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# 28 Months Later: How Inflation Targeters Outperformed Their Peers in the Great Recession

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March 2011

**28 Months Later: How Inflation Targeters Outperformed Their Peers in the Great Recession** [*]

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**Abstract:**
Twenty-eight months after the onset of the global financial crisis of August 2008, the evidence on post-crisis GDP growth emerging from a sample of 51 advanced and emerging countries is flattering for inflation targeting countries relative to their peers. The positive effect of IT is not explained away by plausible pre-crisis determinants of post-crisis performance, such as growth in private credit, ratios of short-term debt to GDP, reserves to short-term debt and reserves to GDP, capital account restrictions, total capital inflows, trade openness, current account balance and exchange rate flexibility, or post-crisis drivers such as the growth performance of trading partners and changes in terms of trade. We find that inflation targeting countries lowered nominal and real interest rates more sharply than other countries; were less likely to face deflation scares; and had sharp real depreciations without a relative deterioration in their risk assessment by markets. While the task of establishing causal relationships from cross-sectional macroeconomics series is daunting, our reading of this evidence is consistent with the resilience of IT countries being related to their ability to loosen their monetary policy when most needed, thereby avoiding deflation scares and the zero lower bound on interest rates.

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*"Inflation targeting is being put to the test – and it will almost certainly fail"* – Joseph Stiglitz, 2008.

*"Just as inflation targeting has proven its ability to prevent the entrenchment of high and volatile inflation, it also has the power to prevent the onset of persistent deflation."* – Mark Carney, 2009.


## I. INTRODUCTION

Two years into the Great Recession, the evidence on post-crisis GDP growth is flattering for inflation targeting countries. Namely, for a sample of 51 advanced and emerging countries, inflation targeting (and flexible exchange rate regime) countries have fared better than their peers in terms of post-crisis GDP growth. Given the record during the Great Moderation years, that is a rather surprising result; for instance, the literature recently reviewed by Ball (2010) finds only weak effects for inflation targeting.

The first step of this paper's argument is to demonstrate that IT countries have indeed fared better than their peers during the Great Recession. That is the easy part. In our sample of 51 countries, IT countries dominate the ranks of the top performers while keeping mostly away from the lower performance rungs. That is true for post-crisis growth in absolute terms and also relative to pre-crisis growth trends. It is also true for a measure of output loss since the crisis (Table 1).

Then in its second step, this paper shows that the positive effect of IT is not explained away by plausible pre-crisis determinants of economic performance, such as growth in private credit, ratios of short-term debt to GDP, reserves to short-term debt and reserves to GDP, capital account restrictions, total capital inflows, trade openness, current account balance and exchange rate flexibility, or post-crisis drivers such as the growth performance of trading partners and changes in terms of trade.

Finally I examine the plausibility of different channels through which differences in monetary policy affected post-crisis outcomes for IT and not-IT countries.

First, in the face of deflationary shocks, a credible inflation target may play an important role at avoiding a liquidity trap and the perils of the zero lower bound on interest rates (e.g. Decressin and Laxton 2009). This has been underscored by the communication strategy of IT central banks. In the words of Governor Carney of the Bank of Canada: "Just as inflation targeting has proven its ability to prevent the entrenchment of high and volatile inflation, it also has the power to prevent the onset of persistent deflation."[3] Bernanke (1999) also argued that Japan could have avoided deflationary pressures had it had put in place a formal inflation targeting framework before those pressures arose.

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[3] Remarks by Governor Carney Remarks by Mark Carney to the Halifax Chamber of Commerce, Halifax, Nova Scotia, in 27 January 2009 (downloaded from http://www.bankofcanada.ca/en/speeches/2009/sp09-2.html)

Second, credible IT frameworks may also allow IT adopters to pursue a more aggressive course of monetary policy easing without compromising their inflation outlooks than otherwise. That is particularly relevant for emerging market IT adopters as they are typically more volatile and vulnerable to inflationary risks than their advanced country counterparts (e.g. Ghosh and others, 2009).

Third, it is plausible that during periods of global booms and easy money (say, because U.S. monetary policy is loose), the pursuit of an inflation target may turn central banks to lean against the wind more than otherwise either in order to reach the inflation target or because exchange rate flexibility limits capital inflows. Indeed, IT countries had higher nominal and real interest rates during the expansion phase prior to the current crisis. The tight monetary stance of IT countries during the build-up to the crisis may have mitigated lending booms or reduced the attractiveness of high-yield foreign assets of dubious quality such as U.S. subprime mortgage to their own financial systems, thereby somewhat insulating them from the subsequent downfall. Moreover, in the event of a sudden crisis, countries with higher nominal interest rates have more room for rate cuts and therefore less need for costly extraordinary fiscal measures.

Fourth, there is a significant correlation between inflation targeting and flexible exchange rate regimes. Flexible exchange rates have long been recognized in the literature as shock-absorbers (e.g. Broda, 2004; Edwards and Levy Yeyati, 2005; Mendoza 1995) and may be a factor boosting the relative performance of IT countries.

We find that inflation targeting countries lowered nominal and real interest rates more sharply than other countries; were less likely to face deflation scares; and had sharp real depreciations without a relative deterioration in their risk assessment by markets. While the task of establishing causal relationships from cross-sectional macroeconomics series is daunting, our reading of this evidence is consistent with the resilience of IT countries being related to their ability to loosen their monetary policy when most needed, thereby avoiding deflation scares and the zero lower bound on interest rates.

This contribution belies the views of some IT skeptics who have advocated scrapping this monetary policy regime as an anachronistic relic of the Great Moderation. Inflation targeting has been the target of pointed criticism: its narrow focus on inflation may blind central bankers from other worthwhile objectives such as reducing unemployment (e.g. Stiglitz 2008); IT central banks may also lose sight of important determinants of financial stability as they narrowed their intellectual pursuits and attention to matters related to meeting their narrow goals (Buiter 2009); and IT regimes, usually implemented under flexible exchange rate regimes, may suffer from destabilizing exchange rate movements when the private or public sector liabilities are dollarized (Calvo and Reinhart, 2002).[4]

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[4] Hungary tried to have an exchange rate target whilst it operated an inflation targeting framework, but it abandoned their narrower exchange rate target after 2004 and its wider +/- 15 percent target was abandoned in

This contribution is also novel as the established empirical research on the advantages and pitfalls of inflation targeting (e.g. Ball and Sheridan, 2005; Batini, Kuttner and Laxton, 2005; Batini and Laxton, 2007; Gonçalves and Salles, 2008; Brito and Bystedt, 2009; Ball 2010) has focused on the Great Moderation years and on inflation and output outcomes over several years, instead of the response to specific global shocks and the policy challenges they ensue. But arguably this is the first major global shock since the inception of inflation targeting.

## II.  SAMPLE SELECTION

To compare the performance of IT and non-IT countries during the crisis, I use simple econometric frameworks on a balanced panel data set of macroeconomic variables by countries.

The choice of sample is crucial to the credibility of this exercise. I used a size cutoff of USD 10 billion for the 2002 nominal GDP in dollars, because small poor developing countries typically do not have the institutional capability for inflation targeting, so they would not be an appropriate comparison group for IT countries. (In the top chart in this page, the hollow dots represent countries excluded from the sample, either for data availability of small size. The list of countries on each category is available in the appendix.)
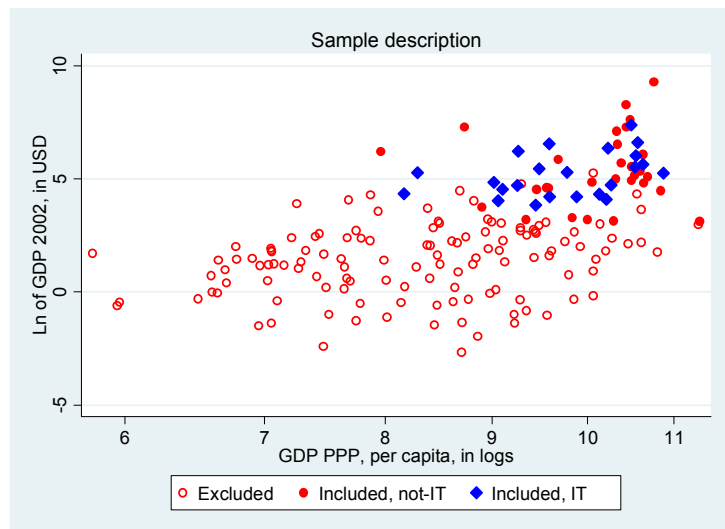


Then I selected countries based on data availability. The data availability cutoff refers to monthly data availability on the unemployment rate, industrial production, policy interest rate and the sovereign 5-year CDS spread – I only consider in the analysis countries for which three of those variables are available. While data availability is a practical concern from the point of view of the researcher, it is fair to say that there is an economic justification for excluding countries for which data availability is limited, as monetary policy in an inflation targeting framework requires a certain degree of sophistication of national economic statistics (see the collection of papers compiled by Carson, Enoch and Dziobek 2002).

The combination of the size and data availability criteria selects 52 countries for our sample, of which 23 are inflation targeters. From an initial full sample of 160 countries, 88 are excluded for not meeting both the size and the data availability criteria; 18 countries for not

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February 2008 (Stone and others, 2009, pp. 43-45). Chile and Israel also dropped exchange rate stabilization because it came into conflict with IT.

meeting the data availability
criterion despite meeting the size
criterion; and 4 are excluded for
not meeting the size criterion
despite availability of data.[5]

The chart to the right reproduces
the chart in the previous pages,
but without the excluded
countries. A cursory visual
inspection shows how similar
those two groups of countries are
in terms of economy size and per
capita output levels. A test of
means shows that non-IT
countries have higher per capita GDP in PPP terms, and are on average larger economies
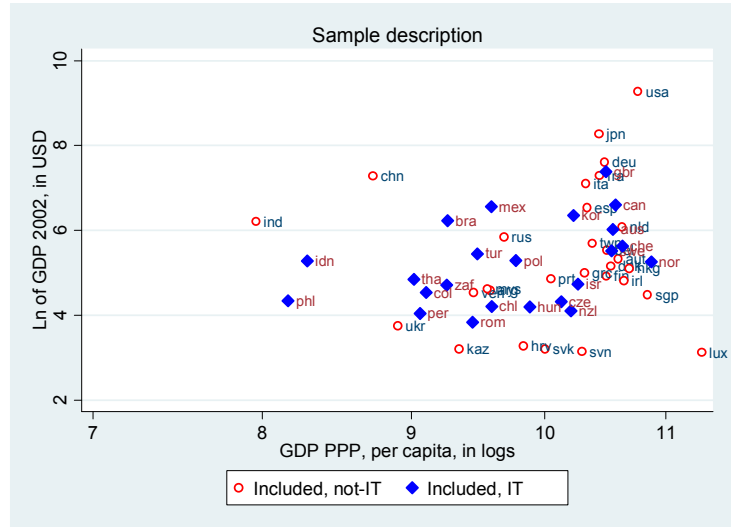than IT countries in our sample (Table 2).

Table 2 also documents the pre-crisis similarities and differences between IT and non-IT
countries in our sample. While there were no statistically significant differences in inflation
rates, credit default swap premia, changes in real exchange rates, inflation forecasts,
unemployment rates, and the level and composition of growth before the crisis, IT countries
stood out for higher policy interest rates, either in nominal or in real terms (real interest rates
are calculated using Consensus Forecasts expectations of inflation) – in our sample, real
interest rates in August 2008 were almost 3 percentage points higher in IT countries than
elsewhere.

## III.  RESULTS

## A.  Were Inflation Targeting countries more resilient during the crisis?

The first question I ask is whether IT countries fared better in the aftermath of the crisis than
their peers. In a simple comparison of median cumulative GDP and industrial production
growth rates for IT countries and their peers, it is clear that IT countries rebounded earlier
(Figures 1 and 2).

The challenge of comparing median or mean growth rates for two groups after the crisis is to
establish a counterfactual that would have occurred without the crisis. I estimate the effect of
IT after the crisis in a panel data setting with country- and time-fixed effects, allowing for
heteroskedastic and serially-correlated errors. Hence in the equation (1) below, $\phi$ is the
parameter of interest:

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[5] For lists of included and excluded countries, refer to the Appendix.

$$y_{it} = \lambda_i + \lambda_t + \phi \times AFTER \times IT_i + \varepsilon_{it}$$
$$\varepsilon_{it} = \rho\varepsilon_{it-1} + u_{it} \text{ where } \mathrm{Var}(u_{it}) = \sigma_i^2$$

(1)

The variable *AFTER* denotes after the crisis (i.e. it is equal to one from 2008Q4 onwards) and the sample starts in 2006Q1.

Table 3 reports the results. When the left-hand side variable is real GDP, the coefficient on the interaction between after the crisis and the indicator of inflation targeting is positive and economically significant. When I introduce interactions with indicators of advanced and emerging economies, the results show that the larger effect is on emerging economies; when I estimate the effect on each quarter after the crisis (column 3), it is clear that IT countries pulled ahead as early after the crisis as the first quarter of 2009.

There is a great coincidence between inflation targeting and flexible exchange rate regime for the sample in this paper.[6] Based on the country classifications in 2007, only 2 countries in our sample are classified as floaters and have not adopted IT (Japan and Singapore); while only 3 countries are classified as IT but their de facto exchange regime cannot be described as floater (Czech Republic, Peru, Philippines). Therefore it is a daunting task to take apart the effects of inflation targeting and exchange rate flexibility in the data. Despite the almost perfect coincidence between inflation targeting regimes and floating exchange rates, I cannot reject the hypothesis that a floating exchange rate regime before the crisis was uncorrelated with GDP performance after August 2008 (column 4).

For the growth rate (relative to the previous quarter), the IT coefficient is now 0.005, which translates into an annualized rate of 1.8% (column 5); and when I estimate the effect on each quarter after the crisis, I find that the bulk of the difference between IT and other countries can be laid on the early recovery or shallower plunge by IT countries in 2009Q1.

Looking into other measures of economic activity, the results are somewhat mixed. For industrial production as the dependent variable, I find an even larger coefficient of the interaction between IT and after the crisis (column 7); while for unemployment rate, I find no significant effect (column 8).

## B. Was it inflation targeting or something else?

Monetary and exchange rate regimes are not always determined by historical accidents, but may be each country's choice based on the characteristics of the risks facing their economy. For concreteness, it is possible that IT countries are exposed to common risk factors driving their performance. If that is true, IT and other exchange rate regimes are not allocated

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[6] I use a de facto classification of exchange rate regimes by Ilzetzki, Reinhart and Rogoff (2008), defining "floater" as the union of the following classifications: pre announced crawling band that is wider than or equal to +/-2%; de facto crawling band that is narrower than or equal to +/-5%; moving band that is narrower than or equal to +/-2% (i.e., allows for both appreciation and depreciation over time); managed floating; and freely floating.

randomly and differences in the performance of IT and non-IT countries in any event may reflect other underlying factors. It is therefore interesting to examine if our finding of greater resilience of IT countries during and after the great financial crisis should be considered a feature of IT or not. That is a issue of causal identification– and those questions are often intractable in macroeconomics. However we can learn about the mechanism that caused IT countries to perform better since 2008Q3 by verifying if the IT effect has explanatory power over and beyond other factors identified in the literature as relevant explanatory variables for the economic contraction in the current crisis.

The existing literature on the determinants of contractions in the current crisis (e.g. Berkmen and others 2009; Blanchard and Faruqee 2010; Lane and Milesi-Ferretti 2010; Tsangarides 2010) has indicated some variables (measured before the crisis) that are correlated to GDP contractions in the global financial crisis of 2008, such as the ratio of short-term external debt to GDP, the degree of openness to trade, the change in the commodity terms of trade, the change in private credit to GDP, the pre-crisis current account balance, and the average GDP growth of trading partners. [7]

For each one of those factors, I run a regression of the post-crisis change in growth rates since the crisis (which I call 'growth acceleration') on a wide array of factors identified in the literature as determinants of exposure to financial crisis in general or this crisis in particular. I define the variable growth acceleration as the difference between the growth rate in 2008H1-2010H1 and the annual growth rate in the five years prior to 2008H1.Table 4 and Figure 3 report the value of this variable for each one of the 52 countries in the sample.[8]

The results are thus reported in Table 5. In column 1, I report a positive and statistically significant relation between IT and growth acceleration (change in GDP growth rate since the crisis), for a sample of 51 advanced and non-advanced countries. In column 2, I split the sample and find that this finding holds for both advanced and not-advanced countries, but I find a larger point estimate for not-advanced countries.

In column 3, I focus on non-advanced countries and replicate a result previously presented by Blanchard and Faruqee (2010) that short-term external debt was an important risk factor for GDP contractions in the immediate aftermath of the global financial crisis: an additional 10 percentage points of GDP of short-term external debt in 2007 implies on average a 3.0

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[7] Our preferred measure of terms of trade is an index of commodity terms of trade, including 43 commodities, with coverage for 55 countries. Because it is based on internationally traded commodities, it is arguably exogenous to national policies (e.g. exchange rates).

[8] I also calculate a measure of output loss since 2008Q3 as the difference between actual output and trend output (calculated by extending a linear trend estimated on quarterly data up to 2007 to 2010Q2). The correlation between the output loss variable and the post-crisis change in growth rate is 0.96. Not surprisingly, the results in this section are robust to using the output loss variable.

percent reduction in annual growth rates since the crisis.[9] Including a control for the pre-crisis ratio of short-term external debt to GDP does not affect the statistical or economic significance of the IT variable (Appendix Figure 1).

In column 4, document the positive relationship between the ratio of reserve to short-term external debt in 2007 and the change in growth rate since the crisis. The difference between the reserve coverage of Peru and Turkey in 2007 was about 100 per cent of short-term external debt. The point estimate of the effect of this variable would account for a growth advantage after the crisis for Peru of about 2.5 percentage points annually. Including a control for the pre-crisis ratio of reserves to short-term external debt does not affect the statistical or economic significance of the IT variable (Appendix Figure 2).

In column 5, I combine the ratio of short-term external debt to GDP and reserves to short-term external debt. Both variables are significant and maintain their sign, and so does the IT variable.

In column 6, I control for the pre-crisis ratio of reserves to GDP. That variable is not statistically significant and does not affect the coefficient on the IT variable (Appendix Figure 3).

In column 7, I control for the pre-crisis ratio of gross public debt to GDP. Surprisingly, there is a significant positive relationship between pre-crisis public debt levels and post-crisis growth performance. While this result is hard to rationalize, it does not change the statistical or economic significance of the IT effect (Appendix Figure 4).

The geographical dispersion of pre-crisis capital account restrictions does not seem to have a relationship with the post-crisis performance. The Quinn index of capital account restrictions is not significantly related to post-crisis performance after one controls for IT and advanced country dummies. Moreover, the effect of IT is robust to inclusion of that measure of capital account restrictions (column 8). Similar results are found for measures of actual capital inflows (the ratio of total capital inflows to GDP for 2006Q1-2007Q2, in column 9, Appendix Figure 5) and actual trade flows (average trade in goods and services to GDP, 2003-2007, in column 10, Appendix Figure 6).

In column 11, I introduce changes in the commodity terms of trade to the specification. That variable enters with the expected positive coefficient and is strongly significant. Interestingly, its introduction reduces the effect of IT, which may be explained by IT countries on average having faced more favorable terms of trade shocks than other countries since the crisis (Appendix Figure 7).[10]

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[9] The coverage of the variable short-term external debt is restricted only to 22 not-advanced economies. I filled the missing values for advanced economies with zeros and added a dummy for advanced economies so I could include the short-term external debt variable in the omnibus regression in column 9 of the table.

[10] There are three missing observations for the terms of trade variable: Kazakhstan, Romania and Ukraine.

In column 12, I find that the coefficient of inflation targeting is also robust to including a measure of credit booms, the change in the ratio of private credit to GDP in the years before the crisis (Appendix Figure 8).[11]

The current account balance is another determinant of post-crisis performance recognized in the literature (Lane and Milesi-Ferretti 2010). In column 13, the results show the coefficient of inflation targeting is also robust to including the average pre-crisis current account balance (Appendix Figure 9).

For the sample of countries in this paper, there is a high correlation between inflation targeting and exchange rate flexibility. Thus it is interesting to verify if the coefficient of inflation targeting is robust to inclusion of measures of exchange rate flexibility. The inclusion of the 2003-2007 volatility of real effective exchange rates (column 14) and dummies for de facto exchange rate pegs and the euro area (column 15) does not add explanatory power and causes little change to the IT coefficient.

Finally, post-crisis performance was probably influenced by 'neighborhood effects', or the performance of trading partners. In column 8, I find a positive but not significant effect of trading partners' growth acceleration and introduction of that variable does not change the finding of a positive coefficient of IT on change in growth since the crisis (Appendix Figure 10).

## C. Robustness to different sub-samples

This paper has focused on a selection of advanced and emerging countries that is not representative of the universe of countries in the world. Thus I show on Table 6 Panel A how our results are insensitive to changes in the composition of the sample.

In the first column of Table 6, I reproduce the result in the first column of Table 5. The main result of an economically significant outperformance of IT countries in terms of change in growth rates since the crisis holds up for sub-samples excluding the 11 Euro area countries (Austria, Belgium, Finland, Germany, Greece, Ireland, Italy, Luxembourg, Netherlands, Portugal and Spain); the 3 oil exporters (Norway, Russian Federation and Rep. Bol. Venezuela); the 9 Eastern European countries (Croatia, Hungary, Poland, Romania, Russian Federation, Slovak Republic, Slovenia, Turkey and Ukraine), or the 5 Emerging Asian countries (India, Indonesia, Malaysia, Philippines and Thailand).

We also undertake a procedure proposed by Hadi (1992) to identify outliers in the sample, and re-run the regressions with a "clean" data set. That procedure tells us to exclude Ukraine, which does not change our main result.

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[11] That is the change in ratio of private credit by DMB and other FI /GDP, 2003-2007. I thank Gian Maria Milesi-Ferretti for sharing the dataset used in Lane and Milesi-Ferretti 2010.

**D.  Are the results robust to extending the sample to other emerging countries?**

In a recent working paper, Tsangarides (2010) finds that among emerging market economies, the growth performance for countries adopting a peg was not different from that of countries with a floating exchange rate during the crisis, after controlling for regime switches during the crisis, using alternative definitions for pegs, and taking into account other growth determinants. Since there is a strong correlation between IT and not having a peg in both my sample of advanced and emerging countries and Tsangarides' sample of emerging countries, it is worthwhile to verify how the results in this paper can be extended to Tsangarides' dataset or how Tsangarides' result holds in this paper's sample.[12]

In Table 6, Panel B, the left-hand side variable is the difference between the annualized post-crisis (2008/09) and pre-crisis (2003/08) growth rates – we have to do that to incorporate all the countries in Tsangarides (2010), as some emerging countries in his sample do not have quarterly GDP data. The results show that the IT effect cannot be detected in the Tsangarides' sample of 50 emerging markets (column 1); adding the Tsangarides countries to our sample renders the coefficient on inflation targeting statistically insignificant (column 2); and that is caused by expanding the sample, as inflation targeting is significant when the same specification is carried out in the sample of this paper (column 3). Finally, when I use an indicator of countries that do not peg – as in Tsangarides (2010) – instead of the inflation targeting dummy, the coefficient is positive, but not statistically significant.

**E.  Bayesian model averaging**

Summing up the results thus far, IT countries seem to have fared better than non-IT countries, in terms of the change in their growth rates since the crisis. This finding is robust to controlling for other important determinants of post-crisis performance, such as post-crisis economic performance of trading partners and changes in terms of trade, and pre-crisis ratios of short-term external debt to GDP, reserves to short-term external debt and reserves to GDP, capital account restrictions, total capital inflows, trade openness, change in private credit, current account balance and exchange rate flexibility.

One might worry however that the IT effect may be explained away by a combination of the other explanatory variables. While theory does not provide much guidance to which variables should belong to our specification, and there is a plausible risk of overparameterizing the model if we add a large subset of the variables at the same time to our small sample with 51 observations, Bayesian model averaging (BMA) provides a method for inferring the robustness of the IT effect. BMA bases statistical inference on averaging over all possible linear models, using the posterior model probabilities as weights. Since we have 15 explanatory variables, there are $2^{15}$ possible models to estimate; therefore we use Markov

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[12] The 25 countries in Tsangarides (2010) sample that are not in mine are Algeria, Armenia, Bosnia & Herzegovina, Bulgaria, Costa Rica, Dominican Republic, Ecuador, Egypt, El Salvador, Estonia, Guatemala, Iceland, Jamaica, Jordan, Latvia, Lebanon, Lithuania, Morocco, Pakistan, Panama, Serbia, Sri Lanka, Tunisia, Uruguay, and Vietnam.

chain Monte Carlo (MCMC) techniques to numerically estimate the model posterior probabilities (that is implemented through the package *bms* in R, see Zeugner 2010).

Figure 4 presents the cumulative probability of inclusion for each of our explanatory variables. On the horizontal axis, it shows the best models from left to right, scaled by the Posterior Model Probability. The best model includes the inflation targeting dummy, and the pre-crisis ratios of short-term debt to GDP, reserves to short-term debt and gross public debt to GDP, all of which with the same sign as in Table 5. The IT variable belongs to almost all probability-weighted models (its posterior inclusion probability is over 97 percent) and it enters with a positive sign in all models where it is included with positive probability. Averaging all models based on their Bayesian probability weights, the posterior mean of the IT coefficient is about 2.6 percent (in the high end of the coefficients in Table 5).

In the next section, I try to determine the extent to which differences in monetary policy and exchange rate flexibility are behind the performance advantage of IT countries.

## IV. DIFFERENCES IN MONETARY POLICY BETWEEN IT AND OTHER COUNTRIES

I am interested in the time-varying performance differences between IT and non-IT countries during the Great Recession. Since the focus is on cross-sectional differences, the econometric specification controls for the changing global environment though time fixed effects common to all countries; because the period in question is the aftermath of the global financial meltdown whose worst part started in August 2008, the specification controls for fixed characteristics of each country through country fixed effects), so the regression I estimate is:

$$y_{it} = \lambda_i + \lambda_t + \left( \phi_t \times IT_i \right) + \varepsilon_{it} \qquad (1)$$

where $y_{it}$ is the dependent variable of interest, $\lambda_i$ is a country specific effect, $\lambda_t$ is a time-effect, and $\varepsilon_{it}$ is a idiosyncratic shock. Our parameters of interest are in the sequence $\{\phi_t\}$ of interactions between IT and time dummies.

Because I want to focus on the effects of the financial crisis, I restrict the sample to a short period of time around the beginning of the full-blown crisis. The failure of Lehman Brothers, which I take as the trigger for the crisis, happened in mid September 2008. Thus August 2008 is the time zero for our event study, i.e. the last period before the crisis gets into full motion.

For the variables observed monthly, the sample typically starts in January 2006; for the ones observed quarterly, our sample starts in 2002Q1. I assign IT to all the countries that have adopted IT before the financial crisis, even if they had not adopted IT yet at some earlier period covered by the sample.

Equation 1 can be estimated with OLS or quantile regression, thereby estimating the time-varying mean or median IT effect. Because the sample is restricted to not more than 51 countries, that is a small panel (23 IT and 28 not-IT countries) and the estimates may be sensitive to the exclusion of a few outliers.

I start by analyzing monetary policy responses, first through nominal policy interest rates, then through the resulting real policy rates; their impact on inflation, inflation expectations and real exchange rates. I also look at EMBI spreads and CDS premia in order to assess how markets evaluated IT countries relative to their counterparts.

## A.  Policy interest rates, in nominal terms

Inflation targeting countries reduced nominal policy interest rates more sharply than their peers. Table 7 shows that all the 5 countries with the largest cuts in nominal rates in 6- and 12-months after August 2008 were inflation targeters, while among the 5 countries that raised nominal rates or made the smallest reductions, only one inflation targeting country is included (Hungary, 6 months after the crisis).

From the beginning of 2008 to August 2008, policy rates were on an increasing path for both the median IT and non-IT countries, but slightly more so for IT countries (Figure 5). In the month of Lehman's failure, September 2008, 6 IT countries tightened their policy rates (Brazil, Chile, Indonesia, Israel, Peru and Sweden). However, as the crisis deepened, the average IT country cut its policy rate by about 1½ percentage points more than the average non-IT country. This difference in interest rate setting between IT and non-IT countries is statistically significant and has persisted at least until September 2010 (Figure 5b).

## B.  Policy rates, in real terms

Inflation targeting countries lowered their real interest rates relative to their peers in the months subsequent to August 2008. That is true for real interest rates based on both backward-looking 12 month inflation and forward-looking Consensus Forecast next year inflation (Figure 6) .[13]

As a matter of fact, there is a very high correlation between changes on each of the measures of real interest rates and changes in nominal interest rate. For forward-looking real interest rates, it is over 0.7 for the six months after the crisis and over 0.8 for 12 months after the crisis. There is also a significant overlap between the list of top 5 countries in terms of large changes in nominal and real interest rates (Tables 7-8).

In quantitative terms, the differences are economically significant. About one year after the crisis, IT countries have managed to lower real interest rates by about 1.5-2 percent more than other countries, and that is true for both forward- and backward-looking real interest rate measures (Figure 7).

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[13] Sample coverage is more limited for Consensus Forecast data. The countries in our sample outside the Consensus Forecast coverage of inflation are Austria, Belgium, Denmark, Finland, Greece, Ireland, Israel, Kazakhstan, Luxembourg, Philippines, Portugal and South Africa.

## C.  Inflation rates and 'deflation scares'

That inflation rates and expectations of inflation plunged by less for inflation targeting countries can be inferred from what we have just presented about the behavior of nominal and real interest rates.

While there is significant evidence that inflation above a certain threshold carries heavy welfare and growth costs, the welfare ranking of different (positive) low levels of inflation is a subject of disagreement in the profession (Benigno and Ricci 2010). But since the analysis of Fisher (1933), the perils of debt-deflation spirals are part of the shared knowledge of macroeconomists.

Looking first at actual inflation outcomes, price levels dropped across the board in the last two months of 2008: the average annualized monthly inflation rate was lower by 3.4 percent for IT countries, 2 percent for the others in December 2008 relative to August 2008; and both the median IT and non-IT country had negative monthly inflation in December 2008 (Figure 8,a). However, the median 12 month inflation for IT countries was never lower than 1.5 percent, while it reached below zero for other countries. I define a deflation scare as the event of three consecutive negative readings of the monthly inflation rate, so we can distinguish the countries that had only 1 or 2 consecutive readings of negative inflation (which may likely be inconsequential) from those where a sequence of negative inflation rates lasted one quarter (which may cause inflation expectations to be revised downward permanently). On that front (n=51, of which 23 IT countries; data through August 2010), inflation targeting countries were less likely to suffer from a 'deflation scare' event during the Great Recession than their peers, with a statistically significant difference for 2008M12-2009M1 and 2009M6 (Figure 8, b).

If anything, the evidence on Consensus Forecasts and actual inflation rates is consistent with IT countries being better able to anchor inflation than their peers during the Great Recession.

## D.  Real exchange rates

There are wide differences in the post-crisis path of real exchange rates for inflation targeting countries and their peers. The real effective exchange rate (REER, n=51, of which 23 IT countries; data through August 2010) of IT countries depreciated sharply in relation to other countries with the onset of the global crisis.

Taking August 2008 as a base period, the median IT currency depreciated by about 12½ percentage points by the first quarter of 2009 before it bounced back through the rest of that year, and now is at about the same level then they were at the outset of the crisis (Figure 9). Throughout that same period, the average non-IT currency remained broadly at the same level as in August 2008. This finding of sharp real depreciation of IT currencies after the crisis unfolded, followed by some appreciation towards pre-crisis levels, is valid for the full sample of 51 countries but it is also robust to including only the subset of 18 emerging

markets, and to excluding countries with pegs or heavily managed floats against the U.S. dollar before the crisis.[14]

As striking as this finding may seem, these results are no artifact of sample choice or driven by outliers. In our sample of 51 countries, of which 23 are IT countries, the 10 countries with the largest real depreciations six months into the crisis (February 2009) were all IT countries (starting from the largest real depreciations, those are: Poland, with -31½ percent, Mexico, Republic of Korea, Australia, Brazil, Hungary, New Zealand, Indonesia, Sweden, and Turkey, with -16½ percent). The flip side of the concentration of IT countries among the ones with large real depreciations is the absence of IT countries among the top 6 countries with real appreciations during that period (e.g. Japan appreciated by 26½ percent, and Venezuela, Rep. Bol. by 26 percent).

Having established thus far that IT countries seem to have on average better dodged the deflation bullet and been able to lower nominal and real interest rates by more than non-IT countries, I examine whether movements in their real exchange rates were in the direction towards injecting external demand when that was most needed.

### E. Measures of risk premia: EMBI and CDS spreads

While real depreciations during a crisis may be a desirable demand-switching mechanism from the national point of view, it may be of little help if accompanied by disruption of confidence, widening of risk spreads or a negative market reassessment of sovereign default. Whether that was the case is an empirical issue. It can be gauged by the behavior of the market assessment of risk premia, as proxied by the EMBI spread, and the premia on sovereigns' credit default swaps.

For the balanced panel of emerging market countries for which I have EMBI spread data for the period of analysis (n=18, of which 12 IT countries, with data through October 2010), the evidence suggests that the real exchange rate depreciation for IT countries was not primarily driven or accompanied by a relative increase in risk perception of those countries (Figure 10). The top panel presents median EMBI spreads for both groups of countries (using means instead would further exacerbate the spike in late 2008 for non-IT countries). For both groups of countries, EMBI spreads rose sharply at the outset of the crisis, but increases for non-IT countries were sharper – for instance the spreads for Argentina, Ukraine and Venezuela, Rep. Bol., all of them non-IT countries, increased by more than 1,000 basis points at their peak relative to August 2008. However, the differences are not statistically significant when we use block bootstrapping to build confidence intervals.

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[14] We define pegs or heavily managed floats against the U.S. dollar as currencies whose exchange rate against the U.S. dollar had a monthly standard deviation of less than 1% in the period from 2006M1 through 2008M8. There are 5 such countries in our full sample: Argentina, China, P.R.: Mainland, China, P.R.: Hong Kong, Ukraine, and Venezuela.

The 5-year sovereign CDS spreads (n= 46, of which 22 IT countries, through September 2010) are also a gauge for financial markets sentiment about countries, with the advantage of a sample coverage that also extends to most advanced economies. In the months before the crisis, both median and average CDS spreads for IT countries were higher than for non-IT ones. In October 2008, CDS spreads increased across the board, but more so for non-IT countries. By November 2008, the average spread for IT countries had improved by more than 200 basis point relative to non-IT ones. The relative improvement in CDS spreads of IT countries is, however, temporary. By the second half of 2009, block bootstrap confidence intervals for the time-varying IT effect include zero (Figure 11).

Taking the evidence on EMBI and CDS spreads together, there is a strong case that real exchange rate depreciation in IT countries was not accompanied by a relative deterioration of market sentiment.

## V. CONCLUSION

With two years of data since the onset of the financial crisis, the evidence on the performance of inflation-targeting countries has been flattering as IT countries suffered smaller decelerations in growth than their peers. In attempting to explain this finding, I confirmed that this effect is robust to inclusion of plausible pre-crisis determinants of post-crisis performance, such as growth in private credit, ratios of short-term debt to GDP, reserves to short-term debt and reserves to GDP, capital account restrictions, total capital inflows, trade openness, current account balance and exchange rate flexibility, or post-crisis drivers such as the growth performance of trading partners and changes in terms of trade.

The finding of a positive IT effect is also confirmed by Bayesian model averaging. In an exercise of Bayesian model averaging based on an uninformative prior, the IT variable receives a very high posterior probability of inclusion; and if included, the support of its probability distribution is positive and bounded away from zero.

Other differences emerged between inflation targeting and other countries, and therein lie some hints on why IT countries outperformed their peers. Inflation targeting countries were able to lower nominal and real policy rates by more and were more likely to dodge the deflation bullet than their peers. With their flexible exchange rate regimes, IT currencies suffered sharp real depreciations which were not associated with a greater perception of risk by markets and may have helped switch demand towards their domestic goods and exports.

While the task of establishing causal relationships from cross-sectional macroeconomics series is daunting, our reading of this evidence is consistent with the resilience of IT countries being related to their ability to loosen their monetary policy when most needed, thereby avoiding deflation scares and the zero lower bound on interest rates.

Further research should determine the degree of permanence of this advantage, and the extent to which IT outperformance was a matter of luck, driven by superior monetary policy, or some omitted factor not considered in this paper.

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Table 1. Top and Bottom 10% Performers in Selected Variables

| Growth performance after the crisis | | | |
|---|---|---|---|
| **Worst 5 performers** | | **Best 5 performers** | |
| **Not IT** | **IT** | **Not IT** | **IT** |
| Finland<br>Ireland<br>Slovenia<br>Ukraine | Hungary | China,P.R.: Mainland<br>India | Indonesia<br>Peru<br>Poland |

| Growth acceleration/slow-down after the crisis | | | |
|---|---|---|---|
| **Worst 5 performers** | | **Best 5 performers** | |
| **Not IT** | **IT** | **Not IT** | **IT** |
| Ireland<br>Russian Federation<br>Ukraine<br>Venezuela, Rep. Bol. | Romania | India | Australia<br>Brazil<br>Indonesia<br>Philippines |

| Output loss since the crisis | | | |
|---|---|---|---|
| **Worst 5 performers** | | **Best 5 performers** | |
| **Not IT** | **IT** | **Not IT** | **IT** |
| Ireland<br>Russian Federation<br>Ukraine<br>Venezuela, Rep. Bol. | Turkey | | Australia<br>Brazil<br>Indonesia<br>Philippines<br>Poland |

Growth performance after the crisis:
Growth acceleration/slow-down after the crisis:
Output loss since the crisis:

## Table 2. Means, Standard Deviations, 10th and 90th percentile, by IT adoption

| | Not Inflation Targeters | | | | | Inflation Targeters | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | mean | sd | p10 | p90 | N | mean | sd | | p10 | p90 | N |
| Nominal GDP in USD Billions | 1472 | 2828 | 69 | 4520 | 29 | 620 | 627 | | 155 | 1499 | 23 |
| GDP per capita, PPP | 29779 | 16486 | 7351 | 47155 | 29 | 21763 | 13845 | | 8243 | 39031 | 23 |
| Inflation rate, 12 months | 7.20 | 6.40 | 3.01 | 18.36 | 29 | 6.48 | 2.58 | | 4.22 | 10.99 | 23 |
| Policy rate | 5.34 | 3.49 | 2.00 | 11.00 | 29 | 7.24 | 3.48 | | 3.50 | 12.00 | 23 |
| CDS 5-year | 119.11 | 197.10 | 9.70 | 424.44 | 26 | 107.66 | 79.90 | | 17.08 | 235.00 | 22 |
| Real appreciation, 12 months | 3.30 | 5.20 | -5.00 | 11.20 | 29 | 2.90 | 9.30 | | -8.30 | 16.30 | 23 |
| Real policy rate, forward-looking | -0.17 | 2.87 | -2.51 | 2.31 | 20 | 2.77 | 2.24 | | 0.28 | 6.01 | 20 |
| Inflation forecast, next year | 6.01 | 6.47 | 2.16 | 12.60 | 20 | 4.26 | 1.73 | | 2.48 | 6.72 | 20 |
| Inflation forecast, this year | 7.64 | 7.52 | 2.82 | 18.75 | 20 | 5.80 | 2.28 | | 3.08 | 9.27 | 20 |
| Unemployment rate | 6.46 | 2.94 | 2.35 | 9.38 | 28 | 7.35 | 5.19 | | 2.93 | 12.15 | 22 |
| GDP growth, same quarter last year | 3.60 | 2.90 | -0.10 | 7.90 | 29 | 3.80 | 3.00 | | 0.70 | 8.90 | 23 |
| Domestic demand growth, q-o-q | 3.90 | 5.10 | -1.40 | 12.60 | 27 | 4.40 | 3.70 | | 1.20 | 10.80 | 23 |
| Net exports contribution to growth | -0.40 | 3.50 | -7.30 | 2.00 | 27 | -0.70 | 3.00 | | -4.20 | 2.60 | 23 |
| Growth in real exports | 6.10 | 6.00 | -0.70 | 11.50 | 27 | 7.00 | 4.70 | | 2.20 | 11.60 | 23 |

Note: All observations are for August 2008, but for the variables measured in quarterly intervals (GDP growth; domestic demand growth, net exports contribution to growth; and growth in real exports) which are for 2008Q2; and the annual ones (nominal GDP, GDP per capita) which are for 2008.

Table 3. Panel Regressions with Time and Country Effects, Heteroskedastic and Serially Correlated Errors: 2006Q1-2010Q2

| | Real GDP (in logs) | | | | Growth | | Industrial production | Unemployment |
|---|---|---|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
| IT x After | 0.015 [0.004] | | | | 0.004 [0.0016] | | 0.032 [0.0073] | -0.053 [0.114] |
| IT x After x Advanced | | 0.008 [0.0047] | | | | | | |
| IT x After x Emerging | | 0.025 [0.0049] | | | | | | |
| Floater x After | | | | 0.007 [0.004] | | | | |
| IT x 2008Q4 | | | 0.009 [0.0044] | | | 0.006 [0.004] | | |
| IT x 2009Q1 | | | 0.025 [0.0056] | | | 0.014 [0.004] | | |
| IT x 2009Q2 | | | 0.028 [0.0063] | | | 0.000 [0.004] | | |
| IT x 2009Q3 | | | 0.031 [0.0067] | | | 0.001 [0.004] | | |
| IT x 2009Q4 | | | 0.035 [0.007] | | | 0.003 [0.004] | | |
| IT x 2010Q1 | | | 0.039 [0.0072] | | | 0.001 [0.004] | | |
| IT x 2010Q2 | | | 0.041 [0.0073] | | | 0.001 [0.004] | | |
| Number of observations | 918 | 918 | 918 | 918 | 918 | 918 | 836 | 809 |
| Country fixed effects? | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Time fixed effects? | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Sample | All 51 | All 51 | All 51 | All 51 | All 51 | All 51 | ex-CHN | ex-IND, IDN |

After denotes the period since 2008Q4. Shaded cells denote statistical significance at 5% level. Standard errors assume heteroskedasticity and AR(1) serial correlation and are reported in square brackets.

Table 4. Change in GDP growth rate between 2003H1-2008H1 and 2008H1-2010H1.

| Change in growth since crisis | | | |
|---|---|---|---|
| Indonesia | -0.005 | Austria | -0.044 |
| Australia | -0.016 | Singapore | -0.044 |
| India | -0.019 | South Africa | -0.045 |
| Brazil | -0.020 | Argentina | -0.046 |
| Philippines | -0.021 | Taiwan Prov.of China | -0.047 |
| Israel | -0.021 | Mexico | -0.050 |
| Portugal | -0.025 | United Kingdom | -0.051 |
| New Zealand | -0.026 | Denmark | -0.053 |
| China,P.R.: Mainland | -0.027 | Greece | -0.053 |
| Poland | -0.027 | Spain | -0.054 |
| Peru | -0.027 | Sweden | -0.056 |
| Korea, Republic of | -0.028 | Kazakhstan | -0.058 |
| Norway | -0.028 | Luxembourg | -0.062 |
| Canada | -0.030 | Hungary | -0.063 |
| France | -0.032 | Czech Republic | -0.065 |
| Belgium | -0.033 | China,P.R.:Hong Kong | -0.068 |
| Switzerland | -0.034 | Turkey | -0.072 |
| United States | -0.036 | Slovak Republic | -0.073 |
| Colombia | -0.037 | Croatia | -0.074 |
| Germany | -0.038 | Finland | -0.078 |
| Malaysia | -0.039 | Slovenia | -0.090 |
| Thailand | -0.040 | Romania | -0.091 |
| Italy | -0.041 | Ireland | -0.095 |
| Chile | -0.042 | Russian Federation | -0.099 |
| Netherlands | -0.043 | Venezuela, Rep. Bol. | -0.105 |
| Japan | -0.044 | Ukraine | -0.145 |

# Table 5. OLS Regression for cross-section of countries

Dependent variable: Change in GDP growth rate since the crisis (difference between 2003H1-2008H1 and 2008H1-2010H1)

| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) | (10) | (11) | (12) | (13) | (14) | (15) | (16) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Inflation targeter | 0.0193 | | 0.0218 | 0.0276 | 0.0258 | 0.0225 | 0.0248 | 0.0225 | 0.0213 | 0.0202 | 0.017 | 0.0197 | 0.0229 | 0.0246 | 0.0211 | 0.0175 |
| | [0.007] | | [0.006] | [0.007] | [0.006] | [0.007] | [0.007] | [0.008] | [0.007] | [0.007] | [0.008] | [0.007] | [0.007] | [0.008] | [0.011] | [0.007] |
| Inflation targeter x Advanced | | 0.0182 | | | | | | | | | | | | | | |
| | | [0.01] | | | | | | | | | | | | | | |
| Inflation targeter x Not advanced | | 0.0264 | | | | | | | | | | | | | | |
| | | [0.011] | | | | | | | | | | | | | | |
| Advanced | | 0.0144 | -0.0272 | 0.0387 | 0.00481 | 0.0111 | 0.00726 | 0.0192 | 0.0111 | 0.0117 | 0.00688 | 0.0128 | 0.01 | 0.00722 | 0.00718 | 0.00635 |
| | | [0.01] | [0.012] | [0.01] | [0.017] | [0.007] | [0.007] | [0.012] | [0.007] | [0.007] | [0.007] | [0.007] | [0.007] | [0.009] | [0.008] | [0.007] |
| Short term external debt/GDP, 2007 | | | -0.296 | | -0.199 | | | | | | | | | | | |
| | | | [0.079] | | [0.085] | | | | | | | | | | | |
| Reserves/ST external debt, 2007 | | | | 0.025 | 0.0174 | | | | | | | | | | | |
| | | | | [0.007] | [0.007] | | | | | | | | | | | |
| Reserves/GDP, 2007 | | | | | | 0.0135 | | | | | | | | | | |
| | | | | | | [0.03] | | | | | | | | | | |
| Gross public sector debt/GDP, 2007 | | | | | | | 0.0285 | | | | | | | | | |
| | | | | | | | [0.011] | | | | | | | | | |
| Restrictions on capital account transactions, Quinn: 0-100 scale, 2006 | | | | | | | | -0.00022 | | | | | | | | |
| | | | | | | | | [0.0002] | | | | | | | | |
| Total Capital Inflows/GDP, 2006Q1-2007Q2, annualized | | | | | | | | | -0.00135 | | | | | | | |
| | | | | | | | | | [0.002] | | | | | | | |
| Trade in G&S/GDP, 2003-07 | | | | | | | | | | -0.00427 | | | | | | |
| | | | | | | | | | | [0.005] | | | | | | |
| Terms of trade, GEE measure | | | | | | | | | | | 0.142 | | | | | |
| | | | | | | | | | | | [0.087] | | | | | |
| Change in ratio of private credit, 2003-07 | | | | | | | | | | | | -0.044 | | | | |
| | | | | | | | | | | | | [0.019] | | | | |
| Current account balance, 2003-07 | | | | | | | | | | | | | 0.0458 | | | |
| | | | | | | | | | | | | | [0.047] | | | |
| Volatility of REER, 2003-07 | | | | | | | | | | | | | | -0.402 | | |
| | | | | | | | | | | | | | | [0.569] | | |
| Exchange rate peg, IMF classification | | | | | | | | | | | | | | | -0.00625 | |
| | | | | | | | | | | | | | | | [0.013] | |
| Euro area | | | | | | | | | | | | | | | 0.00445 | |
| | | | | | | | | | | | | | | | [0.013] | |
| Change in growth, trading partners | | | | | | | | | | | | | | | | 2.55 |
| | | | | | | | | | | | | | | | | [0.944] |
| ------------ | | | | | | | | | | | | | | | | |
| Observations | 51 | 51 | 51 | 51 | 51 | 51 | 51 | 46 | 51 | 51 | 51 | 51 | 51 | 51 | 50 | 51 |
| Adj. R-sqaured | 0.114 | 0.12 | 0.316 | 0.324 | 0.383 | 0.118 | 0.225 | 0.106 | 0.12 | 0.128 | 0.162 | 0.204 | 0.132 | 0.123 | 0.109 | 0.233 |

Standard errors in brackets, constant not reported. Blue shading indicates significance at 1%, green at 5% and orange at 10%.

## Table 6. Robustness
## Panel A. Robustness to different sub-samples

| | (1) | (2) | (3) | (4) | (5) | (6) |
|---|---|---|---|---|---|---|
| | Change in growth since the crisis (between 2008H1-2010H1 and 2003H1-2008H1) | | | | | |
| Sample | All 51 countries | ex-Euro area | ex-Oil exporters | ex-Eastern Europe | ex-Emerging Asia | ex-Ukraine |
| Inflation targeting | 0.019 | 0.024 | 0.015 | 0.016 | 0.019 | 0.016 |
| | [0.007]*** | [0.008]*** | [0.007]** | [0.006]*** | [0.007]** | [0.006]** |
| Observations | 51 | 40 | 48 | 42 | 46 | 50 |
| Adjusted R-squared | 0.114 | 0.151 | 0.0762 | 0.144 | 0.11 | 0.103 |

Standard errors in brackets. Constant not reported

* significant at 10%; ** significant at 5%; *** significant at 1%

## Panel B. Robustness to expanding the sample and comparison with Tsangarides (2010) results

| | (1) | (2) | (3) | (4) |
|---|---|---|---|---|
| | Change in growth since the crisis (2003/08-2008/09) | | | |
| Sample | Tsangarides (2010) | All | This paper | This paper |
| Inflation targeting | 0.0185 | 0.0217 | 0.0291 | |
| | [0.023] | [0.015] | [0.011]** | |
| Not a exchange rate peg, 2007 | | | | 0.0206 |
| | | | | [0.014] |
| In this paper sample | -0.0108 | -0.0125 | | |
| | [0.023] | [0.018] | | |
| In Tsangarides (2010) sample | | -0.0162 | -0.019 | -0.00553 |
| | | [0.017] | [0.011]* | [0.011] |
| Observations | 50 | 76 | 51 | 50 |
| R-squared | -0.0286 | -0.0091 | 0.0986 | 0.0113 |

Standard errors in brackets. Constant not reported

* significant at 10%; ** significant at 5%; *** significant at 1%

Table 7. Change in policy interest rates: 6- and 12-months into the Great Recession

| Change in policy interest rates | | | |
|---|---|---|---|
| **6 months into the Great Recession: August 2008-February 2009** | | | |
| **Top 5 smallest interest rate cuts** | | **Top 5 largest interest rate cuts** | |
| **Not IT** | **IT** | **Not IT** | **IT** |
| Argentina<br>Kazakhstan<br>Russian Federation<br>Venezuela, Rep. Bol. | Hungary | | Australia<br>New Zealand<br>Sweden<br>Turkey<br>United Kingdom |
| **12 months into the Great Recession: August 2008-August 2009** | | | |
| **Top 5 smallest interest rate cuts** | | **Top 5 largest interest rate cuts** | |
| **Not IT** | **IT** | **Not IT** | **IT** |
| Argentina<br>Croatia<br>India<br>Russian Federation<br>Singapore | | | Chile<br>Colombia<br>New Zealand<br>Sweden<br>Turkey |
| Note: Results based on sample of 51 countries, 23 of which are inflation targeters. Countries in the Euro area are classified as non-IT countries and I use the common Euro area policy rate for their (common) policy rate. | | | |

Table 8. Change in real interest rates (based on policy rates and forward-looking Consensus Forecast inflation)

| 6 months into the Great Recession: August 2008-February 2009 | | | |
|---|---|---|---|
| Top 5 smallest interest rate cuts | | Top 5 largest interest rate cuts | |
| Not IT | IT | Not IT | IT |
| Argentina<br>Russian Federation<br>Ukraine | Hungary<br>Indonesia | Venezuela, Rep. Bol. | Australia<br>Norway<br>Turkey<br>United Kingdom |
| 12 months into the Great Recession: August 2008-August 2009 | | | |
| Top 5 smallest interest rate cuts | | Top 5 largest interest rate cuts | |
| Not IT | IT | Not IT | IT |
| Argentina<br>China,P.R.:Hong Kong<br>Japan<br>Russian Federation<br>Singapore | | Venezuela, Rep. Bol. | Chile<br>Colombia<br>New Zealand<br>Turkey |
| Note: Results based on sample of 40 countries, 20 of which are inflation targeters. Countries in the Euro area are classified as non-IT countries and I use the common Euro area policy rate for their (common) policy rate. | | | |

**Data Appendix**

Our full sample includes countries whose nominal GDPs were larger than USD 10 billion in 2002 and for which at least three of the following four variables are available: unemployment rate, industrial production, policy interest rate and the CDS spread.

The countries excluded from our sample because their economies are 108: Afghanistan, I.R. of, Albania, Angola, Antigua and Barbuda, Armenia, Azerbaijan, Rep. of, Bahamas, The, Bahrain, Kingdom of, Barbados, Belarus, Belize, Benin, Bhutan, Bolivia, Bosnia & Herzegovina, Botswana, Brunei Darussalam, Bulgaria, Burkina Faso, Burundi, Cambodia, Cameroon, Cape Verde, Central African Rep., Chad, Comoros, Congo, Dem. Rep. of, Congo, Republic of, Costa Rica, Cyprus, Côte d'Ivoire, Djibouti, Dominica, El Salvador, Equatorial Guinea, Eritrea, Estonia, Ethiopia, Fiji, Gabon, Gambia, The, Georgia, Ghana, Grenada, Guinea, Guinea-Bissau, Guyana, Haiti, Honduras, Iceland, Jamaica, Jordan, Kenya, Kiribati, Kyrgyz Republic, Lao People's Dem.Rep, Latvia, Lebanon, Lesotho, Liberia, Lithuania, Macedonia, FYR, Madagascar, Malawi, Maldives, Mali, Malta, Mauritania, Mauritius, Moldova, Mongolia, Mozambique, Myanmar, Namibia, Nepal, Nicaragua, Niger, Panama, Papua New Guinea, Paraguay, Qatar, Rwanda, Samoa, Senegal, Serbia, Republic of, Seychelles, Sierra Leone, Solomon Islands, Sri Lanka, St. Kitts and Nevis, St. Lucia, St. Vincent & Grenadines, Sudan, Suriname, Swaziland, São Tomé & Príncipe, Tajikistan, Tanzania, Togo, Tonga, Trinidad and Tobago, Turkmenistan, Uganda, Uruguay, Uzbekistan, Vanuatu, Yemen, Republic of, Zambia.

Among those, 4 are excluded from the sample because of the size criterion: Bulgaria, Cyprus, Latvia and Lithuania; and 18 are excluded for not meeting the data availability criterion: Algeria, Bangladesh, Dominican Republic, Ecuador, Egypt, Guatemala, Iran, I.R. of, Kuwait, Libya, Morocco, Nigeria, Oman, Pakistan, Saudi Arabia, Syrian Arab Republic, Tunisia, United Arab Emirates, Vietnam. All others are excluded for both criteria.

These 52 countries are:

| Latin America (7) | | Emerging Asia (9) | | Emerging Europe (9) |
|---|---|---|---|---|
| Argentina | | China, P.R.: Mainland | | Croatia |
| Brazil | | China, P.R.: Hong Kong | | Hungary |
| Chile | | India | | Poland |
| Colombia | | Indonesia | | Romania |
| Mexico | | Malaysia | | Russian Federation |
| Peru | | Philippines | | Slovak Republic |
| Venezuela, Rep. Bol. | | Singapore | | Slovenia |
| | | Taiwan Prov. of China | | Ukraine |
| | | Thailand | | Turkey |
| **Advanced (11)** | | **Euro Area (13)** | | **Other Emerging (2)** |
| Australia | New Zealand | Austria | Ireland | Kazakhstan |
| Canada | Norway | Belgium | Italy | South Africa |
| Czech Republic | Sweden | Denmark | Luxembourg | |
| Israel | Switzerland | Finland | Netherlands | |
| Japan | United Kingdom | France | Portugal | |
| Rep. of Korea | United States | Germany | Spain | |
| | | Greece | | |

Of those, there are 10 countries where one of the four variables is missing. The
unemployment rate is missing for India and Indonesia; industrial production for China,P.R.:
Mainland; the CDS spread for Finland, Luxembourg, Luxembourg, Singapore, Switzerland,
United States and Taiwan Prov. of China is either missing or have limited coverage.

The IT classification was based on Friedman and Laxton (2009) and Roger (2009). There are
23 IT countries in the sample, of which 10 are classified as advanced (based on the WEO
definition), 13 as emerging economies. The table below presents the breakdown of the
sample in terms of inflation targeting regime and level of development.

| Advanced, IT (10) | Advanced, Not-IT (19) | Emerging, IT (13) | Emerging, not IT (9) |
|---|---|---|---|
| Australia | Austria | Brazil | Argentina |
| Canada | Belgium | Chile | China, P.R.: Mainland |
| Czech Republic | China, P.R.: Hong Kong | Colombia | Croatia |
| Israel | Denmark | Hungary | India |
| Republic of Korea | Finland | Indonesia | Kazakhstan |
| New Zealand | France | Mexico | Malaysia |
| Norway | Germany | Peru | Russian Federation |
| Sweden | Greece | Philippines | Ukraine |
| Switzerland | Ireland | Poland | Venezuela, Rep. Bol |
| United Kingdom | Italy | Romania | |
| | Japan | South Africa | |
| | Luxembourg | Thailand | |
| | Netherlands | Turkey | |
| | Portugal | | |
| | Singapore | | |
| | Slovak Republic | | |
| | Slovenia | | |
| | Spain | | |
| | Taiwan Province of China | | |

The **real effective exchange rate** (REER), the **nominal effective exchange rate** (NEER)
and **inflation rate** all come from the IMF/INS database. The REER is based on trade-
weighted CPI indexes.

The **5-year sovereign CDS spread** (n=50, of which 23 IT countries) was obtained from
Datastream and coverage goes through September 2010. I could not find any data on 5-year
sovereign CDS spreads for Luxembourg and Taiwan Prov. of China; while Finland,
Singapore and Switzerland have very limited time coverage.

The **unemployment rate** (n=49, of which 22 IT countries; data through May 2010) data
comes from several sources: IMF/IFS, IMF/GDS, Haver and Datastream/Eurostat. The
countries without data on unemployment are India and Indonesia. Countries for which
quarterly data was linearly interpolated to obtain monthly figures are Argentina, China, P.R.:
Mainland, Malaysia and Singapore.

| Data source for unemployment variable | | | |
|---|---|---|---|
| **IFS (21)** | **GDS (9)** | **Haver (9)** | **Datastream/Eurostat (9)** |
| Australia | Chile | China, P.R.: Hong Kong | Argentina |
| Austria | Colombia | China, P.R.: Mainland | France |
| Belgium | Israel | Croatia | Greece |
| Brazil | Mexico | Kazakhstan | Ireland |
| Canada | New Zealand | Russian Federation | Italy |
| Czech Republic | Peru | Singapore | Malaysia |
| Denmark | Philippines | Taiwan Province of China | Norway |
| Finland | South Africa | Ukraine | Portugal |
| Germany | Thailand | United Kingdom | Spain. |
| Hungary | | Venezuela | |
| Japan | | | |
| Republic of Korea | | | |
| Luxembourg | | | |
| Netherlands | | | |
| Poland | | | |
| Romania | | | |
| Slovak Republic | | | |
| Slovenia | | | |
| Sweden | | | |
| Switzerland | | | |
| Turkey | | | |

**Industrial production** (n=50, of which 23 IT countries; data through May 2010) data comes from IFS or Haver. The only country without data on industrial production is China, P.R.: Mainland. Countries for which quarterly data was linearly interpolated to obtain monthly figures are Australia, China: Hong Kong**,** New Zealand and Switzerland.

| Data source for industrial production variable | | | |
|---|---|---|---|
| **IFS (30)** | | **Haver (20)** | |
| Austria | Japan | Argentina | Switzerland |
| Belgium | Republic of Korea | Australia | Taiwan Province of China |
| Brazil | Luxembourg | Chile | Thailand |
| Canada | Malaysia | China: Hong Kong | Ukraine |
| Croatia | Mexico | Colombia | Venezuela. |
| Czech Republic | Netherlands | India | |
| Denmark | Norway | Indonesia | |
| Finland | Poland | Kazakhstan | |
| France | Portugal | New Zealand | |
| Germany | Romania | Peru | |
| Greece | Slovak Republic | Philippines | |
| Hungary | Slovenia | Russian Federation | |
| Ireland | Spain | Singapore | |
| Israel | Turkey | South Africa | |
| Italy | United Kingdom | Sweden | |

**Policy rate** (n=52, of which 23 IT countries) data comes from the IMF/GDS database. It covers the full sample, through September 2010.

Figure 1. Median real GDP index, 2003=0, for IT and not-IT countries



Real GDP, 2003=0, medians
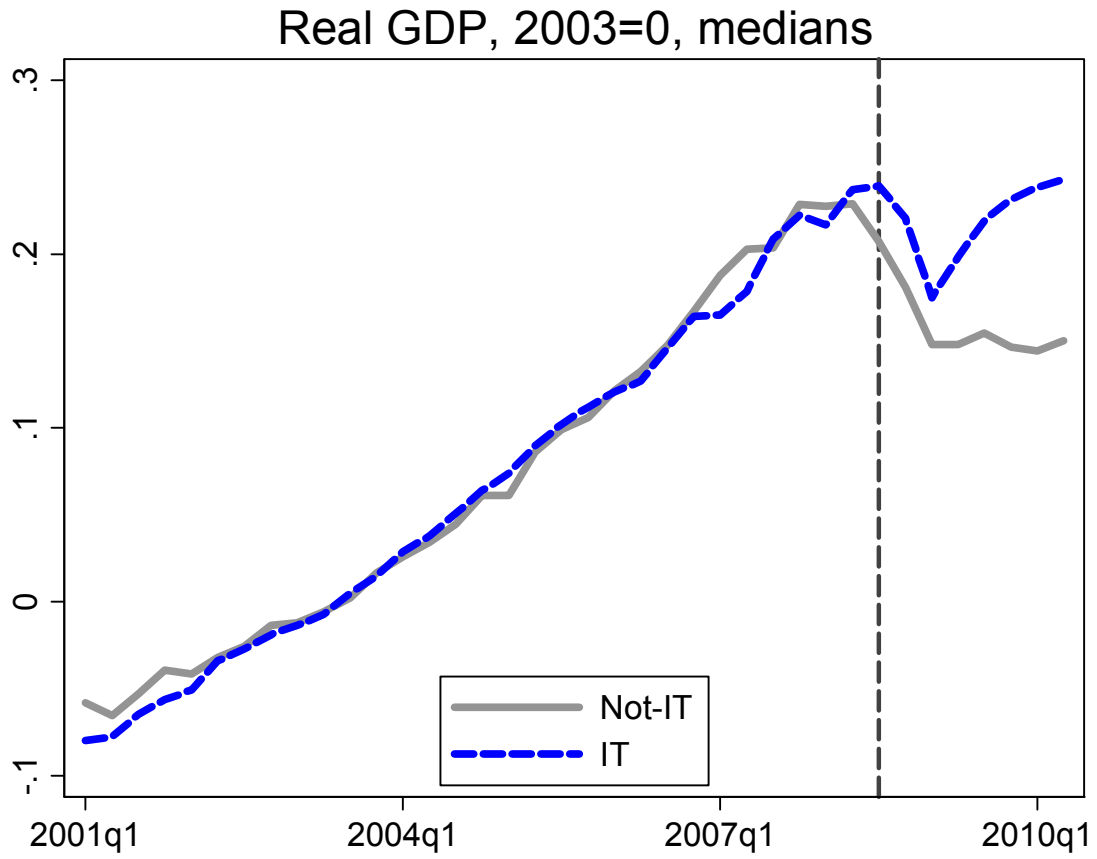
Figure 2. Median industrial production index, 2003=0, for IT and not-IT countries



Industrial production, medians
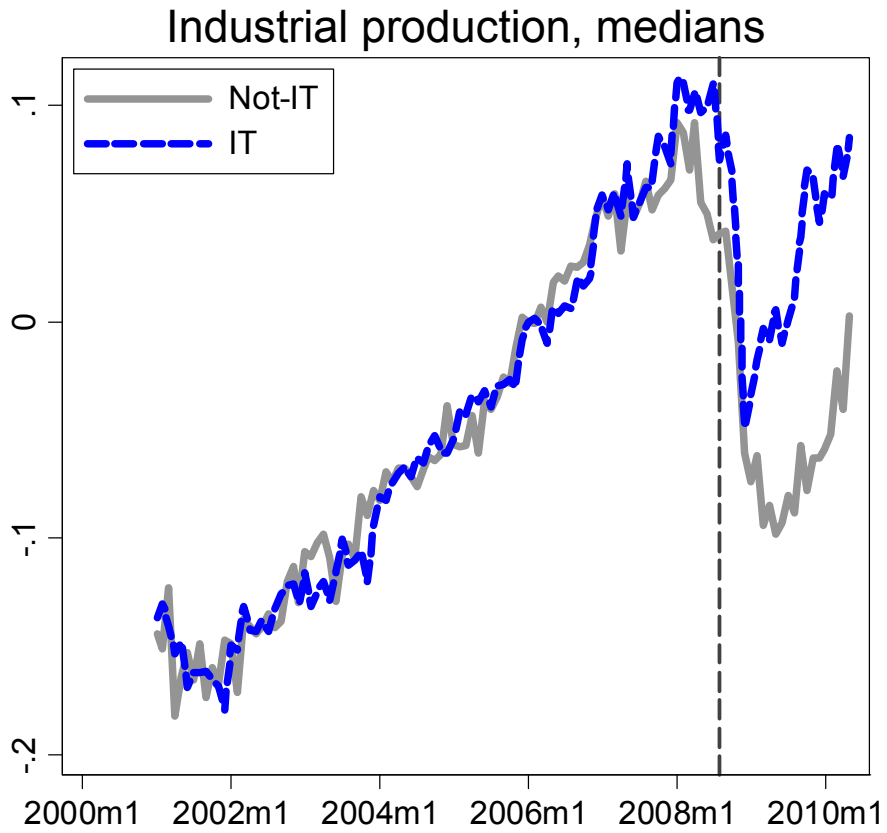
Figure 3. Change in GDP growth rate (2003H1-2008H1 to 2008H1-2010H1)
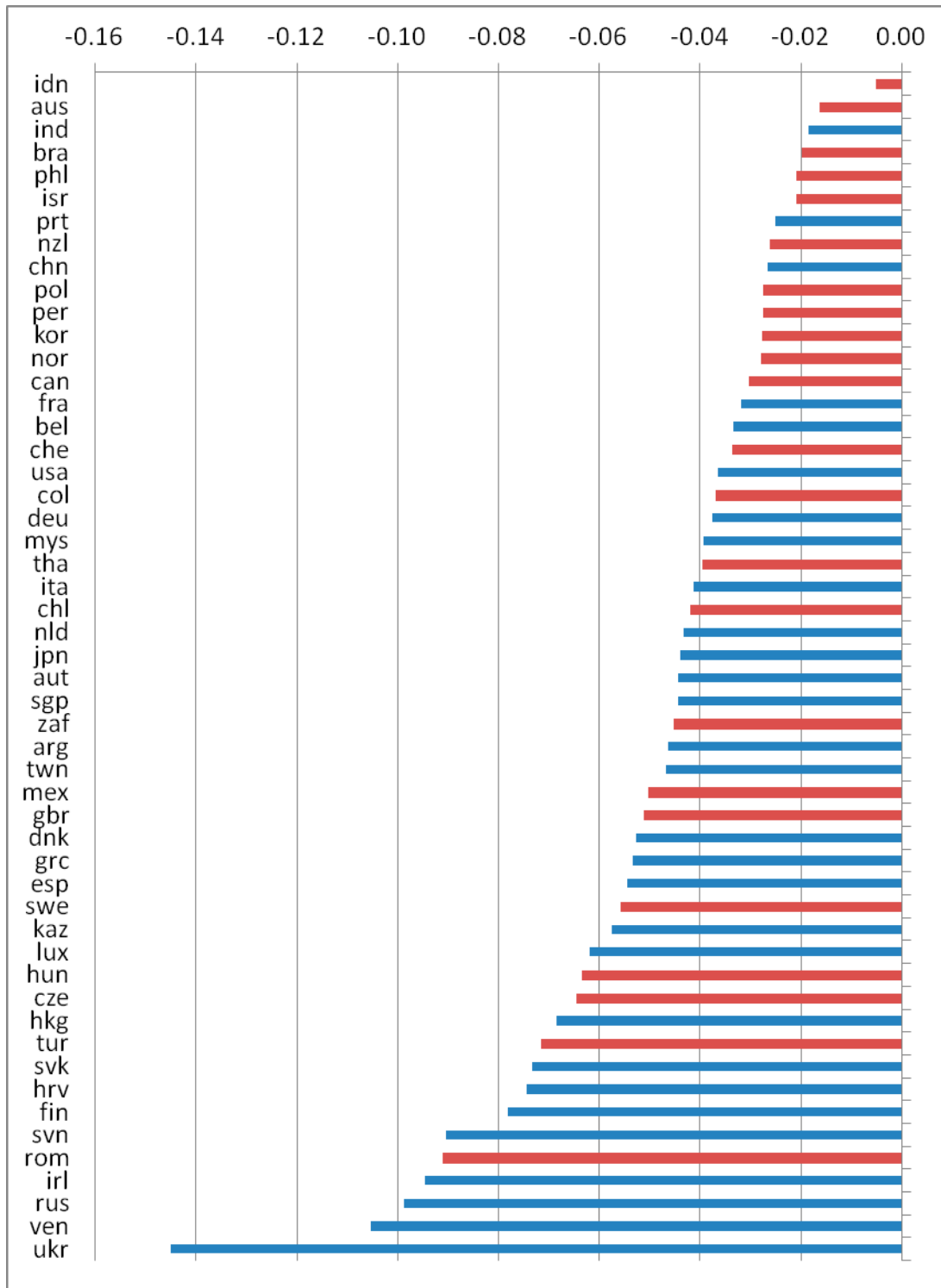


Red bars denote inflation targeting countries.

Figure 4. Posterior Probability of Variable Inclusion in the Equation for Change
in Growth Rate Since the Crisis
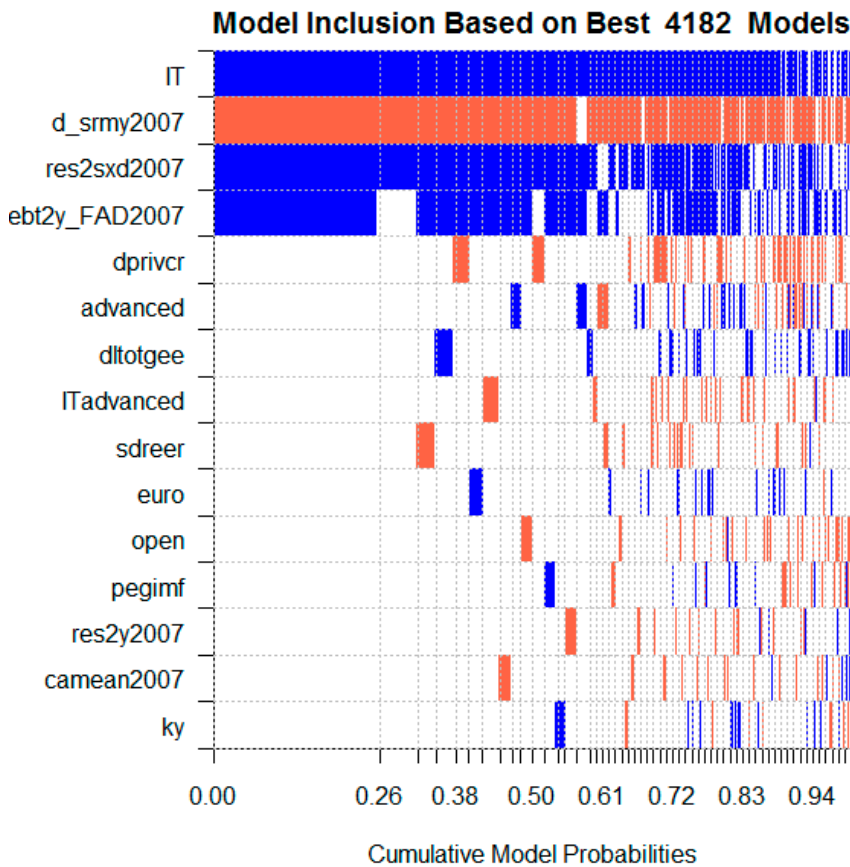


Glossary:
IT: Inflation targeting dummy
d_srmy2007: Short term external debt/GDP, 2007;
res2sxd2007: Reserves/Short term debt, 2007 eop
debt2y_FAD2007: Gross public debt to GDP, 2007
dprivcr: Change in ratio of private credit by DMB and other FI /GDP, 2003-2007
advanced: Advanced country dummy
dltotgee: Change in terms of trade (GEE), 2008H1-2010H1
ITadvanced: Inflation targeting advanced country
sdreer: Volatility of REER, 2003-07
euro: Euro area
open: Trade in G&S to GDP, 2003-07 average
pegimf: Exchange rate peg, de facto measure, AREAER/IMF
res2y2007: Reserves to GDP, 2007 eop
camean2007: Average CA/GDP ratio 2004-2007
ky: Total capital inflows 2006Q1-2007Q2, annualized (%GDP)

Estimates based on 200,000 burned iterations, 400,000 iterations, uniform prior over the space of models.

Figure 5. Policy interest rate, for IT and not-IT countries

Policy rate, means



(a)



(b)
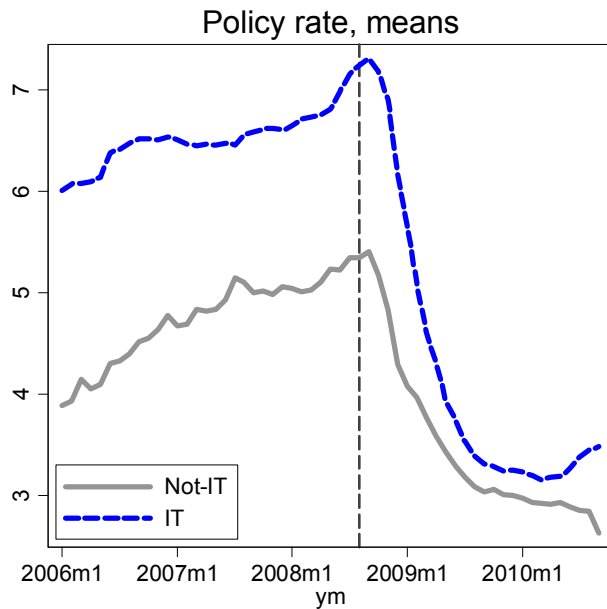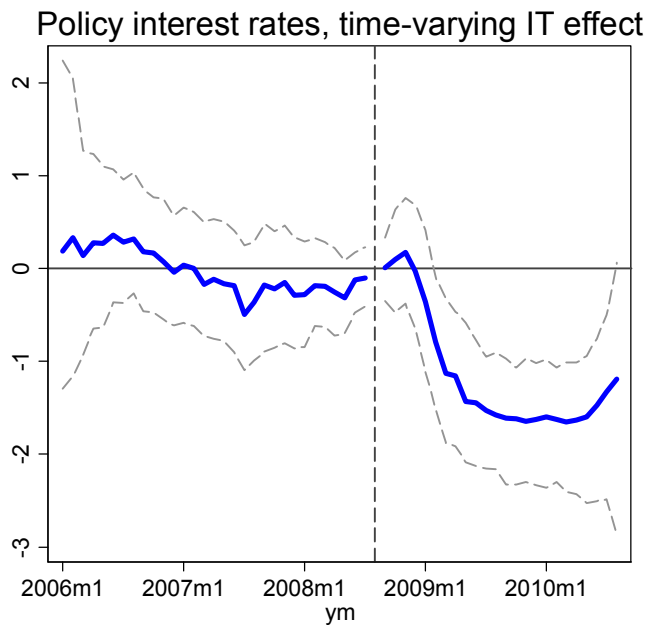
Source of data: IMF/GDS.
 (a) Mean policy rate for IT and non-IT countries;
(b) Difference in the time effects of policy rates for IT and non-IT countries. August 2008 is the excluded period and set to zero. Dashed lines are 90 percent confidence intervals obtained through block bootstrapping.

Figure 6. Real policy interest rate based on forward- and backward-looking inflation, for IT and not-IT countries



(a)



(b)
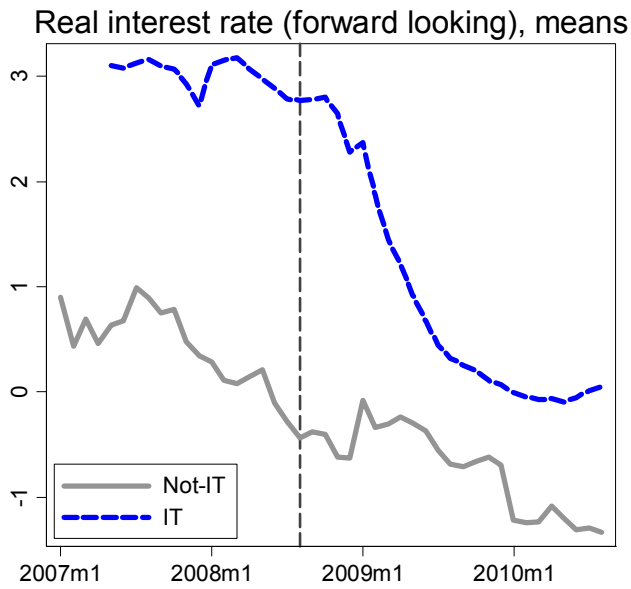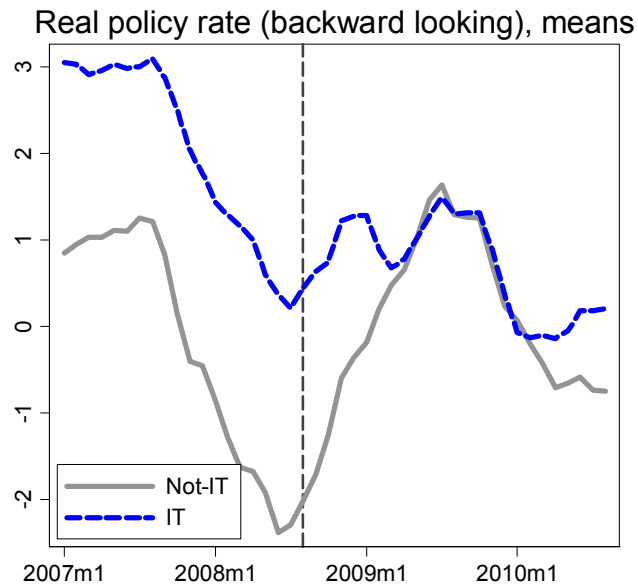
Source of data: IMF/GDS.

(a) Mean real policy rates for IT and not-IT countries, based on Consensus Forecast inflation rates for the subsequent year. The sample consists of 37 countries, of which 20 inflation targeters;

(b) Same, for real policy rates based on 12-month backward-looking inflation rates. The sample consists of 51 countries, of which 23 inflation targeters.

Figure 7. Differences in IT and not-IT time effects on real policy interest rate based on forward- and backward-looking inflation
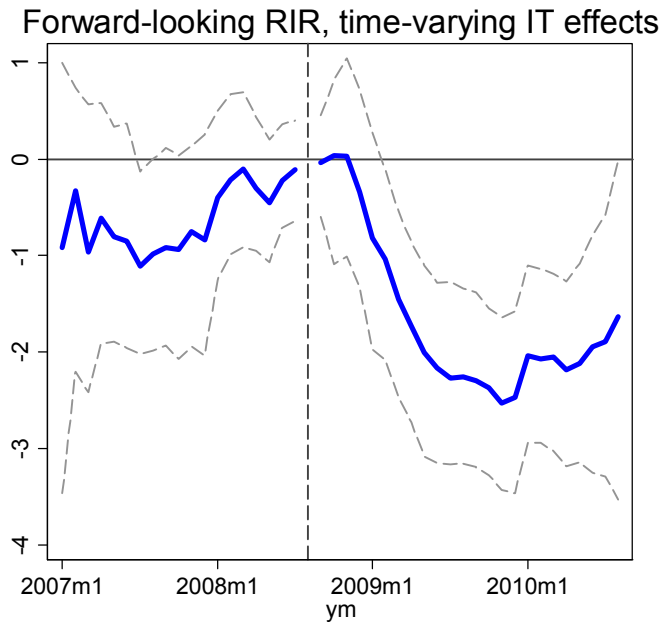


(a)
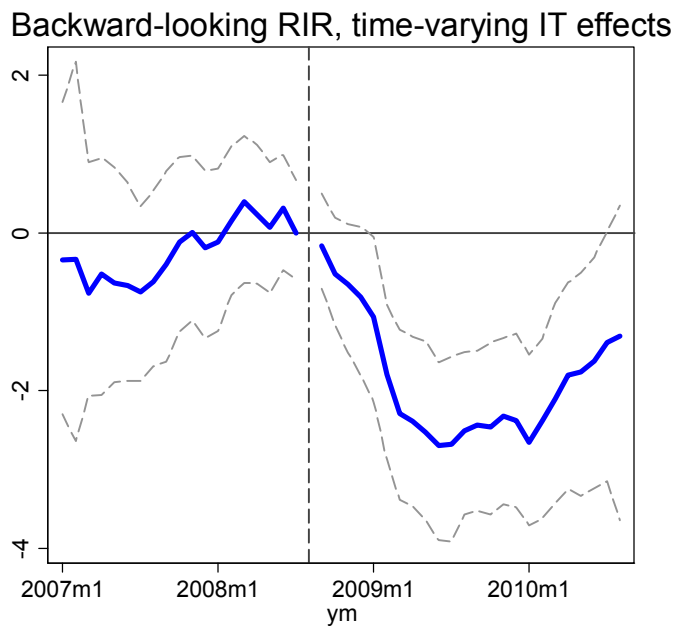


(b)

(a) Difference in the time effects of forward-looking real policy rates for IT and non-IT countries. August 2008 is the excluded period and set to zero. Dashed lines are 90 percent confidence intervals obtained through block bootstrapping.

(b) Same for backward-looking real policy rates.

Figure 8. Median 12-month inflation and the frequency of deflation scares, for IT and not-IT countries.

**12-month inflation (medians)**



(a)

**Frequency of 3 month deflation**
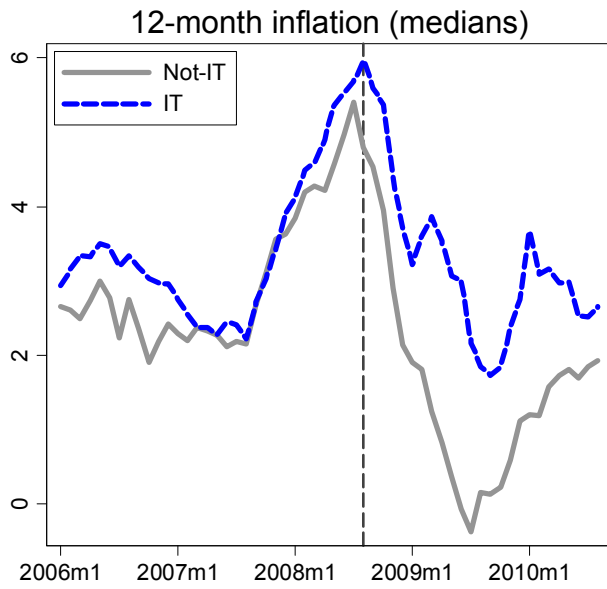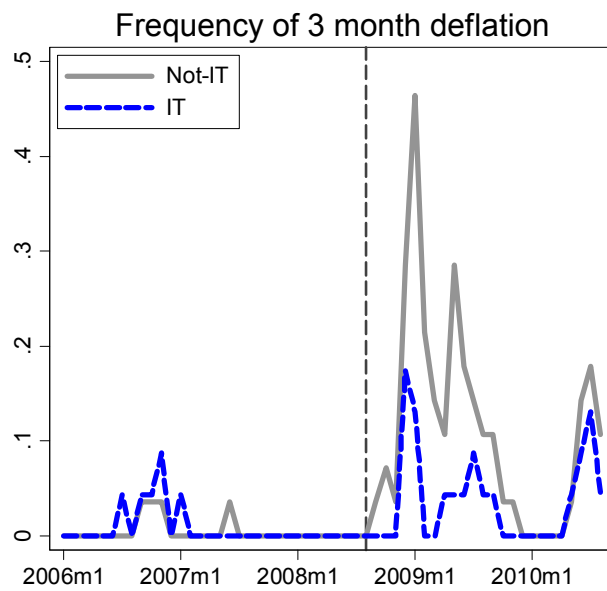


(b)
(a) Median 12-monthed inflation for IT and non-IT countries;
(b) Frequency of 3 subsequent months of negative inflation rates for IT and non-IT countries.

Figure 9. Real effective exchange rates: Medians and difference in time effects for IT and not-IT countries.
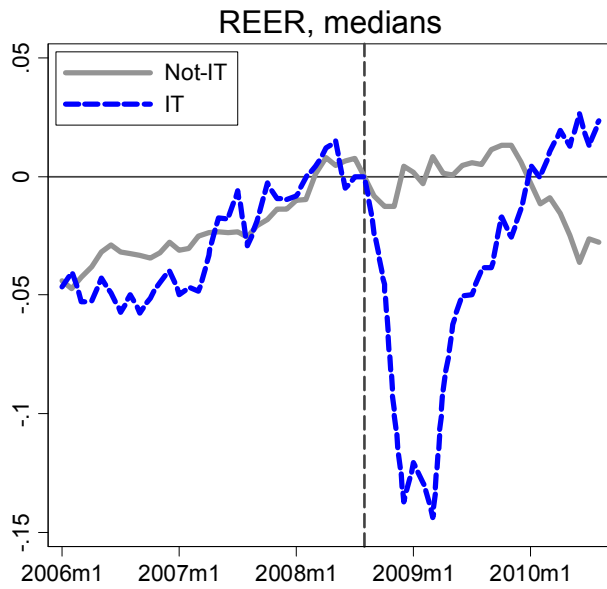


(a)
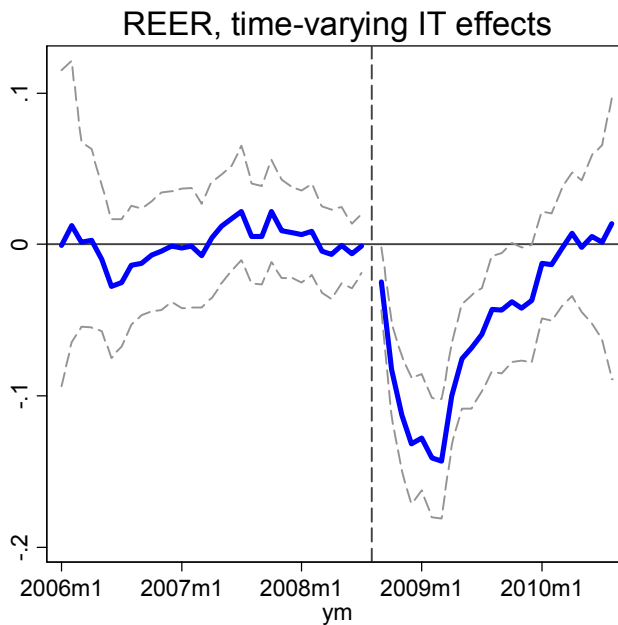


(b)

(a) Median log real effective exchange rates (REER) for IT and non-IT countries, measured as deviations from the August 2008 level.
(b) Difference in the time effects of the deviation of log real effective exchange rates from August 2008 level. Dashed lines are 90 percent confidence intervals obtained through block bootstrapping.

Figure 10. EMBI risk spread: Medians and difference in time effects for IT and not-IT countries.

### EMBI spread (medians)



(a)

### EMBI spread, time-varying IT effects
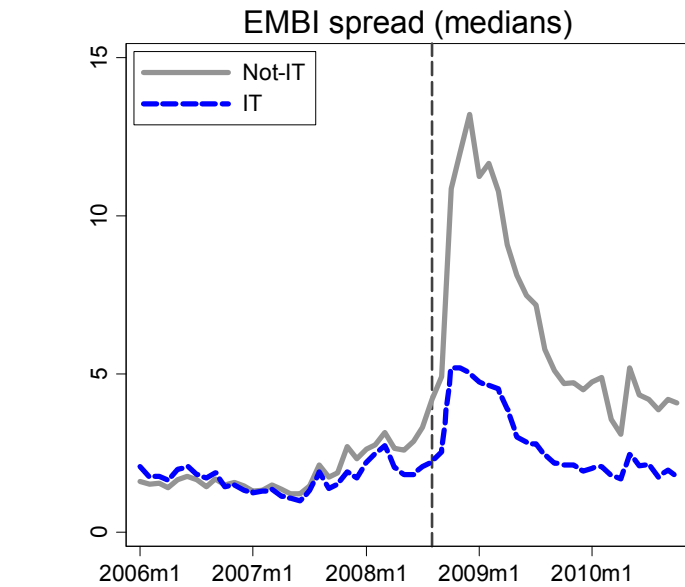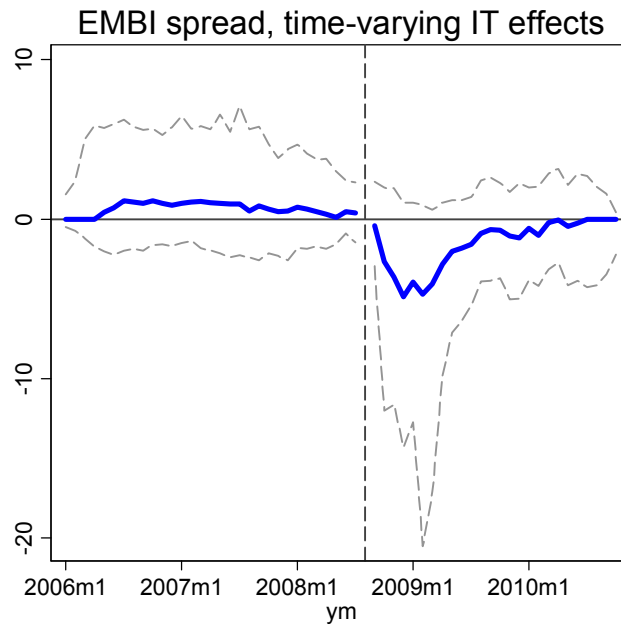


(b)

(a) Median EMBI spread for IT and non-IT countries;
(b) Difference in the time effects of the deviation of EMBI spreads from August 2008 level.
Dashed lines are 90 percent confidence intervals obtained through block bootstrapping.

Figure 11. Five-year CDS spread: Medians and difference in time effects for IT and not-IT countries.

## 5-Year CDS spreads (medians)



(a)

## 5-Year CDS spreads, time-varying IT effects
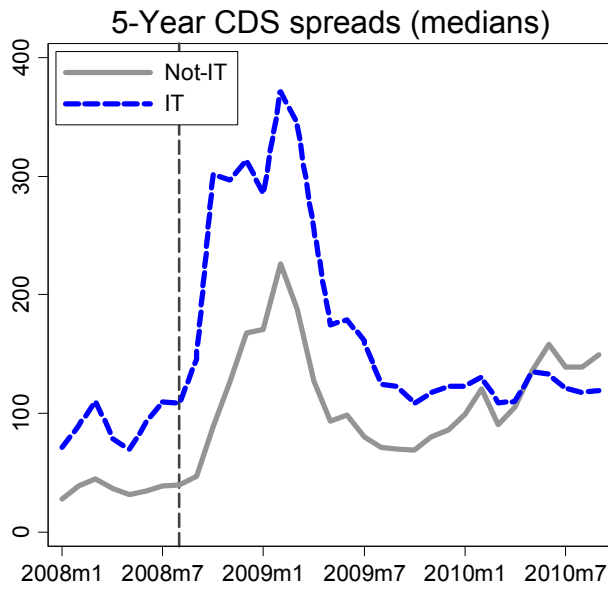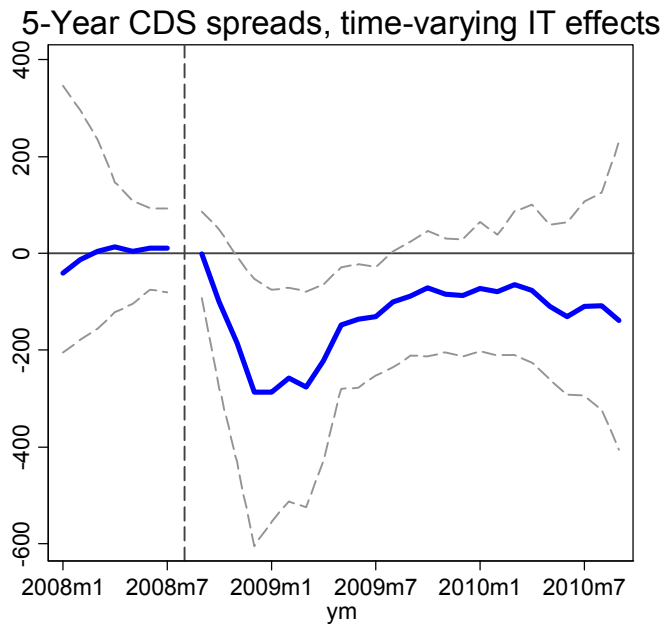


(b)

 (a) Median CDS spreads for IT and non-IT countries;
(b) Difference in the time effects of CDS premia for IT and non-IT countries. August 2008 is the excluded period and set to zero. Dashed lines are 90 percent confidence intervals obtained through block bootstrapping.

# Appendix Figures

Appendix Figure 1. Growth Acceleration and Pre-Crisis Level of Short-Term
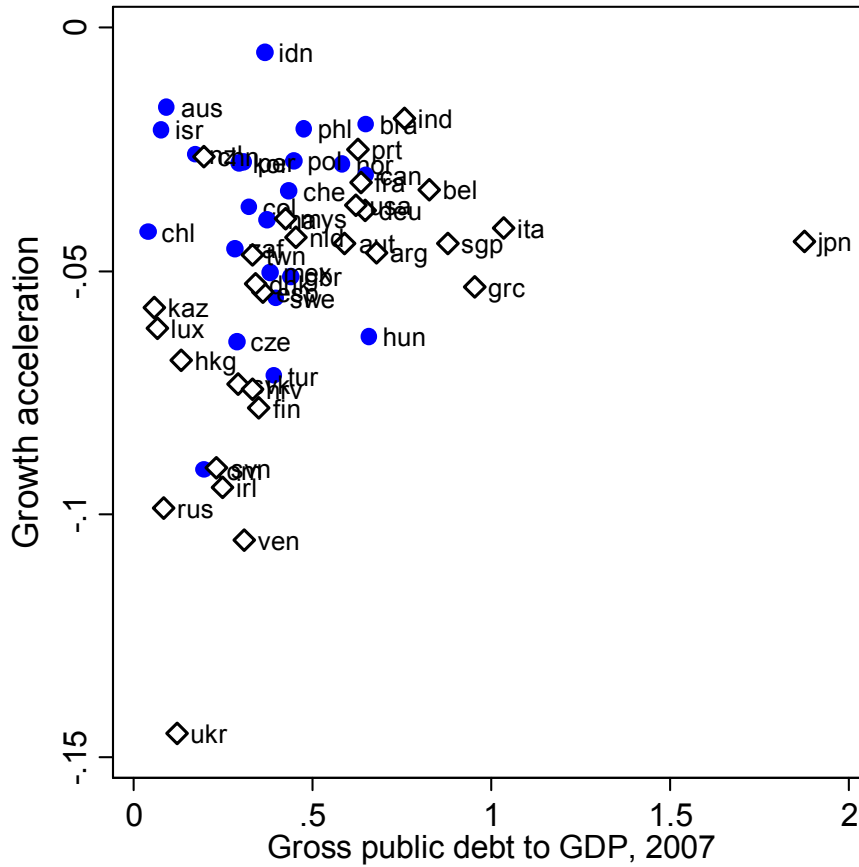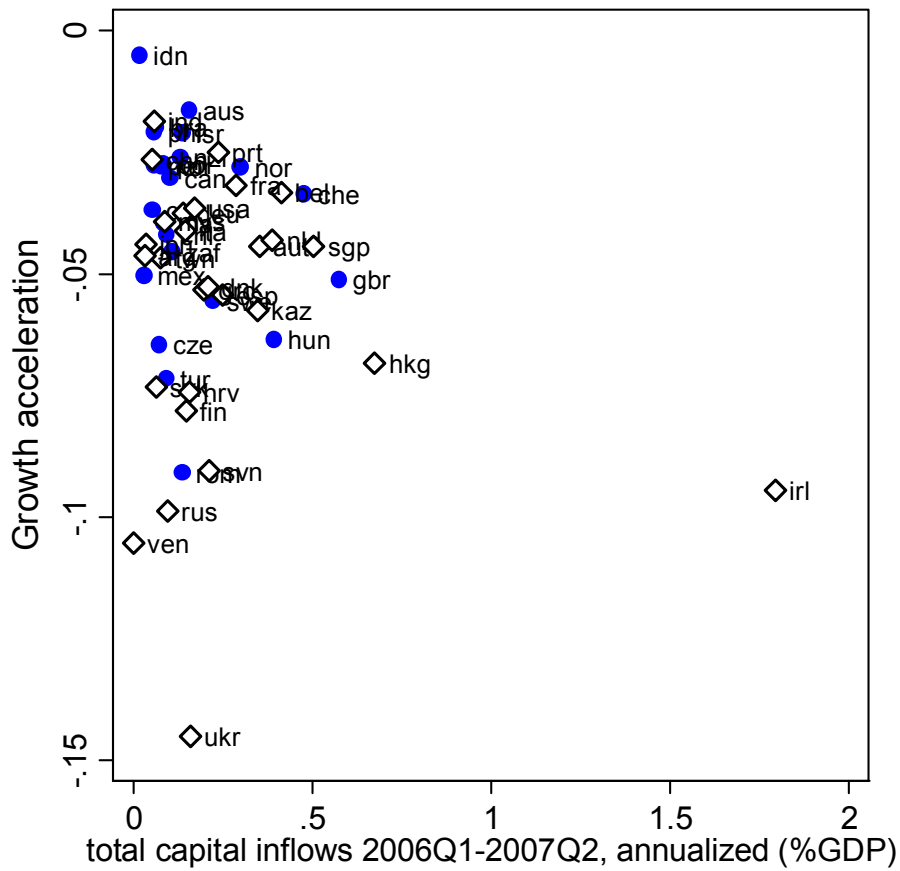External Debt to GDP
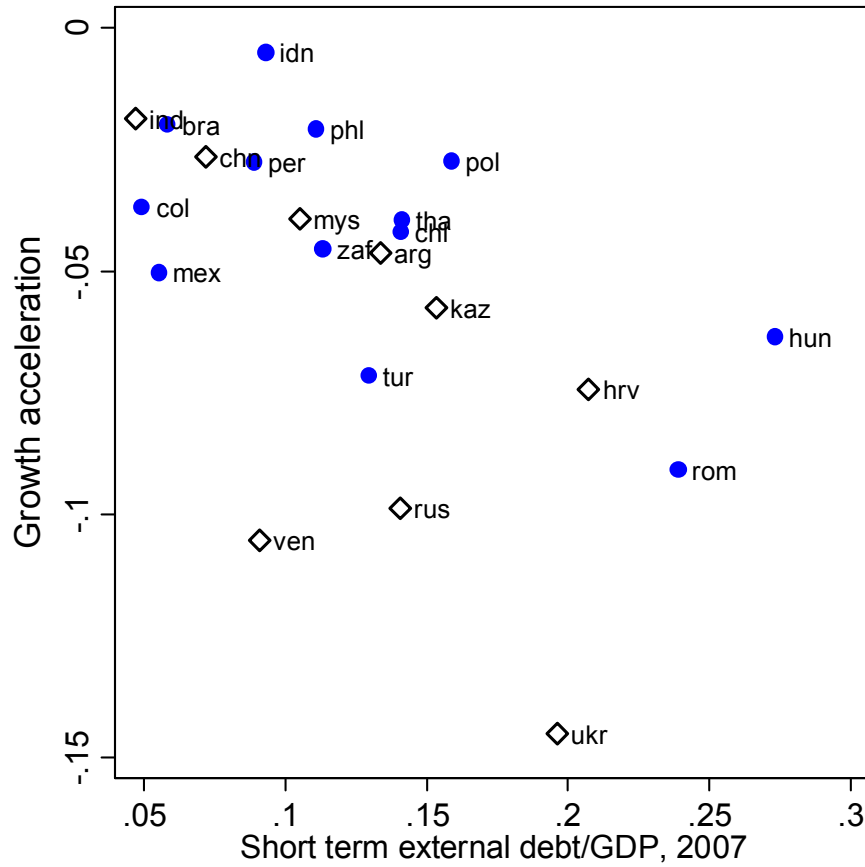


Blue circles are IT countries; other countries are represented by hollow diamonds.
Growth acceleration is the difference in growth rate between 2008H1-2010H1 and 2003H1-
2008H1.

Appendix Figure 2. Growth Acceleration and Pre-Crisis Ratio of Reserves to Short-Term External Debt
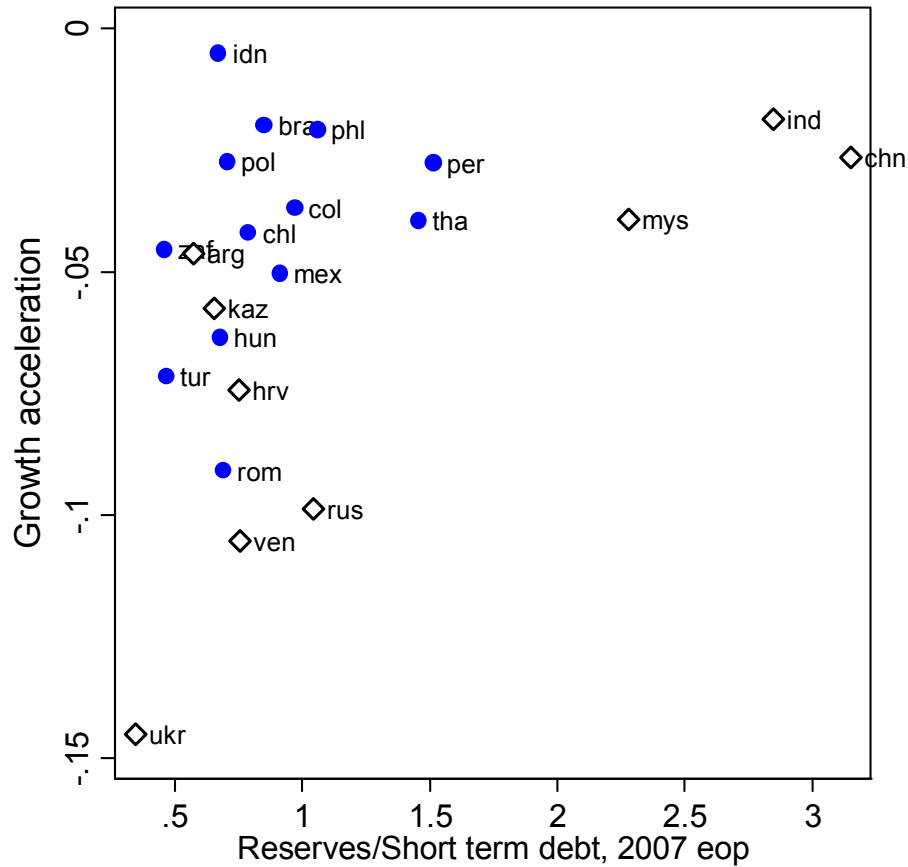


Blue circles are IT countries; other countries are represented by hollow diamonds. Growth acceleration is the difference in growth rate between 2008H1-2010H1 and 2003H1-2008H1.

Appendix Figure 3. Growth Acceleration and Trade Openness, 2003-2007
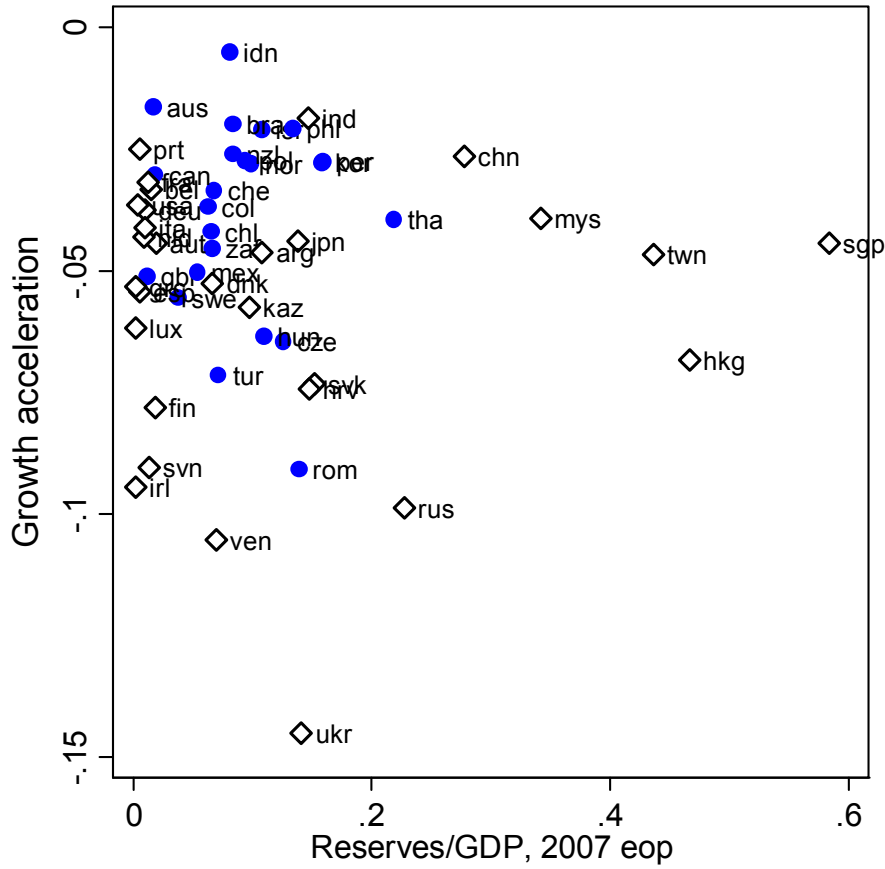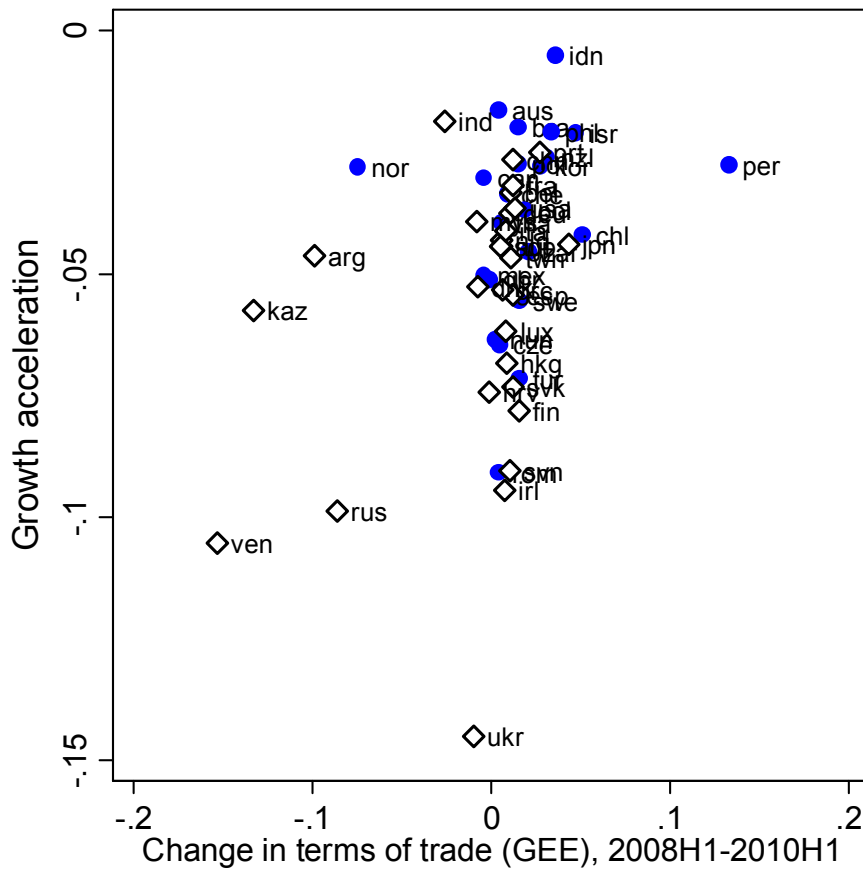


Blue circles are IT countries; other countries are represented by hollow diamonds.
Growth acceleration is the difference in growth rate between 2008H1-2010H1 and 2003H1-2008H1.

Appendix Figure 4. Growth Acceleration and Pre-Crisis Gross Public Debt to GDP
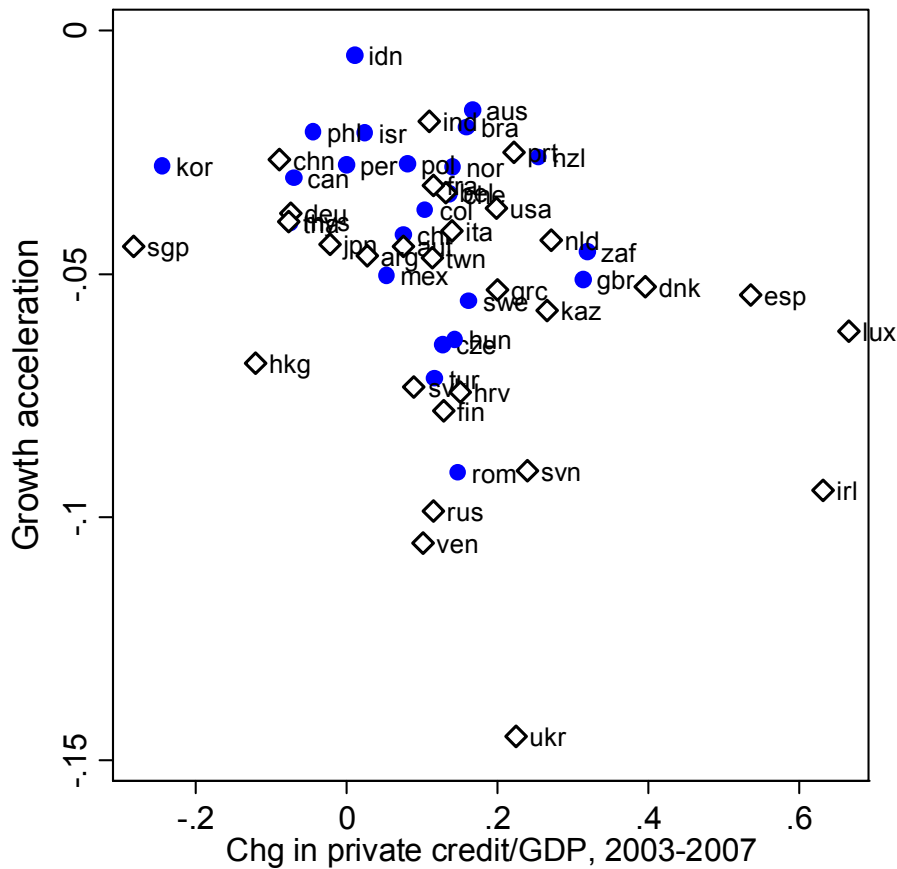


Blue circles are IT countries; other countries are represented by hollow diamonds.
Growth acceleration is the difference in growth rate between 2008H1-2010H1 and 2003H1-2008H1.

Appendix Figure 5. Growth acceleration and Pre-Crisis Total Capital Inflows to GDP (Luxembourg excluded from this figure)



Blue circles are IT countries; other countries are represented by hollow diamonds.
Growth acceleration is the difference in growth rate between 2008H1-2010H1 and 2003H1-2008H1.

Appendix Figure 6. Growth acceleration and Pre-Crisis Trade in Goods and Services to GDP
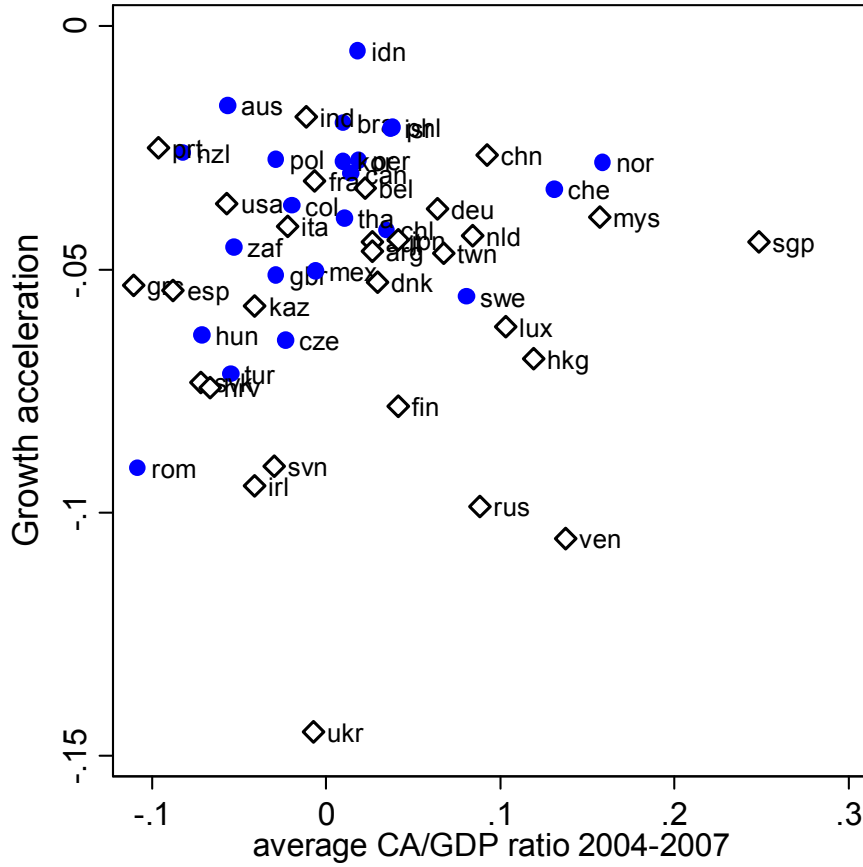


Blue circles are IT countries; other countries are represented by hollow diamonds.
Growth acceleration is the difference in growth rate between 2008H1-2010H1 and 2003H1-2008H1.

Appendix Figure 7. Growth Acceleration and Change in Terms of Trade 2008-2010.



Blue circles are IT countries; other countries are represented by hollow diamonds.
Growth acceleration is the difference in growth rate between 2008H1-2010H1 and 2003H1-2008H1.

Appendix Figure 8. Growth Acceleration and Change in the Ratio of Private Credit from DMB and Other Financial Institutions to GDP, 2003-2007.
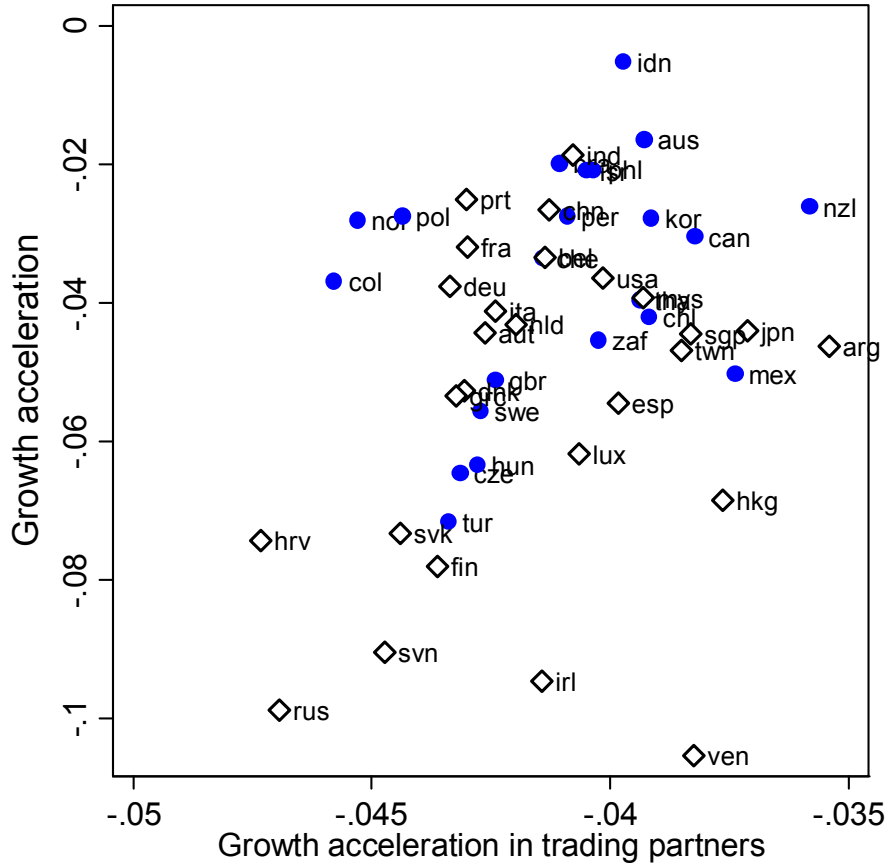


Blue circles are IT countries; other countries are represented by hollow diamonds.
Growth acceleration is the difference in growth rate between 2008H1-2010H1 and 2003H1-2008H1.

Appendix Figure 9. Growth Acceleration and Average Current Account Balance to GDP, 2003-2007.



Blue circles are IT countries; other countries are represented by hollow diamonds.
Growth acceleration is the difference in growth rate between 2008H1-2010H1 and 2003H1-2008H1.

Appendix Figure 10. Growth Acceleration and Average Growth Acceleration in Trading Partners



Blue circles are IT countries; other countries are represented by hollow diamonds.
Growth acceleration is the difference in growth rate between 2008H1-2010H1 and 2003H1-2008H1.