.94	.55
Growth in Property Prices	3.6 (4.8)	3.2 (6.6)	.94	.75

Coefficients displayed for monetary regime dummy variables on regressand; default regime is sloppy center. Standard errors in parentheses; coefficients significantly different from zero at .05 (.01) marked with one (two) asterisk(s). Each row estimated by panel least squares estimation with fixed time and random country effects (except for cross-sections). Annual data spanning 2007-2012, 78 countries (with gaps).

Endnotes

[1] Except to enter EMU; more on that caveat below.

[2] This is consistent with much of the analysis in Reichlin and Baldwin (2013) who write " 'Flexible inflation targeting has survived the test of a major financial crisis well' writes Charles Wyplosz summing up a view broadly held by the authors."

[3] As Svensson (2010) argues "… financial-stability policy and monetary policy are quite different, with different objectives, instruments, and responsible authorities, the latter with considerable differences across countries. This does not mean that there is no interaction between them."

[4] For the purposes of this paper, I use "country" interchangeably with the more precise and appropriate term "economy;" some of the economies in my sample are territories, colonies, special administrative regions, and the like, without full political sovereignty.

[5] *AREAER* is published by the Fund in the Autumn.

[6] Only mainland China is included as a large economy; Hong Kong, Macao, and Taiwan maintain their own monetary policies.

[7] There is some small question about EMU, which was classified on April 31 2008 as floating with an inflation target. However, it was classified both before and after as floating with an "other" monetary framework and the Fund also states that no EMU countries had their monetary regimes reclassified.

[8] An easy comparison is provided by the 1990-2005 Stone-Bhundia data set in which approximately 10% of monetary regimes change each year; more on this below.

[9] My argument is consistent with the contention I made some years ago that much of the new stability in the international monetary system derives from the emergence of inflation targeting. In Rose (2007), I described the emerging "Bretton Woods Reversed" system, driven primarily by inflation targeting administered by independent and transparent central banks. These countries place few restrictions on capital mobility and allow their exchange rates to float. This system was not planned and does not rely on international coordination. In 2007 I argued that there was no role for a center country (a claim I would now weaken, given the success of the swap lines provided by the Federal Reserve), the IMF, or gold. Succinctly, it is the diametric opposite of the post-war system; Bretton Woods, reversed. My central claim concerned the durability of the system; in contrast to other monetary regimes, no country has been forced to abandon an inflation-targeting regime. The GFC has now provided the experiment to put Bretton Woods Reversed to the test, and the system has proved, at least thus far, resilient.

[10] The inclusion of countries that the IMF classifies as "conventional peg" may raise the eyebrow here. Examples of these countries include Caribbean peggers (Aruba, Bahamas, Barbados, and Belize), Euro peggers (Denmark, Latvia) Gulf peggers (Bahrain, Saudi Arabia), the CFA franc zone (Benin, Burkina Faso), South African peggers (Lesotho, Namibia). The vast majority of these pegs were in fact quite hard, making it inappropriate to place them in another bin. I examine this issue in more detail below.

[11] Of the hard fixers in 2012, most had been hard fixers for many years. It is hard to be definitive, since there is currently no continuous measure of the *de facto* monetary regime available historically, as discussed earlier.

[12] Much of the analysis below compares the features of the 60 durable hard fixers to the inflation targeters.

[13] 2011 is the last year for which I have a broad sample of comparable real GDP data.

[14] Eichengreen and Sachs (1985) is one important paper in a large literature.

[15] Masson and Ruge-Marcia (2003) analyze the determinants of exchange rate regime transitions. Note also that the considerable literature on choice of exchange rate regime (as opposed to transitions between by regimes), rarely focuses on business cycle events; e.g., Poirson (2001).

[16] The LYS classification only begins in 1974 and is hence unusable for this purpose.

[17] I use standard parameter values for my filtering techniques: a smoothing parameter of 6.25 for Hodrick-Prescott (as suggested by e.g., Ravn and Uhlig); and for Christiano-Fitzgerald and Baxter-King bandpass filtering, minimal/maximal periodicities of two/eight years respectively, with a lead-lag length of three years (as suggested by e.g., Baxter and King).

[18] Note that the estimates in Table 6 are contemporaneous; they could surely be strengthened by taking lags into account appropriately. Also, all economies are included in Table 6; excluding large economies does not change any results substantively.

[19] For the first, I use the polity2 variable, which ranges from -10 (autocracy) to +10 (democracy), taken from the *Polity IV* project; http://www.systemicpeace.org/polity/polity4.htm. I have also experimented less successfully with measures such as those Kaufman, Kraay, and Mastruzzi produce in the *World Governance* project.

[20] Information on the Chinn-Ito index of capital account openness is available at http://web.pdx.edu/~ito/Chinn-Ito_website.htm while data and discussion on the Index of Economic Freedom is available at http://www.heritage.org/index/. Financial freedom is defined as "a measure of banking efficiency as well as a measure of independence from government control and interference in the financial sector " while "In an economically free country, there would be no constraints on the flow of investment capital. Individuals and firms would be allowed to move their resources into and out of specific activities, both internally and across the country's borders, without restriction. Such an ideal country would receive a score of 100 on the investment freedom component of the *Index of Economic Freedom*."

[21] Quantiles are points taken at regular intervals from the cumulative distribution function of a random variable. Dividing ordered data into q essentially equal-sized data subsets is the motivation for q-quantiles; the quantiles are the data values marking the boundaries between consecutive subsets (http://en.wikipedia.org/wiki/Quantile).

[22] These regressions are run without either time- or country-specific fixed effects. There is little reason to expect important effects from the former, though there is much reason to believe that the latter would be highly statistically significant. Still, the objective of Table 8 is to understand why countries choose their monetary regimes; including only variation around country-specific intercepts would essentially wipe out all effects of interest. The standard errors are robust, and have been clustered by country.

[23] This non-result stands in contrast to much of the literature. For instance, Eichengreen and Razo-Garcia (2006) argue that many emerging markets maintain some sort of peg because it is infeasible for them to float, as they lack the preconditions for capital account openness necessary for exchange rate flexibility. Capital account liberalization requires strong financial systems, prudential supervision and regulation, transparency and reliable corporate governance, and financial markets to provide instruments for firms and banks to hedge exchange rate risk. But the results of Table 8 imply that capital mobility is not in fact an independently important determinant of the monetary regime; this idea is worth pursuing further.

[24] This negative result is actually good news, since it allows one to model the effects of monetary regimes more plausibly.

[25] Since some *countries* in the last group are in hard fixes for some of the period (and thus not in a sloppy center monetary *regime* each year), I use this taxonomy at some, hopefully small, risk of confusion.

[26] Since the countries in the hard fixes and inflation targeting regimes are chosen because of their durability, country fixed-effects would render regime effects inestimable.

[27] An alternative strategy would be to follow the methodology of Klein and Shambaugh (2013) and directly examine the strength of interest rate linkages across monetary regimes.

[28] I thank Kristin Forbes and Frank Warnock for providing me with their data set.

[29] For the cross-sectional analysis, I do not include either country or time effects.

[30] Montiel (1998) provides a convenient taxonomy.

[31] I ignore intervention that is effective, permanent, and sterilized; Engel (2013) writes in his recent survey "Very few studies have found significant evidence of a sustained effect of sterilized intervention on the level of the exchange rate."

[32] Series on the bond yield and stock index are taken from the IMF's *International Financial Statistics*, while property prices are taken from the BIS.

[33] Zimbabwe is a serious outlier because of its recent hyper-inflation and has been excluded from CPI inflation estimation.

[34] These results do not depend on the presence of conventional pegs, as can be seen from Appendix Tables A1 and A2; these are analogues to Tables 9 and 10 without conventional peg observations.

[35] The balancing property is satisfied when inflation targeters are compared either to hard fixers or the sloppy center, but not when hard fixers are compared to the sloppy center either by themselves or with inflation targeters; the latter results should be treated with appropriate caution.

[36] It should be noted that Rey does not actually test the relevance of the exchange rate regime.

[37] My (2011) paper concludes "The fact that similar economies make completely different choices might lead one to despair; as a profession, we have collectively made little progress in understanding how countries choose their exchange rate regimes. Still, before panicking, one should first remember that such choices often seem to have remarkably little consequence. Exchange rate regimes are flaky: eccentric and unreliable."

[38] In their survey, Frankel and Rose (1995, p 1706) write "The more general point is that the volatility of macroeconomic variables such as money, output, and prices (appropriately parameterized) does not vary much across exchange rate regimes, certainly not enough to rationalize the large cross-regime differences in exchange rate volatility."   These negative results are also consistent with those in related literatures. For instance, in its 2012 Spillover Report, the IMF uses three approaches to pin down spillover effects (event studies, examination of US portfolio flows and vector autoregressions) and sums up the findings as indicating that "The above results do not permit any easy generalization about advanced country monetary policy as the main driver of asset price pressures in emerging markets."

[39] A number of countries that engage in hard fixes have characteristics – the critical ones being size and polity – similar to those of inflation targeters, including Bulgaria, Republic of Congo, Denmark, Ecuador, Panama, and El Salvador. It seems reasonable to expect more such countries adopt inflation targeting in the decades to come, and the stability of the international monetary system to expand accordingly.