

Policy Conflicts and Inflation Targeting: The Role of Credit Markets^{*}

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Abstract A broad set of countries have adopted inflation targeting monetary policy regimes. We show that stabilizing volatility in credit growth often conflicts with price stability goals as unusual credit expansions often occur when inflation is low relative to goals and credit slumps often appear when inflation is overshooting. We find that inflation targeting central banks target credit conditions in both developed and emerging-market economies. However, emerging-market central banks are more sensitive to inflation conditions, responding to credit growth only when consistent with reaching the price target. We also find that macroprudential regulations are also used as a substitute for monetary policy used to address financial markets when orthodox monetary policy moves would be inconsistent with the price target.

^{*} This paper should not be reported as representing either the views of the IMF or those of the Bank of Korea. The views expressed herein are those of the authors and do not represent those of the IMF or BOK.

I. Introduction

Over the last twenty years, a wide range of central banks in developed and emerging-market economies have adopted inflation targeting monetary policies (see Hammond, 2012). There are an extensive set of elements of a full-fledged inflation targeting regime. Key aspects include the use of the overnight interest rate as the operating instrument and a focus on price stability as both the ultimate goal and the nominal anchor for the currency. Price stability is one among many of the possible goals for the central bank. Given a liberalized money market, a central bank with a focus on a limited number of instruments may be unable to achieve other potentially important goals including business cycle stability, exchange rate stability, and financial market stability amongst others.

To achieve each independent goal, policymakers must have access to an independent instrument. However, different stability goals are likely to be connected with one another in many cases. For example, New Keynesian theory suggests that implementing price stability does not conflict with business cycle stabilization goals and indeed can achieve first best outcomes, if the economy is subject to standard demand shocks (see Woodford, 2002). Only if independent shocks shift inflation and the output gap in opposite directions, would policymakers face a trade-off between alternative goals.

This paper is meant to tabulate potential conflicts between price stabilization and alternative monetary policy goals. Though many central banks have price stability as an ultimate objective, inflation targeting regimes present clear numerical targets for the inflation rate. Most inflation targeting regimes will also allow target ranges for inflation before a target is considered to be missed. We identify periods when an inflation targeting central bank faces monetary policy constraints by comparing actual measures of inflation with the target range. During periods when inflation lies outside of the target range, the degrees of freedom that the central bank might have to address conflicting goals is likely reduced. For example, if inflation rates exceed the target range, a central bank response to a business cycle recession or an appreciating currency could raise credibility issues regarding the central bank's commitment to its inflation target.

This paper examines the frequency with which the price stability goal might conflict with a variety of other goals like the stability of the output gap, exchange rates, and credit growth. These conflicts can be particularly transparent for inflation targeting central banks which are explicit about their numerical goals and acceptable range for inflation outcomes. Periods in which inflation are out of range require policy actions or justifications. We find examples in which inflation is below the target range suggesting expansionary policy but other potential goals are already accelerating and likewise find examples when inflation is above target but other potential goals are slowing.

Though goals of stabilizing the output gap and the exchange rate sometimes conflict with movements in the inflation rate, conflicts are not as frequent as potential conflicts between credit growth and the inflation rate. We find that credit growth is at least as frequently high when inflation is above target as when it is below.

An ongoing debate considers whether an exclusive focus on price stability is optimal with a financial system out of sync with inflationary conditions. We estimate a monetary policy reaction function with panel data, finding that central banks are responsive to credit growth in setting their monetary policy rates (in addition to inflation and the output gap). In emerging markets, however, central banks response to credit conditions is limited to periods when policy movements are required by inflation condition. In developed economies, the sensitivity of monetary policy to credit growth is more consistent across inflation conditions.

Macroprudential regulatory adjustments are an additional tool that can be used to address additional goal. We find that macroprudential actions are used as a substitute for the traditional monetary policy instruments when the latter are constrained by the inflation target. We find that when inflation is below the target range, which might constrain a central bank from raising interest rates based on financial conditions, central banks are more likely to implement macroprudential actions that tighten credit. Likewise, we find that when inflation is above the target range, central banks are more likely to implement macroprudential regulations which broaden the availability of credit.

II. Data

We examine data from 23 countries identified as implementing inflation targeting in Hammond (2012) including Australia, Brazil, Canada, Chile, Colombia, the Czech Republic, Hungary, Iceland, Indonesia, Israel, Korea, Mexico, New Zealand, Norway, Peru, Philippines, Poland, Romania, South Africa, Sweden, Thailand, and Turkey. We do not include Armenia, Ghana, Guatemala or Serbia for reasons of data availability. Data on the inflation target are taken from a variety of central bank publications, web sites and IMF Article IV reports listed in the appendix. Some countries operate a target range without a particular numerical target. In these cases, we use the midpoint of the range as a proxy for the target. Some countries operate point targets without specifying an error band. In these cases, we assume targets of \pm targets. All inflation targets are specified on an annual basis. Where possible we used ex ante targets, ignoring changes that occur within a year.

We obtain measures of headline CPI inflation from the IMF International Financial Statistics. Data on Core Inflation comes from the OECD Main Economic Indicators and a variety of national statistical agencies and central banks. Australia, Canada, Chile, Czech Republic, Hungary, Israel, Iceland, Korea, Mexico, New Zealand, Norway, Poland, Sweden, Switzerland,

Turkey, UK, and South Africa core inflation is *CPI: All Items: Non-Food Non-Energy* from OECD Main Economic Indicators base 2010. For Peru, we use *CPI: Lima: Core* base 2009=100 from Central Reserve Bank of Peru. For the Philippines, we use Core Consumer Price Index base 2006=100 from Philippine Statistics Authority. For Romania, we use HICP: All Items: excl Energy, Food, Alcohol & Tobacco base 2005=100 from Eurostat. For Thailand, we use CPI: NFB: Exclude Food and Energy base 2011=100 from Bureau of Trade and Economic. For Brazil, we use National Consumer Price Index: IPCA: Core: Exclusion (ex2) from Central Bank of Brazil. For Indonesia, we link Consumer Price Index: Core from Central Bureau of Statistics using base 2002, 2007, and 2012 successively.

In Table 1, we report statistics for each region (specifying Turkey, Israel and South Africa as Miscellaneous). We show the median level of year-on-year inflation, both headline and core for the period 2003-2014. We see that inflation tends toward the low single digits in the regions of the world. Due to the commodity cycle during this period, headline inflation has tended to be above core inflation by somewhat more than 50 basis points in all of the regions of the world except the miscellaneous category. In column (c) and (d), we show the median deviation of inflation from the inflation target (which varies from country to country and over time). The median gap is near zero with headline inflation above target and core inflation typically below target. Within each region, the typical deviation from target also tends to be small, less than 1% in all cases except Scandinavia where core inflation has generally run more than 1% below target and the miscellaneous countries where core inflation has generally been more than 1% above target.

Despite this overall good performance, there have been periods when inflation has deviated from target range. Column (e) through (h) show the % of country-quarters in which inflation is outside the target range for the countries in various regions. Columns (e) shows the number of quarters that any countries y-o-y core inflation rate was above the upper bound of the target range relative to the total number of country quarters in that region between 2003 and 2014. Column (f) shows the percentage with core inflation below the lower bound of the target range. Columns (g) and (h) show the percentage in which headline inflation is out of the target range. In the World as a whole, the headline inflation is more likely to be above the target range than core inflation, while at the same time core inflation is more likely to be below the target range. This is true for most of the regions of the world except for the Anglophone and the miscellaneous countries. In the Miscellaneous countries, the opposite pattern is observed while Core Inflation tends to be more likely to be within both bounds in the Anglophone countries.

It could be generous to consider inflation performance given the gap between core and headline inflation. Figure 1 reports the fraction of country-quarter in which core inflation in the broad set of inflation targeting countries exceeds the bounds over the period 2003 to 2014. Given that core headline has tended in most cases to be under the inflation target, the overshooting by core-

inflation could offer a clear indicator of overheating. The figure also shows the fraction of country-quarters in which headline inflation is under the lower bound. Given that headline inflation in most cases has tended to be above target, this might also offer a clear indicator of disinflationary pressures. During most of the previous decade, it appears that inflation has been held in check. The fraction of country-quarters in which year-on-year core inflation has been over target has been in the 10-20% range with the exception of 2008 and 2009. In 2008, over half of the time core inflation was above the target range. This might be attributed to the commodity cycle; in the same year, headline inflation exceeded the target range in over 80% of country-quarters. The occurrence of disinflationary episodes shows more volatility. We can observe that in more than half the years, headline inflation has been below the lower bound in more than 20% of country-quarters, while in another 3 years (2008 and 2010-11) only 10% of country quarters display disinflationary pressures. Notably, the crisis year of 2009 displays the greatest dispersion of inflationary and disinflationary conditions. In more than 30% of country quarters in 2009, core inflation was over shooting the target range while in another more than 30%, headline inflation was undershooting the range. Interestingly, the most recent year, 2014 displays the greatest frequency of disinflationary outcomes with more than 40% of country-quarters.

III. Inflation Targeting Policy Conflicts

A. Business Cycle Stabilization

We examine the conflicts between price stability and other goals which might be evidenced by an inflation targeting regimes. One potential conflict is the traditional Phillips curve tradeoff between inflation and growth. One can examine this tradeoff by comparing periods when inflation is outside of the target range with business cycle outcomes. We measure the output gap as the percentage deviation of seasonally adjusted real GDP (using the X12 method) from the Hodrick-Prescott Trend. The HP trend is constructed using data from 1990-2014. For each country, we construct the standard deviation of the output gap over the period between the onset of the inflation targeting regime and the second quarter of 2008. If that country's output gap in a given quarter is above that level, we characterize the country as in a boom during that quarter; if that country's output gap is below the negative of the pre-crisis standard deviation, we characterize the country-quarter as a recession.

We find little evidence of conflicts between stabilizing headline inflation. In Table 2, Panel A and B, we show the frequency of periods in which headline and core inflation respectively are outside of the target range. This is mapped versus periods within which the output gap is in an expansionary or recessionary period as defined in the above paragraph. We see that when headline inflation is below the target range, the economy is three times as likely to be in a recession as in an expansion. We see that when headline inflation is above the target range, the economy is more than twice as likely to be in an expansion as in a recession. These are

consistent with the idea that business cycles are primarily demand driven shifting the output gap and inflation in the same direction.

To more comprehensively assess the relationship between the output gap and business cycle stabilization, we construct a discrete variable *Inflation Status* which equals -2 when headline inflation is below the target, -1 when headline inflation is below target but within the target range, 1 when headline inflation is above target but within the range, and 2 when inflation is above the target upper bound. We also construct a continuous variable *Inflation Gap* which is the gap between inflation and the inflation target (or midpoint of the target range when a point target is unavailable). Table 2, Panel C shows the regression coefficient from a simple regression of our measure of the output gap on these variables. In each case, the relationship between headline inflation relative to target and the output gap is positive and significant at the 1% critical value. We also estimate a regression of the output gap on the inflation gap including country fixed effects and get similar results.

The evidence is less clear when we examine core inflation. We do see that when core inflation is below the target range, the economy is substantially more likely to be in a recession than in an expansion. However, when core inflation is above the target range, the economy is only slightly more likely to be in expansion than in recession. To assess the relationship, we construct a discrete variable called Core Inflation Status which ranges from -2 to 2 with periods when core inflation is below target lower bound coded as -2, periods when core inflation is coded as 2; and periods when core inflation is within the target range but below or above target coded as -1 and 1 respectively. We also construct a continuous variable *Core Inflation Gap* which is the difference between year-on-year core inflation and the target range. We regress the output gap on these two series and report the results in Table 2.C. We also report the regression coefficient from a regression of the output gap on the core inflation gap with country fixed effects. All of the coefficients are positive. The coefficient on *Core Inflation Status* is only significant at the 10% critical value. The other coefficients are significant at the 1 % critical value.

B. Exchange Rate Stability

Another policy conflict potentially impacting central banks is the goal of exchange rate stability. A floating exchange rate is key condition for implementing inflation targeting in order to allow for a focus on internal price stability. Price stability and inflation stability are inherently linked as changes in the exchange rate feed through into domestic CPI inflation. Beyond its role in determining domestic prices however, exchange rate stability can offer independent benefits in stabilizing external goods and financial markets.

We define periods of exchange rate appreciation or depreciation for a subset of inflation targeting countries in terms of the behavior of their exchange rate with the US dollar. We restrict our analysis to countries in Latin America or Asia in addition to Anglophone countries. Exchange rate stability versus the Euro might be more important for countries in Scandinavia,

Eastern Europe or the Near East. For each of the remaining countries, we calculate periods of depreciation as periods when the year-on-year growth rate of the US dollar exchange rate is larger than the rate measured as one standard deviation above the average for the period between the onset of inflation targeting and the onset of the Lehman Brothers crisis. We calculate periods of appreciation as quarters when the growth rate is lower than the rate measured as one standard deviation below the average for the same period.

Table 3, Panel A and Panel B tabulate periods of appreciation and depreciation versus *Inflation Status* and *Core Inflation Status*. In both cases, when inflation is above the upper target bound, the economy is much more likely to be in a period of depreciation. However, the opposite is not the case when examining periods of disinflation. When the inflation rate is below the lower bound, the exchange rate is roughly equally likely to be in a period of depreciation as appreciation. However, we can still observe a relationship between periods of appreciation and low inflation. For example, we see that when we are in a period of appreciation, the core inflation rate is more than twice as likely to be below target as above target.

We again regress the year-on-year growth rate of the exchange rate (i.e. the depreciation rate) on the Inflation Status and the Inflation Gap and Core Inflation Status and Core Inflation Gap. We see in simple regressions or fixed effects regressions a uniformly positive relationship with all coefficient estimates being significant at the 1% critical value. It is not perhaps surprising that nominal exchange rate movements are positively associated with inflation movements. These preliminary results are not sufficient to minimize the possibility of the existence of significant conflicts between inflation targeting goals and exchange rate stability. However, they do lead us to turn towards examining conflicts in potential goals with credit markets.

C. Financial Stability

i. Credit Growth

We examine credit growth for a number of countries within our sample. As our measure of credit, we use credit to the non-financial private sector from domestic banks as measured by the BIS Long-term Private Credit database. This database has quarterly data for Australia, Brazil, Canada, Czech Republic, United Kingdom, Hungary, Indonesia, Korea, Mexico, Norway, Poland, Sweden, Thailand, Turkey, and South Africa. We augment this with quarterly data on Bank Claims on the Private Sector for Chile, Colombia, Iceland, Philippines, Romania and Serbia from IMF IFS. Each of these series is deflated with the CPI. The year-on-year percentage increase in these series we call credit growth.

We construct measures of periods of credit contraction and expansion which are compared with inflation conditions in Table 4. A period of loosening credit is one in which real credit growth expands at a level higher than the average level plus one standard deviation for that country

measured over the pre-crisis inflation targeting period for that country. Conversely, credit tightening occurs when real credit growth is slower than the average growth rate less one standard deviation measured over the pre-crisis inflation targeting period. The association of credit conditions with inflation conditions is a bit mixed. For example, a period in which headline inflation is considerably below the lower bound of the target range is notably more likely to be in a credit contraction than in an expansion. The reverse is true for core inflation, however; when core inflation is below the lower bound, credit conditions are more likely to be loose. Moreover, we also see that in country-quarters where inflation is above the relevant target range, credit conditions are likely to be tight with significantly more periods with credit growth one standard deviation below mean rather than above.

Regressing real credit growth on either a continuous measure of the Inflation Gap or on Inflation Status, we see that the results are mixed in terms of sign but never significant. However, when we add country fixed effects, we see that both the headline *Inflation Gap* and the *Core Inflation Gap* are strongly negatively associated with inflation. We could view this as evidence of a conflict since the policy interest rate is thought to affect both variables in the same direction. Raising policy interest rates to slow credit growth would also exacerbate slow inflation while cutting rates to accelerate slow inflation would exacerbate slow credit growth.

ii. Hot Money Flows

A more ambiguous form of financial stability facing policymakers in small open economies is the volatility of short-term liabilities. Abstracting from inflationary concerns, a country experiencing a wave of capital inflows might raise interest rates to slow the expansion of domestic credit. Other policymakers might argue for cutting interest rates to reduce incentives to participate in the carry trade. Given this ambiguity, it may not be ex ante clear whether strong capital inflows or capital outflows conflict with inflation targeting goals at any time period. Still, it may be interesting to outline these outcomes.

We measure hot money stocks as the sum of short-term liabilities to BIS banks and short-term international debt securities. Hot money flows are measured as the year-on –year incremental increase in outstanding hot money stocks relative to GDP 4 quarters previous. We categorize the economy as experiencing hot money inflows when hot money flows are more than pre-crisis mean plus one pre-crisis standard deviation and the economy is experiencing hot money outflows when hot money flows are less than pre-crisis mean less one pre-crisis standard deviation. Table 5 tabulates periods of hot money flows relative to periods of inflation vs. disinflation. Overall, there are more periods of hot money outflows perhaps related to post-crisis financial disintermediation. During periods in which inflation (either core or headline) is below the lower bound of the target range, there are a disproportionately high number of outflows relative to periods of inflows. When inflation is above the range, this is not true.

We also report direct regressions of hot money flows on inflation and the inflation gap measurements. Though we are unable to find a significant relationship between hot money flows

and headline inflation, we do find a strong negative and significant relationship between measures of the gap between hot money flows and core. Whether that relationship indicates a conflict with price stability goals may depend on the nature of the transmission mechanisms and hot money flows.

IV. Credit Conflicts and Monetary Policy

To assess the impact of credit markets on monetary policy, we estimate a version of the Taylor rule equation. We define the interest rate gap as the difference between the interest rate and the inflation target. We think of the interest rate gap as a quasi-real interest rate that can be directly controlled by the central bank. If inflation expectations were well grounded at the target, the interest rate gap would be equivalent to the real interest rate. Data on short-term nominal interest rates is from IMF International Financial Statistics. For Australia, Brazil, Canada, Chile, Colombia, Indonesia, Israel, Korea, Mexico, New Zealand, Norway, Peru, Philippines, South Africa, Sweden, Thailand, Turkey, and United Kingdom we use “Monetary Policy-Related Interest Rate.” For Czech Republic and Romania, we use Repurchase Agreement Rate. For Hungary, we use Treasury Bill Rates.

The standard Taylor rule suggests that the policy rate should be a function of inflation and the output gap. We estimate a Taylor rule for the Inflation Targeting countries using a panel, fixed effects regression of the Interest Gap on the Output Gap and the Inflation Gap. Interest rate adjustments will be gradual and a lagged term is included. We find that policy rates respond to surges in core inflation, so we also include the first difference in the Core Inflation Gap. All regressions will include Year dummies, seasonal dummies and a dummy variable for the four quarters spanning the 3rd quarter of 2008 to the 2nd quarter of 2009 (i.e. the period of the global financial crisis). We restrict our examination to countries that have brought the inflation target into single digits.

The baseline results are reported in Table 6, Column A. We find that all of the coefficient estimates are positive and significant. Both inflation and the output gap enter into the policy function. The interest rate gap is persistent with an auto-regressive coefficient that is above .8 (we tested a 2nd order specification but the coefficient on the second order term was small and negative and its inclusion had little impact on the other coefficients).

In Column B, we test whether inflation targeting central banks respond to credit growth. We add an additional term measuring the year-on-year real credit growth defined in the previous section. We find that the coefficient on credit growth is positive and significant. The coefficient appears quantitatively small. A transitory 1% rise in real credit growth would be associated with slightly more than a basis point immediate policy rate increase. However, policy rates are persistent and

credit growth is quite variable. A permanent one standard deviation rise in real credit growth would be associated with a long term rise in policy rates of nearly 100 basis points. We are interested in whether the potential conflicts observed between real credit growth and inflation volatility impact the central bank response to credit conditions.

We examine cross country variation in the response of central banks to credit growth. Table 7, Column A shows the coefficients on interactions between real credit growth and country dummies (conditioning on the output gap, lagged interest gaps, the inflation gap and surges in the core inflation rate). We find that the monetary policy rate is positively associated with credit growth in most countries (Brazil is the only country in which the coefficient is negative and significant). We test whether the coefficients are equal; the hypothesis is rejected at any given critical value.

In Table 6, Column C, we include a regression specification that includes real credit growth and the interaction of real credit growth with dummy variables. The first dummy variable equals one if core inflation is over the upper bound of the allowed range of variation and zero otherwise. The second dummy equals one if headline inflation is below the lower bound of inflation targeting range and is zero otherwise. We use these terms to represent times when an inflation targeting central bank might conservatively be expected to be constrained by the price stability goal.

As shown in Column C, the coefficient of the interaction between real credit growth and core inflation over target range is positive and statistically significant. The estimated marginal impact of credit shocks on the policy rate is about five times as large when inflation has exceeded its upper bound as when inflation is within the target range. Conversely, the coefficient on the interaction with headline inflation below the lower bound is negative (though not significant). The point estimate of the marginal impact of a credit shock when inflation is below the lower bound is near zero. Given a standard deviation of credit growth of 8.42% within this sample, a one standard deviation rise in credit growth would be associated with a nearly 200 basis point long term rise in the policy rate, when core inflation is above the target range as opposed to a long term 50 point rise when inflation is on target and a statistically insignificant change when headline inflation is below target. An interpretation is that when the central bank is unconstrained by the inflation policy goal, they might use those degrees of freedom to address financial stability.

We divide our sample of countries into groups. The first includes those countries in Scandinavia and the English speaking countries of Australia, Canada, New Zealand, and the United Kingdom. The rules of the game in financial markets in this group could be considered to be more long established. We estimate the policy rule for pooled data from six of these seven countries (credit growth data for New Zealand is unavailable for the sample period). The parameters of the

persistent Taylor rule for this group are quite similar to those from the broad sample. Interest rate adjustments are highly persistent and include a weight on the output gap. Established country central banks put more emphasis on the headline inflation gap and relatively less on surges in core inflation.

Amongst the Established countries (see Column D), we find that the central bank responds to increases in real credit growth to a slightly greater degree than in the full sample. The coefficient on credit growth is significant at the 5% critical value. We do not find evidence that central bank sensitivity to credit conditions is dependent on whether inflation is on target. The coefficients on the interaction terms of real credit growth with dummies for over and under target inflation are not significant at standard critical values. Interestingly, we find both coefficients are positive, so the central bank raises interest rates more sharply in response to credit growth whenever inflation is outside of the target band in either direction.

In Column E we report the estimates for fourteen of the remaining countries which we refer to as emerging markets (credit data is unavailable for Peru and Israel). Again, we find significant coefficients for the lag of the interest gap, the output gap, the inflation gap and surges in core inflation. In this sample, the coefficient on real credit growth is essentially zero. However, the coefficient on the interaction term is positive and significant at the 1% critical value. Emerging market central banks only adjust the policy rate in relation to credit growth when core inflation is above target. When inflation is below target, we find a negative relationship between credit growth and the policy rate though this is insignificant at any reasonable critical value.

Choi and others argue that emerging markets can be divided into groups by the strength of the financial system. We estimate the monetary policy response for the more resilient group of emerging markets including the Czech Republic, Korea, Mexico, Poland, Romania and Thailand; and the more fragile countries including Brazil, Chile, Hungary, Indonesia and Turkey. Column F and G reports estimates for these two groups. In general, the policy rates in the resilient countries are more sensitive to inflation and the output gap. We also find that the response of interest rates to credit expansion is significantly positive in both country groups only when core inflation is above target. We also find that when headline inflation is below the target range that policy rates are negatively associated with credit growth. This might suggest that in these countries accommodate credit expansions when inflation goals are not being met.

In Table 8, we examine whether the policy rates of inflation targeting central banks respond to hot money flows. Short-term borrowings or debt issuance can be used as an alternative to domestic credit as a channel for financing the credit cycle. Table 8, Column A reports an estimate of the monetary policy equation which includes a measure of hot money flows as defined in Section III.C.ii. The inclusion of a possible policy response to hot money goals does not have substantial impact on the estimate of the coefficients on lagged interest rates, the output

gap, or the inflation gap. We find that, conditioning on inflation and the output gap, an increase in external debt relative to GDP is associated positively and significantly with the policy interest rate. The coefficient is relatively small. However, given the inertia in interest rate adjustments combined with the volatility of hot money flows the long-term movement in interest rates could be significant. Within the sample, the standard deviation of hot money flows is above 14%. The long-term adjustment of interest rates to a one standard deviation shocks would be around 70 basis points. One interpretation is that in periods in which foreign borrowing is growing, the central bank raises interest rates to limit the impact on the domestic financial sector. Column B also shows that policy responses are affected by the level of inflation relative to the inflation targeting goals. In this regression, we include interactions with dummy variables for periods in which core inflation is above the inflation target or headline inflation is below the target. We find that on average, there is a positive response to real credit growth. However, the coefficient on the interaction with periods when inflation is above target is positive and significant at the 1% critical value. Effectively, the response of the policy rate when inflation is above the target range is more than double that seen otherwise. The coefficient on the interaction term with the dummy for periods when inflation is below the lower bound is negative; the point estimate of the response in those periods is about zero. However, the coefficient on this interaction term is not significant at any critical value.

Returning to Table 7, we estimate the policy response to hot money flows allowing this to vary by country. Again we see that there is considerable variation in the response to hot money flows. Of the established countries, five of the seven raise interest rates in response to short term external borrowing. Five of sixteen emerging markets raise interest rates while eleven cut interest rates. A number of emerging markets including Brazil, Indonesia, and Mexico display sharply negative responses.

We examine if there are differences between policy responses in established economies and in emerging markets. In Column C, we report the estimates from 7 established economies amongst the Anglophone and Scandinavian countries. The estimates are quite similar to those from the broad set of countries. The coefficient on hot money flows and the interaction between hot money and dummies for periods when inflation is above target are positive and significant at the 5% critical value. The coefficient on the interaction with periods with inflation below target is essentially zero.

In the emerging markets countries the results are somewhat different. We find that the coefficient on hot money inflows is essentially negative. Emerging markets countries, on average, tend to cut their interest rates on average when faced with inflows. For emerging markets, short term external liabilities may be dominated in foreign currencies. Cutting domestic interest rates might discourage the carry trade. However, the coefficient is insignificant at any reasonable critical value. The coefficients on the interaction terms are also economically significant but statistically

insignificant indicating that on average emerging market countries react to capital inflows during inflationary times by raising rates but react by cutting rates in disinflationary periods

There may be some variation across emerging market countries in how monetary policy makers respond to capital inflows. We focus on seven resilient countries (the six mentioned above plus Israel). Amongst these countries, we again find no statistically significant response to hot money inflows. Among the five fragile countries, we do find that emerging markets that experience capital inflows in deflationary times are likely to cut sharply cut interest rates (possibly fending off appreciation pressures from capital inflows on domestic inflation as well) even though this outcome is significant only at the 10% critical value).

We also consider how central banks respond to exogenous financial market shocks. We observe fluctuations in the spread between Moody's Seasoned Baa Corporate Bond Rate and the Federal Funds Rate from FRED. This measure includes both the bond risk premium and the yield curve in the United States. We can think of innovations in this indicator as being relatively exogenous to domestic conditions in our smaller inflation targeting countries. We examine how monetary policy responds to these exogenous shocks.

Table 9 reports estimates of the monetary policy reaction function including quarterly innovations in the Risk Spread. Column A reports data for the whole sample (including periods when the inflation target is in single digits). The coefficient is negative and significant at the 1% critical value. When global bond market risk increases, central banks respond by cutting interest rates and easing domestic liquidity. Column B shows that this response to exogenous shocks is impacted by the constraints imposed by the inflation target. Estimates of a regression which includes interactions between innovations in the risk premium and dummy variables for periods when the core inflation is above target and also for periods in which headline inflation is below target are reported. This regression shows that when inflation is in the target range, inflation targeting central banks respond negatively and significantly (at the 10% critical value) to global risk shocks. However, the coefficient on the interaction between the risk shock and the core inflation over target dummy is positive and significant at the 10% level. When core inflation is above the target range, the interest rate essentially does not respond to the shock. However, the coefficient on the interaction between the risk shock and the headline inflation below target is negative and significant at the 5% critical value. When inflation is below the target range, the interest rate response is much more substantial than at normal times.

We split the sample into established economies. Table 9, Column C reports the results for 7 established economies. Amongst this group of countries, the response to the global risk premium is to cut interest rates in normal times or when headline inflation is below the target. The coefficient on the innovation in the risk term is significant at the 5% critical value. However, the coefficient on the interaction term with core inflation above target is large, positive and

significant at the 1% critical value. The net effect is that when inflation is above target, the central bank response in established countries is to raise policy rates. Column D reports the results for sixteen emerging markets countries. Amongst these countries, the coefficient on the innovation in global risk is zero. However, the coefficient on the interaction with inflation below target is negative and significant at the 5% critical value. Monetary policy allows for easing only when inflation is already below the threshold for policy easing.

V. Macprudential Measures

Central banks constrained by the policy anchor may use alternative policy instruments when confronted with credit conditions that are inconsistent with inflationary conditions. A variety of potential administrative and regulatory tools might be adjusted to the economic environment under the rubric of macroprudential measures. Lim (2011) show that 40 out of 49 countries surveyed have used macroprudential actions.

Shim et al. construct a database of macroprudential measures implemented by a large number of advanced economy and emerging market central banks (including the inflation targeting countries being examined) over the period to the middle of 2012. The database uses information from central bank publications to identify official actions. These actions include monetary adjustments to banking regulations including reserve or liquidity requirement adjustments in addition to direct regulation of mortgage lending including adjustments to loan-to-value or debt-to-income ceilings; and ceilings to aggregate credit growth. The database divides these actions into those that tighten regulations to restrain credit issuance and those that ease regulations to advance lending. We construct a dummy variable equal to one for each country quarter in which there was one or more macroprudential actions to tighten credit and zero for each country quarter in which there was no such action. Another dummy variable equals one for each country quarter in which there was at least one macroprudential action to ease credit conditions and zero when there is no such action. For a small number of country-quarters, there may be both tightening and easing actions. In those cases, we classify the country quarter as being either tightening or easing depending on whether there were more tightening or easing actions in that quarter or the general tendency of the country's policymakers in adjacent quarters.

For our sample of inflation targeting countries in which credit growth data is available, we calculate the percentage of country-quarters in which there were macroprudential actions during the periods of inflation targeting. We find that in 7.8% of the country quarters in our sample, some sort of macroprudential tightening activities were undertaken. In 5.8% of the periods, macroprudential easing actions were taken.

Macroprudential actions can offer alternatives to monetary policy to a constrain central bank. In Table 10, we report the results from a logit regression of macroprudential actions on business

cycle conditions and indicators of constrained inflation targeting monetary policy. The data includes those periods after Hammond identifies the central bank as implementing an inflation target (Israel, New Zealand, and Peru are excluded as lacking credit growth data). The logit regressions in this section include year dummies, a dummy covering the crisis period, and seasonal dummies.

Column A reports a logit regression of the dummy variable for credit tightening actions on the output gap, the gap between headline inflation and the inflation target, and the CPI inflation adjusted growth rate of real credit along with a dummy variable indicating that headline inflation is below the inflation target range. Macroprudential tightening could be viewed as a substitute for raising interest rates to slow credit growth. However, inflation targeting might limit such actions when inflation is below target. We find that macroprudential tightening is more likely when the economy is booming. The coefficients on the output gap, the inflation gap, and real credit growth are all positive. The coefficient on the output gap is marginally insignificant at the 10% critical value; the coefficient on the inflation gap is significant at the 5% critical value and the coefficient on real credit growth is significant at the 1% critical value. The coefficient on the dummy for inflation being below target is also positive and significant at the 10% critical value. Macroprudential tightening is more likely to occur when monetary policy is constrained by price stability goals.

We also examine a regression where the dummy variable for headline inflation being below the range with a dummy that is set equal to one only when headline inflation has been below the target range for at least four quarters. Macroprudential adjustments may be less flexible than monetary policy changes. Therefore, they may be likeliest when monetary policy has been constrained for a substantial period of time. The results in Column B show that macroprudential tightening is more likely when monetary policy has been constrained for a year. The coefficient on the dummy variable that headline inflation has been below the bound for four quarters is positive and significant at the 1% critical value. Column C shows similar results for a sample restricted to emerging markets economies. In Column D, we replace the dummy variable with a measure of the number of consecutive periods in which headline inflation is below target (up to 3 years). This finds that the number of periods in which headline inflation is below the target range is also associated positively and significantly with the likelihood of implementing macroprudential tightening.

Columns (E)-(H) report the results of a logit regression of macroprudential easing measures on macroeconomic conditions and indicators of constrained monetary policy. We find that macroprudential easing is more likely when economic conditions are poor though the effect is weaker than the findings in columns (A)-(D). Qualitatively, the coefficients on the output gap, the inflation gap and real credit growth are negative; quantitatively, the coefficients are somewhat smaller in absolute size than the associated coefficients from the regressions using

macroprudential tightening measures. Moreover, none of the reported coefficients are significant at the 10% critical value.

There is also (somewhat weaker) evidence that macroprudential easing is more likely when monetary policy is otherwise constrained. In column (E), we include a dummy variable for country-quarters when core inflation is above the target range. Macroprudential easing could be seen as a substitute for cutting interest rates which might be untenable when inflation is high relative to the range. The coefficient on the dummy for constraints on cutting interest rates is positive but marginally insignificant at the 10% level. Column (F) shows the coefficients on a dummy variable equal to one for periods when core inflation has been above the target range for at least one year. This coefficient is positive and marginally significant at the 10% level. Similar results are found when the sample is limited to emerging markets as in column (G) though the coefficient is statistically insignificant. Column (H) shows that the coefficient on the variable indicating the number of consecutive quarters that core inflation had been above the target range is positive and significant at the 5% critical value.

VI. Conclusion

We find that credit market stability and inflation stability might be at odds as a goal. We find that central banks lean against the wind to an extent even in inflation targeting countries. However, this behavior is sharply attenuated in emerging markets when leaning against the wind conflicts with inflation stability goals. However, macroprudential actions may act as a substitute.

A natural question is whether the constraints of inflation targeting lead to instability. We might identify this by examining financial market volatility when inflation is outside of target.

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Table 1 – Inflation Outcome. This table shows the average inflation outcomes for inflation targeters from various regions along with a comparison with the target levels in those regions.

	Average Y-o-Y Inflation		Gap from Target		Core		Headline	
	Headline	Core	Headline	Core	% of Quarters Above Upper Bound	% of Quarters Below Lower Bound	% of Quarters Above Upper Bound	% of Quarters Below Lower Bound
Anglophone	2.25	1.95	0.09	-0.25	8.38%	8.90%	22.40%	13.02%
East Asia	3.61	2.87	0.30	-0.60	12.82%	33.33%	32.29%	25.52%
Eastern Europe	3.50	2.46	0.37	-0.51	18.92%	39.46%	41.30%	30.43%
Latin America	3.97	3.41	0.69	0.22	28.40%	18.93%	33.75%	9.17%
Scandinavia	2.00	1.10	-0.32	-1.22	5.52%	55.17%	25.69%	32.64%
Miscellaneous	5.28	5.67	0.93	1.31	50.00%	17.81%	37.50%	26.39%
World	3.22	2.66	0.32	-0.24	20.45%	27.78%	32.21%	21.62%

Table 2 Business Cycle Conflicts with Inflation. This table tabulates outcomes for a measure of the output gap (HP filtered seasonally adjusted real GDP) in comparison with the achievement of the inflation target. Panel A compares periods (from 2003-2014) for which the economy is in recession (more than one s.d. below zero) or expansion (more than one s.d. above zero) with periods in which headline inflation is above, within or below the target range. Panel B makes a similar comparison with core inflation. Panel C shows coefficients of a simple regression of the output gap on measures of inflation relative to target along with dummies indicating the status relative to target. A country fixed effect regression is also included.

	Headline Inflation				
Panel A	Below Target Range	Within Target Range		Above Target Range	Total
		Below Target	Above Target		
Output Gap in:					
Recession	45	32	29	42	148
Neither	161	188	197	216	762
Expansion	15	20	37	94	166
Total	221	240	263	352	1,076
	Core Inflation				
Panel B	Below Target Range	Within Target Range		Above Target Range	Total
		Below Target	Above Target		
Output Gap in:					
Recession	42	35	30	41	148
Neither	223	245	162	133	763
Expansion	30	55	36	45	166
Total	295	335	228	219	1,077
	Regression Coefficient				
	<i>Dependent Variables</i>				
Panel C	<i>Headline Status</i>	<i>Core Status</i>	<i>Inflation Gap</i>	<i>Core Inflation Gap</i>	
Independent Variable					
Output Gap	0.26*** (.03)	0.07* (.04)	0.23*** (.02)	0.08*** (.03)	
Fixed Effects Regression Coefficient					
			Inflation Gap	Core Inflation Gap	
			0.27*** (.03)	0.12*** (.04)	

Table 3 Exchange Rate Conflicts This table tabulates outcomes for a measure of the exchange rate depreciation (growth rate of the exchange rate vs. the US dollar) in comparison with the achievement of the inflation target. Panel A compares periods (from 2003-2014) for which the exchange rate is in appreciation (more than one s.d. below mean) or depreciation (more than one s.d. above mean) with periods in which headline inflation is above, within or below the target range. Panel B makes a similar comparison with core inflation. Panel C shows coefficients of a simple regression of the exchange rate growth on measures of inflation relative to target along with dummies indicating the status relative to target. A country fixed effect regression is also included.

	Headline Inflation				
Panel A	Below Target Range	Within Target Range		Above Target Range	Total
		Below Target	Above Target		
Exchange Rate:					
Appreciation	10	34	31	19	94
Neither	73	96	145	131	445
Depreciation	13	18	17	36	84
Total	96	148	193	186	623
	Core Inflation				
Panel B	Below Target Range	Within Target Range		Above Target Range	Total
		Below Target	Above Target		
Exchange Rate:					
Appreciation	16	50	15	14	95
Neither	96	175	110	63	444
Depreciation	15	22	16	31	84
Total	127	247	141	108	623
	Regression Coefficient				
	<i>Dependent Variables</i>				
Panel C	<i>Headline Status</i>	<i>Core Status</i>	<i>Inflation Gap</i>	<i>Core Inflation Gap</i>	
Independent Variable					
Output Gap	0.82*** (.29)	1.62*** (.3)	0.84*** (.24)	1.38*** (.31)	
Fixed Effects Regression Coefficient					
			Inflation Gap	Core Inflation Gap	
			0.74*** (.25)	1.59*** (.35)	

Table 4 Credit Growth Conflicts This table tabulates outcomes for a measure of real credit growth (growth in claims on the private sector deflated by the CPI) in comparison with the achievement of the inflation target. Panel A compares periods (from 2003-2014) for which the credit is tightening (less than one s.d. below mean) or loosening (more than one s.d. above mean) with periods in which headline inflation is above, within or below the target range. Panel B makes a similar comparison with core inflation. Panel C shows coefficients of a simple regression of the real credit growth on measures of inflation relative to target along with dummies indicating the status relative to target. A country fixed effect regression is also included.

	Headline Inflation				
Panel A	Below Target Range	Within Target Range		Above Target Range	Total
		Below Target	Above Target		
Credit Growth:					
Tightening	41	35	43	81	200
Neither	122	121	152	173	568
Loosening	28	43	42	51	164
Total	191	199	237	305	932
	Core Inflation				
Panel B	Below Target Range	Within Target Range		Above Target Range	Total
		Below Target	Above Target		
Credit Growth:					
Tightening	33	67	59	41	200
Neither	185	188	105	90	568
Loosening	53	54	33	24	164
Total	33	67	59	41	200
	Regression Coefficient				
	<i>Dependent Variables</i>				
Panel C	<i>Headline Status</i>	<i>Core Status</i>	<i>Inflation Gap</i>	<i>Core Inflation Gap</i>	
Independent Variable					
Output Gap	0.35 (.24)	0.01 (.26)	-0.26 (.16)	-0.12 (.22)	
Fixed Effects Regression Coefficient					
			Inflation Gap	Core Inflation Gap	
Output Gap			-0.77*** (.16)	-1.33*** (.23)	

Table 5 Hot Money Flow Conflicts This table tabulates outcomes for a measure of international capital flows (increases in short term debt as a percentage of nominal GDP) in comparison with the achievement of the inflation target. Panel A compares periods (from 2003-2014) for which there are short-term outflows (less than one s.d. below mean) or inflows (more than one s.d. above mean) with periods in which headline inflation is above, within or below the target range. Panel B makes a similar comparison with core inflation. Panel C shows coefficients of a simple regression of the hot money flows on measures of inflation relative to target along with dummies indicating the status relative to target. A country fixed effect regression is also included.

	Headline Inflation				
Panel A	Below Target Range	Within Target Range		Above Target Range	Total
		Below Target	Above Target		
Hot Money :					
Outflows	52	53	38	88	231
Neither	124	152	170	180	626
Inflows	25	22	48	74	169
Total	201	227	256	342	1,026
	Core Inflation				
Panel B	Below Target Range	Within Target Range		Above Target Range	Total
		Below Target	Above Target		
Hot Money :					
Outflows	51	64	60	56	231
Neither	197	197	118	115	627
Inflows	33	58	38	40	169
Total	281	319	216	211	1,027
	Regression Coefficient				
	<i>Dependent Variables</i>				
Panel C	<i>Headline Status</i>	<i>Core Status</i>	<i>Inflation Gap</i>	<i>Core Inflation Gap</i>	
Independent Variable					
Output Gap	-0.17 (.28)	-1.20*** (.29)	-0.03 (.19)	-0.79*** (.22)	
Fixed Effects Regression Coefficient					
			Inflation Gap	Core Inflation Gap	
Output Gap			0.09 (.21)	-1.14*** (.28)	

Table 6 – Taylor Rules & Credit Conflicts This table shows coefficients from country fixed effects panel estimates of the quarterly monetary policy reaction function using the gap between the interest rate and the inflation target. The monetary policy function allows for a reaction to real credit growth and interaction between real credit growth and dummy variables for periods when core inflation is outside and above the target range and periods when headline inflation is outside but below the range. All regressions include year dummies, seasonal dummies, and a dummy for the period of the global financial crisis.

	Dependent Variable: Interest Gap _t = $i_t - \pi^{TGT}$						
	(A)	(B)	(C)	(D)	(E)	(F)	(G)
Dependent Variables	Whole Sample			Established	Emerging Markets	Resilient EM	Fragile EM
Interest Gap _{t-1}	0.85*** (.01)	0.86*** (.01)	0.86*** (.01)	0.83*** (.03)	0.86*** (.02)	0.82*** (.03)	0.86*** (.03)
Output Gap _t	0.11*** (.02)	0.09*** (.02)	0.08*** (.02)	0.07** (.03)	0.09*** (.02)	0.07** (.03)	0.18*** (.05)
Inflation Gap	0.09*** (.01)	0.10*** (.01)	0.09*** (.02)	0.20*** (.03)	0.06*** (.02)	0.03 (.04)	0.08** (.03)
ΔCore Inflation Gap	0.21*** (.03)	0.26*** (.03)	0.26*** (.03)	0.05 (.06)	0.32*** (.04)	0.20** (.08)	0.39*** (.07)
Real Credit Growth		0.012*** (.003)	0.006* (.003)	0.014*** (.004)	-0.001 (.004)	-0.004 (.005)	-0.005 (.011)
Real Credit Growth x Core Above Range			0.023*** (.004)	0.011 (.008)	0.031*** (.006)	0.042*** (.008)	0.022* (.011)
Real Credit Growth x Headline Below Range			-0.005 (.006)	0.013 (.011)	-0.006 (.007)	0.005 (.01)	-0.031** (.014)
N	1016	916	916	281	635	269	227
Countries	23	20	20	6	14	6	5
R ²	.95	.95	.95	.97	.95	.92	.96

Table 7 Country Specific Leaning Against the Wind Table shows the country specific responses of monetary policy rates to real credit growth and hot money flows.

	Credit Growth		Hot Money	
	Coefficient	T-Stat	Coefficient	T-Stat
Australia	0.011	0.49	0.050	1.56
Brazil	-0.029	-2.42	-0.312	-3.42
Canada	0.021	1.43	-0.014	-0.26
Chile	0.019	0.9	-0.010	-0.19
Colombia	0.018	1.37	0.059	0.73
Czech Republic	-0.001	-0.11	-0.087	-1.65
Hungary	0.024	2.54	-0.018	-0.58
Iceland	0.017	4.62	0.007	3.71
Indonesia	0.021	1.01	-0.246	-1.48
Israel	n/a		0.092	0.79
Korea	0.004	0.23	-0.044	-0.85
Mexico	-0.002	-0.19	-0.247	-1.72
New Zealand	n/a		0.027	1.09
Norway	0.019	1.38	0.022	1.46
Peru	n/a		0.091	1.5
Philippines	-0.001	-0.08	0.006	0.1
Poland	-0.004	-0.45	-0.032	-0.38
Romania	0.016	2.85	-0.007	-0.44
South Africa	0.035	2.6	-0.061	-0.49
Sweden	0.003	0.1	-0.011	-0.59
Thailand	0.015	0.83	0.069	0.82
Turkey	0.003	0.2	-0.030	-0.26
UK	0.048	2.68	0.015	1.83

Table 8 Taylor Rules & Hot Money Conflicts This table shows coefficients from country fixed effects panel estimates of the quarterly monetary policy reaction function using the gap between the interest rate and the inflation target. The monetary policy function allows for a reaction to hot money flows and interaction between hot money flows and dummy variables for periods when core inflation is outside and above the target range and periods when headline inflation is outside but below the range. All regressions include year dummies, seasonal dummies, and a dummy for the period of the global financial crisis.

	Dependent Variable: Interest Gap _t = $i_t - \pi^{TGT}$						
	(A)	(B)	(C)	(D)	(E)	(F)	(G)
Independent Variables	Whole Sample	Whole Sample	Established	Emerging Markets	Resilient EM	Fragile EM	
Interest Gap _{t-1}	0.86*** (.01)	0.85*** (.01)	0.85*** (.03)	0.86*** (.01)	0.83*** (.03)	0.86*** (.03)	
Output Gap _t	0.10*** (.02)	0.11*** (.02)	0.04 (.02)	0.13*** (.02)	0.11*** (.03)	0.18*** (.05)	
Inflation Gap	0.10*** (.01)	0.10*** (.01)	0.17*** (.03)	0.08*** (.02)	0.06** (.03)	0.11*** (.03)	
ΔCore Inflation Gap	0.22*** (.03)	0.22*** (.03)	0.05 (.05)	0.26*** (.04)	0.09* (.05)	0.40*** (.07)	
Hot Money Flows	0.007*** (.002)	0.005** (.002)	0.005** (.002)	-0.012 (.014)	-0.013 (.014)	-0.013 (.05)	
Hot Money Flows x Core Above Range		0.008** (.004)	0.009** (.004)	0.016 (.029)	-0.022 (.046)	0.007 (.064)	
Hot Money Flows x Headline Below Range		-0.005 (.011)	0.001 (.01)	-0.005 (.027)	0.006 (.026)	-0.218* (.116)	
N	1016	1016	315	701	305	217	
Countries	23	23	7	16	7	5	
R ²	.95	.95	.97	.94	.91	.95	

Table 9 Taylor Rules and Global Risk Shocks This table shows coefficients from country fixed effects panel estimates of the quarterly monetary policy reaction function using the gap between the interest rate and the inflation target. The monetary policy function allows for a reaction to global risk shocks (represented as the spread between Moody's BAA spread and the Fed Funds rate) and interaction between global risk shocks and dummy variables for periods when core inflation is outside and above the target range and periods when headline inflation is outside but below the range. All regressions include year dummies, seasonal dummies, and a dummy for the period of the global financial crisis.

	Dependent Variable: Interest Gap _t = $i_t - \pi^{TGT}$						
	(A)	(B)	(C)	(D)	(E)	(F)	(G)
Independent Variables	Whole Sample	Whole Sample	Established	Emerging Markets	Resilient EM	Fragile EM	
Interest Gap _{t-1}	0.83*** (.01)	0.83*** (.01)	0.76*** (.02)	0.86*** (.01)	0.83*** (.02)	0.85*** (.03)	
Output Gap _t	0.08*** (.02)	0.08*** (.02)	0.06** (.03)	0.10*** (.02)	0.05*** (.02)	0.16*** (.05)	
Inflation Gap	0.14*** (.01)	0.14*** (.01)	0.19*** (.03)	0.12*** (.02)	0.17*** (.02)	0.16*** (.04)	
ΔCore Inflation Gap	0.22*** (.03)	0.21*** (.03)	0.06 (.05)	0.28*** (.03)	0.20*** (.05)	0.35*** (.08)	
ΔU.S. BAA-Fed Funds Spread	-0.12*** (.04)	-0.10* (.05)	-0.14** (.07)	-0.01 (.08)	0.00 (.10)	-0.18 (.18)	
ΔU.S. BAA-Fed Funds Spread x Core Above Range		0.13* (.07)	0.38*** (.13)	-0.06 (.09)	-0.04 (.11)	-0.03 (.22)	
ΔU.S. BAA-Fed Funds Spread x Headline Below Range		-0.16** (.08)	-0.05 (.1)	-0.28** (.11)	-0.27** (.12)	-0.31 (.46)	
N	1360	1360	529	831	400	236	
Countries	23	23	7	16	7	5	
R ²	.95	.95	.93	.95	.95	.95	

Table 10 Macprudential Actions This table shows coefficients from panel logit regressions of indicators of the implementation of macroprudential actions from the Shim et al. (2013) database. The regressions contain indicators of constrained monetary policy. All regressions include year dummies, seasonal dummies, and a dummy for the period of the global financial crisis.

	Implements Macroprudential Tightening				Implements Macroprudential Easing			
	(A)	(B)	(C)	(D)	(E)	(F)	(G)	(H)
Dependent Variables	Whole Sample	Whole Sample	EM	Whole Sample	Whole Sample	Whole Sample	EM	Whole Sample
Output Gap _t	0.16 (.10)	0.17* (.10)	0.15 (.12)	0.17* (.1)	-0.12 (.08)	-0.12 (.08)	-0.08 (.1)	-0.12 (.08)
Inflation Gap	0.16** (.07)	0.16** (.07)	0.15* (.08)	0.17** (.07)	-0.07 (.08)	-0.05 (.07)	-0.06 (.08)	-0.07 (.08)
Credit Growth	0.05*** (.02)	0.06*** (.02)	0.07*** (.02)	0.06*** (.02)	-0.01 (.01)	-0.01 (.01)	-0.03 (.02)	-0.01 (.01)
Headline Below Range	0.84* (.45)							
Headline Below Range for 1 Year		1.70*** (.52)	1.50** (.66)					
# of Quarters Headline Below Range				0.27*** (.08)				
Core Above Range					0.66 (.42)			
Core Above Range						0.77* (.45)	0.57 (.51)	
# of Quarters Core Above Range								0.15** (.07)
N Countries	966 20	966 20	589 14	966 20	966 20	966 20	589 14	966 20

Figure 1

