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Goal Dependence for Central Banks:

Is the Malign View Correct?

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1. Can central banks be too goal independent?

The granting of independence in central banks has in twenty years gone from a relative rarity to the norm for monetary regimes. The widespread adoption of inflation targeting has abetted this movement, and helped to lock it in. Yet, the act of delegation of monetary policy setting to a central banker or committee which is more conservative than the median voter and most politicians (in the sense of Rogoff (1985)) remains inherently somewhat problematic. Recent developments, including the global financial crisis of 2008-11, have made monetary policy decisions extremely salient politically, and the output and employment costs of economic shocks have risen. To whatever degree politicians and voters were overcoming their own time-inconsistent views of the inflation-output tradeoff in the 1990s and early 2000s, so doing must be more challenging today. Meanwhile, as Blinder (1998) and McCallum (1998) pointed out, the size and stickiness of the ‘inflation bias’ implied by models like that of Barro-Gordon (1983) and their ilk is inconsistent with the ease with which such bias seems to have been eliminated. And, the ability of central banks to maintain independence is correlated with either the existence of a powerful anti-inflation constituency in the richer economies (Posen (1993, 1995)), or the rule of law in less developed economies (Cukierman, et al, 1992). In sum, it is unsurprising that central bank independence has been increasingly debated and challenged in recent years.

But how fragile are the credibility gains from independence to public intervention? Are there circumstances under which the government might usefully override the central bank? In a seminal pair of papers (DeBelle and Fischer (1994); Fischer (1995)), Stanley Fischer set out the distinction between *goal* and *instrument* independence for central banks. In these papers, it was argued that for reasons of economic efficiency as well as political accountability, central banks should have their policy goals set – and when circumstances demanded reset - by elected officials, even as pursuit of those goals should be left to the instrument independent central bank. Later advocates of inflation targeting, including Bernanke, et al (1999), tended to build in this distinction of goal versus instrument independence in the setting up of those frameworks. In essence, the intermittent override of the independent central bank’s output-weight conservatism

versus the median voter was thought to lead to better economic outcomes as well as more sustainable monetary regimes.²

Of late, however, many commentators have conflated goal and instrument independence. Critical discussions of policy responses to the global financial crisis by, *inter alia*, the Bank of England, the Bank of Japan, the European Central Bank, and the Federal Reserve, have included calls by elected officials for changes in these central banks mandates, and such changes were enacted in the first two cases. These resetting of central bank goals in turn elicited great outcry from conservative policy advocates (including inside the central banks in question) and some market participants that such moves compromised central bank independence writ large, and would lead to de-anchoring of inflation expectations, if not bond market slides. As discussed in Posen (2010), these complaints often took the form of resistance to any voluntary collaboration between central banks and elected officials, and of predicting a huge immediate credibility loss (seemingly a literal mapping of Barro-Gordon (1983) on to real life). The distinction between flexibility on goal independence and protection of instrument independence set out by Fischer was either disputed, ignored, or intentionally lost.

In our paper, we attempt to establish the facts about goal dependence for central banks. Using the set of 26 inflation targeting central banks plus the BoJ, ECB, and FRB, we assess whether differences in who sets and revises central bank goals affects the level of the inflation targets set, the strictness with which inflation targets are pursued, the outcomes for inflation and inflation variability, and ultimately the anchoring of inflation expectations. In sum, we find that there is nothing to fear from goal dependence for central banks, as Debelle and Fischer (1994) advocated – and there is reason to believe that occasional political override of conservative central bankers is a beneficial increase in monetary flexibility.

² Debelle and Fischer (1994), as well as Rogoff (1985), Flood and Isard (1989), Lohmann (1992), and Drazen and Masson (1994), all make arguments for why this kind of override would be optimal in the face of endogenous price and wage setting institutions or of varying sizes of macroeconomic shocks.

2. The increasing incidence of changes in central bank goals

The trend in recent years had been almost monotonic towards increasing central bank independence, until a plateau was reached with essentially all OECD economies and major emerging markets (except China) having given their central banks independence. Boosts were given to this trend by both the Maastricht Treaty in Europe, and the bulk of policy advice, including from the IMF. Over the course of the last 15 years, many countries have enacted new central bank laws, often in conjunction with the adoption of inflation targeting. In practice, the common elements of independence have been enhancing the governor's job security and placing explicit limits on the degree to which the central bank can finance government spending. As argued in Kuttner and Posen (2001), these are the two components of central bank independence that have predictive power for inflation rates in politically stable market economies.³

Often, these legal changes in independence were combined with adoption of inflation targets. As a result of having a public target, these laws have to spell out explicitly how that target for monetary policy is set, that is whether the bank is goal independent. The state of the art in inflation targeting was widely held to include goal *dependence*, that is that the inflation target would be set by, or at least in consultation with, elected officials – and reviewed at intervals – and then pursued by an instrument independent central bank.⁴ In Bernanke, et al, (1999, p. 38), citing DeBelle and Fischer (1994), the authors argued for goal dependence in inflation targeting,:

“Of the two, it seems that instrument independence would be more likely to minimize short-run political interference and maximize central bank accountability while still leaving the ultimate goals of policy to be determined at least in part by democratic processes... This strategy calls for the inflation targets themselves to be set by a political process in which the central bankers consult with the appropriate legislators or ministers. The execution of the policy is then left completely to the central bank...”

³ The multitude of other components in many indices of central bank independence – including notably central bank mandates – have no predictive power for inflation. In countries without strong rule of law, turnover in the Governorship is the main predictor (as first pointed out in Cukierman, Webb, and Neyapti (1992)).

⁴ See Gill (2012) for a recent example.

The early designers and analysts of inflation targets allowed for the target to be reset or overridden with at least some element of political participation. At least implicitly, they expected central bank goals to be reset occasionally transparently and without incident. Yet, such target resets proved rare in practice. It seems that inflation targets took on something of the attributes of exchange rate pegs: once a number was set, authorities were reluctant to alter them for fear of harming credibility, even if the target became inappropriate for changing economic conditions. And as with exchange rate pegs, the reluctance to change target has been asymmetric, fearing the impact of raising inflation targets more than lowering them. This pattern was largely overlooked until recent events.

Such an apparent consensus about, if not comfort with, at least partial political control over central bank goals has come under fire in the aftermath of the global financial crisis. Complaints about central banks ‘overreaching’, entering fiscal policy, disregarding price stability, and the like have become widespread. Scapegoating of central banks for disappointing or unpopular outcomes is of course nothing new, and are part of the point of central bank independence in the first place. What is new is the frequency with which central bank’s goals are actually being changed today. What is in question is the economic impact of such changes. Some market observers conflate instrument and goal independence, and fear that such pressures on the central banks will lead to higher, less stable, inflation.

2.1 Threats to Instrument Independence

An early example of this kind of conflation took place in the Czech Republic. An amendment was made to [the CNB Act \(pdf, 178 kB\)](#) in 2000. The original stated aim of this amendment (No. 442/2000) was to harmonise the Act with the legislation governing the European Central Bank. Some additional revisions above and beyond the harmonisation changes, however, were incorporated into the amendment on its way through Parliament. Taking effect from January 2001, these changes significantly curbed the CNB's independence. They concerned the following measures in particular:

- Matters relating to the inflation target and the exchange rate regime had to be consulted with the Government, and agreement had to be reached with the Government before the inflation target and the exchange rate regime could be set;

- The Bank Board had to approve only the budget for activities associated with pursuing its primary monetary objective, whereas the CNB's operational and investment budget had to be approved by the Chamber of Deputies of the Parliament of the Czech Republic.
- The amendment also included a proposed change to the mechanism for appointing Bank Board members. Under this amendment, they were to be appointed by the President of the Republic at the proposal of the Government.

These revisions received a negative response from many in professional circles and from numerous significant international institutions, for instance the International Monetary Fund, the European Commission and the European Central Bank. The Constitutional Court of the Czech Republic found the revisions to be unconstitutional, and they were consequently repealed with effect from 3 August 2001. In May 2002, a further amendment to [the Act on the CNB \(pdf, 178 kB\)](#) (No. 127/2002) entered into force, which restored the statutory independence of the CNB to its position prior to the 2000 amendment. The CNB remains independent of political structures and “determined to employ its monetary policy to foster a sustainable low-inflation economic environment.”

Although instrument independence has become almost universal, there have been instances in which the government has tried to meddle in the setting of interest rates or the management of foreign exchange reserves.

Example #1: Colombia

Colombian President Juan Manuel Santos said on Tuesday that the government, which is represented by the finance minister on the central bank's seven-member board, will ask the monetary authority to lower the benchmark interest rate next week. ‘I believe the central bank can continue reducing interest rates,’ Santos told a meeting of the textile industry in Medellin, Colombia's second-largest city. ‘They should meet next week for the first board meeting of this year and we're going ask the board to continue lowering interest (rates) to be able to also give additional stimulus to the economy,’ he said. (Reuters, January 22, 2013.)

<http://www.reuters.com/article/2013/01/22/colombia-economy-rates-idUSL1N0AR9JR20130122>

Example #2: Russia

Russia's central-bank head diplomatically rebuffed President Vladimir Putin's indirect call to ease monetary policy amid slowing economic growth, saying that borrowing rates will fall after inflation slows. Mr. Putin said at a government meeting, broadcast on state television, that he was worried by 'a troubling rise in interest rates, and to a level significantly above the rate of inflation, which inevitably affects lending. *Wall Street Journal*, January 13, 2013. <http://tinyurl.com/bdlmk9r>

Example #3: Argentina

Argentine President Cristina Fernandez de Kirchner tried to fire central bank chief Martín Redrado after he failed to back a plan to tap \$6.6 billion in reserves to pay debt, setting off a constitutional clash with Congress. 'This is a serious crisis,' Claudio Loser, an Argentine economist and former Western Hemisphere director for the International Monetary Fund, said in a phone interview. 'The fact that Fernandez wants to run over the central bank creates doubt there are any institutions left at all in Argentina.' *Bloomberg*, January 6, 2010.

These instances were widely criticized and punished by market responses.

2.2 *Increases in the inflation target*

More interesting is the reaction to instances where there have been implicit or explicit threats to restrict goal independence. This usually has taken the form of public statements by elected leaders that the independent central bank's performance has delivered results at odds with national well-being.

Example #1: Hungary

Hungarian Central Bank Governor Gyorgy Matolcsy (former finance minister, appointed by Prime Minister Viktor Orban):

The Hungarian central bank has been independent and will remain independent. But it is part of the Hungarian nation-state so it is not independent from the Hungarian nation." *Wall Street Journal*, March 1, 2013. <http://tinyurl.com/a4tuh3a>

Example #2: Japan

Japanese Prime Minister Shinzo Abe, in a televised debate on February 18, 2013:

“It would be necessary to proceed with revising the BOJ law if the central bank cannot produce results under its own mandate.” *Wall Street Journal*, February 22, 2013. <http://tinyurl.com/bdegfz4>

It is not uncommon for countries to ratchet down the inflation target during the early years after adoption. Examples include Israel (from 7-10 to 1-3), Iceland (from 1-6 to 1-4), Mexico (from 6.5 to 4.5), Peru (from 2.5 to 2), CA (from 2-4 to 1-3), Armenia (from 4.5 to 4) and Brazil (from 8 to 3.5). This is both a disinflation strategy, and a way of establishing easy wins at the start of inflation targeting (see Bernanke, et al (1999)). Also, the UK lowered its target from 2.5 to 2 when it moved from targeting the RPI inflation series to the HCPI.

Only a few have gone the other way and raised the inflation target. New Zealand permanently increased it from 0-2 to 1-3. Others relaxed it temporarily. Brazil is the most notable case, boosting it from 3.5 to 8.5 in 2003. Turkey is another example. After formally adopting IT in January 2006, its plan was to reduce inflation to 4% in 2008. Halfway through 2008, however, it became clear that the 4% target was unrealistic, and so it was revised up to 7.5%. The CBRT claimed that the revision enhanced the Bank’s credibility. Arguably, in the spirit of Drazen and Masson (1994), being realistic should enhance credibility.

It should be noted that none of these three inflation targeting central banks which raised their targets has goal independence. Informally, Iceland is another potentially interesting case. It seems to have tacitly allowed a huge deviation from the inflation target during the 2007-08 financial crisis. The Bank of England could be placed in a similar category, having allowed significant overshoots in the years following the crisis, citing the mandate not to put the real economy through significant volatility. Both of these central banks’ inflation targets are set by the government as well (and in Spring 2013, the UK government endorsed the Bank of England’s flexible interpretation of the inflation target).

3. How should changes in central bank goals matter

The conventional view has increasingly become that central bank independence is unambiguously a good thing, despite the question of DeBelle and Fischer (1994). This is widely now held to be true not only of instrument independence, but also of goal independence. Granting goal independence to the central bank, the thinking goes, prevents the government from resetting the policy objectives for political advantage. The justification for this view comes from the venerable Barro-Gordon (1983) time inconsistency model, and the simplest interpretation of the Rogoff (1985) argument for a conservative central banker. We can call this the **malign view** of goal dependence.

There are reasons to believe that *too much* autonomy can be a bad thing, however, and that goal independence could lead to worse outcomes. The reasoning is that it may sometimes be optimal to deviate from the central bank's default loss function (or the targeting rule derived from that objective),

$$\min E_t \sum_{s=0}^{\infty} \delta^s [(\pi_{t+s} - \pi^*)^2 + \lambda(y_{t+s} - y^*)^2] \quad (1)$$

where π is the inflation rate, π^* is the target, y is (log) output and y^* is the equilibrium (natural) level of output. The λ parameter represents the degree of weight conservatism (a smaller value corresponding to a greater degree of "hawkishness") and δ is the discount factor applied to future outcomes. In this context, deviating from the loss function can be modeled as a temporary change in π^* or λ , effectively an "escape clause."

Rogoff's (1985) model of a conservative central banker provides a justification for such deviations. In that model, the central bank targets a level of output that exceeds the natural rate, creating the familiar problem of inflation bias. In this case, it will be optimal to delegate policy to a central banker whose λ is less than that of society at large (i.e. the median voter). Importantly, the optimal degree of conservatism will be an inverse function of the shocks' variance. It would therefore be appropriate to be less hawkish in the face of large shocks. DeBelle and Fischer (1994) analyze how labor market contracting can be endogenous to the monetary regime, and change the sacrifice ratio –

one of the parameters that goes into the optimal distance between the median voter's and the central banker's λ .⁵ We term this the **beneficial view** of goal dependence.

Flood & Isard (1989) and Lohmann (1992) extended the Rogoff framework to account for the possibility of overriding the central bank when there are large shocks. The rationale stems from the fact that the marginal cost of deviations is increasing with the size of the deviation. (A 4% deviation from potential output is four times as costly as a 2% deviation, for example.) When the government incurs a *fixed* cost to overriding the central bank, above some threshold it will be optimal to intervene. The nature of this cost to the politicians overriding is never specified in these models. Presumably it is some combination of perception of softness on inflation, upsetting constituencies who have an interest in the central bank's set of goals, and political capital expended to make the change that cannot be used for other desired policies (as discussed in Posen (1995)).

Of course, such obvious intervention opens the door to excessive, opportunistic intervention on the part of the government. If intervention is too frequent, or too frequently threatened, it will consistently affect the central bank's policies and erode the credibility bonus from independence. Taking this into account Lohmann (1992) embeds the override decision within a "meta game" involving the negotiation of the circumstances in which the government is allowed to intervene. We interpret this as the design aspect of inflation targets (and a few other monetary regimes) to have escape clauses and regular reviews of central bank mandates.

The Rogoff, Flood-Isard, Lohmann, and Debelle-Fischer stories all rest on the assumption that policymaking has been delegated to a weight-conservative central banker in order to mitigate the time inconsistency problem. The deviations from or overrides of delegation, however, are also optimal, whether due to changes in shocks or structural changes, and thus should not be damaging central bank credibility –or national welfare – if properly understood.

These considerations provide a rationale for governmental interference/goal resetting. Central bank can save face/preserve "credibility" by citing *force majeure* or a set of rules allowing for that. This supports the **beneficial view** of goal dependence for central banks.

⁵ See the related discussions in Ball (1992) and Posen (1993, 1998).

So the nature of successful political intervention or override should take the form of (1) Explicit formal changes (increases) in the inflation target; (2) Changes (increases) in λ (which are harder to detect and make evident). Hard to document empirically and politically, since λ is not part of the goal that the government explicitly gives to a goal dependent or inflation targeting central bank. It must be subtler, e.g. giving approval to target overshoots or escape clauses. Lengthening the horizon for returning inflation to the target can be interpreted as a temporary relaxation of the inflation target.

4. Evidence on the impact of changes in goal independence

This section looks at whether goal (in)dependence has any impact on policymaking and/or economic outcomes. Without specifying a fully articulated macro model and specific assumptions, parameter values etc.), it is impossible to determine whether a central bank's policy choices are optimal, even ex post. We will focus instead on a variety of indicators that could some provide indicative evidence on the degree of malignancy or benevolence of changes in monetary policy goals.

Our analysis focuses primarily on 26 inflation targeting central banks.⁶ The reason is that it is straightforward to determine the *de jure* degree of goal independence in these cases. This is harder to discern for non-inflation targeting central banks, such as the U.S. Federal Reserve, whose statutory goals (“price stability” and “full employment”) are left vague. We only attempt to do so for the Fed, whose goals we assume are determined jointly with the government; the Bank of Japan, whose goals are set by the government; and the ECB, which we treat as fully goal independent. But we present our results both including and not including these three central banks.

Figure 1 depicts the 29 central banks' inflation targets, grouped by degree of goal independence. The countries on the far left are those in which the government determines the inflation target (shaded red). To the right of these are those in which the target is determined jointly (shaded yellow). Next are the goal independent central banks. The Fed, BOJ and ECB are on the far right. Solid black circles represent developed countries. Those currently classified as emerging market economies (EMEs) have red

⁶ According to Hammond (2012), 27 central banks had adopted inflation targeting as of 2012. Ghana's IT framework remains a work in progress with a vague time-varying target, however, and so that country is excluded from the analysis.

triangles, and those who make it on some but not all lists of EMEs get green squares. Hollow blue circles mark the Fed, the ECB and the Bank of Japan. The greyed-out symbols for Australia, New Zealand, South Africa and New Zealand indicate that these countries specify a target range with no midpoint.

Interestingly, central banks with less goal independence tend to have higher inflation targets. The average for fully goal independent banks is 2.5%, compared with 2.9% and 3.5% for the other two categories. Since non-goal independent central banks from developed countries (e.g. UK and Canada) tend to have low targets, dropping the developed countries from the comparison would amplify the differences. This pattern is a little puzzling, since according to theory there is nothing to be gained in the long run from higher steady-state inflation. To some extent, this pattern may be explained by the fact that some countries adopted IT before the process of disinflation was complete, and reduced the target over time. But for most of the countries shown in the figure, the disinflation process was more or less complete by 2012 and the targets had already been adjusted downwards.

4.1 Institutional quality and goal independence

We will look first at the relationship between goal independence and other measures of institutional quality. One hypothesis is that countries with weak institutions choose to limit the central bank's goal independence in order to facilitate meddling in monetary policy. Alternatively, it may make more sense in such a context to delegate goal setting entirely to the central bank in order to reduce the likelihood of opportunistic (malign) intervention. Often speaking with central bankers in developing countries, one gets this sense of the belief in the central bank as a technocratic citadel. Of course, in countries with strong rule of law, there may be nothing to fear from accountability structures.

There are a number of gauges of institutional strength to choose from, none of them ideal. For our initial work, we use the rule of law index from the Kaufman et al. (2010) [governance indicators](#), which is likely to correspond most closely to the dimensions relevant to the implementation of monetary policy.

Figure 2 plots the rule of law index as of the date of adoption (on the vertical axis) as a function of the degree of goal independence at the time of adoption (on the horizontal axis).⁷ The symbols are defined as in Figure 1.

The figure shows that there is no systematic relationship between institutional strength and goal independence among developed countries. All rank highly on the rule of law metric. Three central banks (Iceland, Japan and the UK) have government-specified goals, four have jointly determined goals (the US, Canada, New Zealand and Australia), and three have goal independence (Sweden, Norway and the European Union).

The picture is very different for EMEs. For these countries, an upward-sloping relationship is readily apparent, indicating that a greater degree of goal independence is associated with higher scores on the rule of law index. With the exception of Hungary, those with low rule-of-law scores consistently lack complete goal independence (have goals set by the government, or determined jointly). With the sole exception of Peru, those that rank highly on the rule-of-law index delegate goal setting to the central bank.

It is interesting to note that the only central banks to have revised their inflation targets upward (New Zealand, Brazil and Turkey) lack goal independence.

4.2 Inflation outcomes

We turn now to an examination of inflation outcomes. We look at two measures of inflation performance: the average deviation of inflation from its target (or the midpoint of the range) and the persistence of fluctuations around the target. Both can be interpreted as (flawed) indicators of the credibility of the inflation target.

The average deviation of inflation from the target might be interpreted as a crude gauge of inflation bias in the context of the Barro-Gordon framework, or alternatively as a lack of willingness to endure the cost of disinflation. This is a highly imperfect indicator, of course. The likelihood of deviations from the target depends a great deal on the magnitude and nature of the shocks and the structure of the economy. Even over a

⁷ The index only goes back to 1996, so we use the 1996 figures for countries adopting IT prior to 1996. Fortunately, these measures tend to be quite stable over time. The rule of law index for Germany is used for the EU on the grounds that the ECB is to a large extent the reincarnation of the Bundesbank. Information on the degree of goal independence is obtained from Hammond (2012).

sample of ten years (typical of some EMEs) bad inflation outcomes may be as much a function of bad luck as bad policy.

Figure 3 depicts the average target miss along with the 90% confidence intervals for the 26 inflation targeters, plus the Fed, ECB and BOJ.⁸ The countries are arranged and the symbols are defined as in Figure 1. Within each group, the average miss is ordered from smallest to largest.

The figure shows that the average miss tends to be larger for those central banks lacking goal independence. The average for those with government set targets is 2.4%, versus 1.1% for those with jointly set targets, and 0.1% for those with bank-determined targets. The Fed, BOJ and ECB have effectively nailed their respective targets (taken to be 2% PCE inflation for the U.S., 0% CPI inflation for Japan, and 2% HCPI inflation for the Euro Area).

Inflation persistence is a commonly used metric for assessing inflation outcomes.⁹ Persistence is arguably a better gauge of “credibility” (or more precisely, conservatism) than the average target miss, in the sense that it is more influenced by policy and less by luck. In most standard models of optimizing monetary policy, the speed of convergence to the inflation target is a decreasing function of λ (the weight on output in the objective function in equation 1), δ (the discount factor applied to future periods, and the sacrifice ratio (the inverse of the slope of the aggregate supply curve)). For similar structured economies integrated with global financial markets, differences in persistence are likely to represent primarily differences in λ . Note, however, that inflation persistence will not be a clean gauge of central bank conservatism, especially for those with varying labor market institutions. As discussed in Ball (1993) and Posen (1998), it will be optimal for countries with a steep aggregate supply curve (a small sacrifice ratio) to reduce inflation more rapidly than those with a shallow curve (a large sacrifice ratio).

To estimate the degree of persistence, we use OLS to fit an AR(2) model to the quarterly deviations of inflation from its target (again starting a year after adoption) and calculate

⁸ The statistics are calculated from one year after the adoption of IT to allow for some time for the policy to become established. Turkey’s start date is two years after adoption since the CBRT initially changed the target from quarter to quarter. And Canada starts in 1993 since no explicit targets were announced at the time of the official adoption in 1991.

⁹ See Siklos (1999) and Kuttner and Posen (2001), among others.

the largest autoregressive root. Figure 4 depicts the results. The symbols denote the point estimates and the bars are the 90% confidence intervals.

The salient result is that the point estimate of the autoregressive root is less than one, significantly so for most of the countries. The upper bound of the 90% confidence interval exceeds 1 only for Australia, Serbia and Turkey.¹⁰ Reassuringly, this indicates that inflation does indeed revert to the target for every country that has adopted inflation targeting.

The more goal-independent central banks exhibit less inflation persistence. The differences are not particularly large, however. On average, those with government-set targets have a root equal to 0.56 (although this is skewed Serbia's observation). The corresponding figure for those with jointly set targets is 0.47, and for goal independent central banks the estimate is 0.39. The non-inflation targeters' persistence is on par with that of the goal-independent central banks.

¹⁰ Australia's result is an artifact of the unusually large standard errors in the two-lag specification. With four lags, the point estimate is 0.67 and the upper bound is 0.89. Stock's (1991) median unbiased estimates are generally consistent with these results, although a root of 1 is (barely) within the 90% confidence interval for Colombia, Iceland, Poland, Romania and Turkey. With start dates of 2009 and 2010, the Serbia and Turkey estimates should be regarded as highly unreliable.

Interestingly, there is a positive relationship between the average target miss and the degree of inflation persistence. As shown in Figure 5, persistence is higher for those countries that tend to overshoot their targets. Serbia is an extreme case, but even with that observation deleted, there is a positive and statistically significant relationship between the two indicators of inflation performance.

Figure 6 shows the median (depicted with the same symbols used in the preceding figures) along with the mean (plus signs) and the 10% and 90% fractiles of the deviations from the targets. The chart shows that the distribution of the deviations is distinctly skewed to the right in several cases. The mean exceeds the median by at least 0.5% for seven countries: Serbia, the Philippines, Guatemala, Indonesia, Brazil and Iceland. All have non-goal independent central banks, and except for Iceland, all are emerging market economies. (In no case is the distribution skewed to the left.) Central banks that lack goal independence evidently tend to be more accommodative towards adverse (positive) inflation shocks, compared with those that are fully goal independent.

The results depicted in Figure 3 through Figure 6 show that target overshoots (and to a somewhat lesser extent) inflation persistence tend to be higher for central banks lacking goal independence. One interpretation is simply that the less independent banks place a higher weight on output fluctuations (a lower value of λ in the standard model of discretionary policy). This would explain what appears to be a larger inflation bias, and a slower convergence towards the inflation target, and support the malign view discussed earlier.

That conclusion does not necessarily follow, however. For the malign view to be true, one would have to know whether the faster speeds of adjustment typically observed for the goal independent central banks really were optimal and not the result of an inappropriate degree of conservatism.

Specifically, cross-country differences in the sacrifice ratio could, in theory, account for disparities in inflation persistence. It will generally be desirable for countries with a high sacrifice ratio (a low value of γ) to return to the target more gradually than those with a low ratio. The occasional governmental override (in the case of Brazil) or relaxation (in the case of the U.K.) may even be optimal. If so, and if the sample contains a significant

number of positive inflation shocks, one would also observe a greater tendency for non-goal independent central banks to experience above-target inflation.

To explore this possibility, we computed rough-and-ready estimates of sacrifice ratios using a method similar to that used in Ball (1993) and Debelle & Fischer (1994). The procedure involves identifying discrete episodes of disinflation and calculating the associated output loss.¹¹ The estimated sacrifice ratio is simply the ratio of the output loss to the change in the inflation rate. Due to data limitations, we were able to perform the calculations for only 21 of the 29 countries being analyzed.¹² Most countries experienced only one significant disinflation episode during the 1989Q1-2013Q1 period. The average ratio was used for those with two or more episodes.

The results of this analysis are distilled into Figure 7, which plots inflation persistence as a function of the sacrifice ratio. The ratio is generally in the vicinity of 1, indicating that a 1 percentage point real GDP (growth) reduction is associated with a disinflation of 1 percentage point, although it is significantly (perhaps implausibly) higher for five countries (Hungary, Turkey, Israel, the Czech Republic and the EU). The inflation persistence measure on the vertical axis is the same as that plotted in Figure 4 and Figure 5.

The main finding from this exercise is a negative one. The conventional theory sketched above suggests that countries with a smaller sacrifice ratio should display less inflation persistence. The scatterplot reveals no such relationship, however. Of course, this does not (necessarily) invalidate the theory. But it does indicate that cross-country variation in inflation persistence cannot be rationalized by differences in the terms of the output-inflation tradeoff (i.e. the γ). Instead, it suggests that the relationship between the degree of goal independence and inflation persistence can be traced to differences in central banks' preferences (the λ).

¹¹ The calculation is based on a centered three-year moving average of the inflation rate. The beginning of the disinflation episode is marked by a reduction in the smoothed inflation rate, and a decline over the subsequent six quarters that exceeds a pre-set threshold (1% for most countries). The end of the disinflation episode is the quarter in which the smoothed inflation rate is rising, and inflation is stabilized in the medium term (defined as a decline in inflation of no greater than 0.1% over the next six quarters). For The output loss is calculated as the average growth rate of real GDP from two quarters prior to the beginning of the disinflation episode to two quarters before the end of the episode, minus the average growth rate from ten to two quarters before to the beginning of the episode.

¹² In addition, implausible (negative) estimates were obtained for two countries, leaving 19.

4.3 The anchoring of inflation expectations

Inflation expectations are just as important, if not more so, than actual inflation outcomes. This section looks at whether the lack of goal independence undermines the public's trust in the central bank's commitment to its stated objectives and leads to unstable inflation expectations.

This is not an easy task. There are two general approaches to assessing the degree to which inflation expectations are anchored. One relies on the behavior of financial markets. Research using this method relies on high-frequency (daily) bond yield and forecast data: either long-dated nominal interest rates or the spread between nominal and indexed bonds. Examples include Gürkaynak et al. (2005) and Beechey et al. (2011). Another approach, which has been used by Levin et al. (2004) and Kuttner and Posen (2012), uses survey-based measures of inflation expectations.

Unfortunately, a lack of data severely limits the applicability of these methods to the countries we are considering. Many of the EMEs simply do not have well-developed long-term bond markets, much less inflation indexed bonds. Nor are survey expectations widely available. Given the data constraints, the best we can do involves using low frequency (quarterly) on long-term nominal government bonds. This limits our sample to the 15 countries (currently) for which we were able to obtain data.

Our method involves estimating the impact of economic news – specifically, inflation shocks – on long-term nominal bond yields. In that regard, our analysis is in the same spirit as Gürkaynak et al. (2005) and Beechey et al. (2011). Those studies were able to use day-ahead forecasts of various economic data releases (e.g. CPI, employment) to extract the “news” content. Lacking those data, we look instead at the response to inflation shocks from a simple vector autoregression (VAR) model.

To do this, we estimate a quarterly two-lag three-variable model involving the inflation rate, the policy rate and the long-term government bond yield.¹³ The system is orthogonalized in that order. This is consistent with the plausible assumptions that the interest rates have no contemporaneous impact in the inflation rate and that the central

¹³ The results are qualitatively similar with one or four lags.

bank does not react directly within the quarter to changes in the bond yield. To the extent that bond and policy rates incorporate information about inflation expectations, it is not unreasonable to interpret the innovation in the inflation equation as a rough gauge of inflation “news.”

The results appear in Table 1. The numbers represent the response, in terms of basis points, to a 1 percentage point inflation shock. The within-quarter responses to the inflation shock, reported in the first column, all tend to be quite small, mostly in the single digits. For the U.K., for example, a 1 percentage point shock is associated with a trivial 4 basis point increase in the bond yield. Mexico and Poland show the largest responses, but even these are quite small.

The change in the bond yield by itself is not a good measure of inflation expectations, however. One reason is that it also reflects expected future changes in the *real* short-term interest rate. An increase in the bond yield may therefore be due either to an increase in inflation expectations or an increase in the real rate. Alternatively, the bond yield would rise by less than the increase in inflation expectations if the real short-term interest rate were to decline over some horizon. This will be an issue when policy adjusts gradually to inflation (a phenomenon that is evident in the VAR impulse responses), leading to an initial decline in the real interest rate.

We make two adjustments to the estimated response in an effort to gauge more accurately the impact on inflation expectations. The first is to use the VAR to calculate the ten-year forecast for the real policy rate, and subtract the average of this forecast from the response of the bond yield. This means that if the bond yield were to rise by 20 basis points but the average real short-term real interest rate were also to increase by 5 basis points, then the increase in inflation expectations (over the life of the bond) would be only 15 basis points.

The results incorporating the adjusting for the average level of real interest rates are shown in the second column. The adjustment makes very little difference, and indeed in

many cases the correction works in the opposite direction, increasing the measured response of inflation expectations.¹⁴

The second adjustment is to look at the response of the bond yield in the quarter *after* the initial shock, thereby allowing for a gradual or delayed reaction of the policy rate. This makes a nontrivial difference in the cases of Poland and Mexico, both of which now show a bond yield (and implied inflation) response in excess of 20 basis points.

With so few countries in the non-goal independent categories, it is hard to draw firm conclusions from the VAR analysis about the effects of goal independence *per se*. Mexico's (relatively) large response of inflation expectations is what one would expect if government-set goals undermined the commitment to low inflation. The same cannot be said for Poland, whose central bank *does* enjoy goal independence.¹⁵ However, it is interesting to note that both countries are on the high end in terms of size of the target miss (at least for the subset of countries included in the VAR analysis), and Poland's inflation persistence is above average.

5. Conclusions

The conclusions from the empirical work are fourfold:

1. Among EMEs, countries with stronger institutions, as measured by the rule of law index, are more likely to confer goal independence on the central bank.
2. Judging from inflation outcomes, EME central banks whose inflation targets are set unilaterally or in consultation with the government do appear to be somewhat "softer" on inflation than those with goal independence. There is very little difference for developed countries' central banks.
3. Any softness is just a matter of degree, as inflation reverts to its target (explicit or implicit) in every country, regardless of the degree of goal independence.

¹⁴ This is because many central banks cut rates in response to the financial crisis even as inflation crested. This peculiar result disappears when the post-crisis period is excluded from the regression.

¹⁵ Using four lags in the VAR shrinks Poland's response to only 13 basis points, so one should probably not put too much weight on this estimate. Mexico's remains 23 basis points.

4. With the exception of Mexico (and possibly Poland) there is no evidence of unanchored inflation expectations. (The lack of data for EMEs severely constrains scope of the analysis, unfortunately.)

Left unanswered (for now) is the question posed in the title, i.e. whether the malign view of central bank dependence is correct. Granted, a superficial reading of the evidence is consistent with such a view. A closer look suggests a more nuanced view, however. There is no evidence of inflation “drift” as there was in many countries (including the U.S.) in the past, and inflation expectations appear to be well-anchored, despite the appearance of a small but pervasive inflation bias among goal-dependent central banks.

Moreover, theory suggests that the occasional override or adjustment of the inflation target may be optimal. In the standard model of time inconsistency, such overrides are symmetric: the government will temporarily lower the target in the face of favorable (negative) inflation shocks in order to avoid an excessively large boom, just as adverse (positive) inflation shocks optimally lead to a temporary increase in the target. The assumptions generating this result are patently implausible, however. Surely no government would ever override a central bank that was willing to let the economy expand rapidly in an effort to keep inflation close to the target.¹⁶ Consequently, it is hard to say definitely whether the observed overshoots of goal-dependent central banks are due to malign inflation bias, or to beneficial flexibility in response to adverse shocks.

¹⁶ To our knowledge, a model incorporating an asymmetric override has yet to be worked out. The appendix contains a tentative sketch of what such a model might look like.

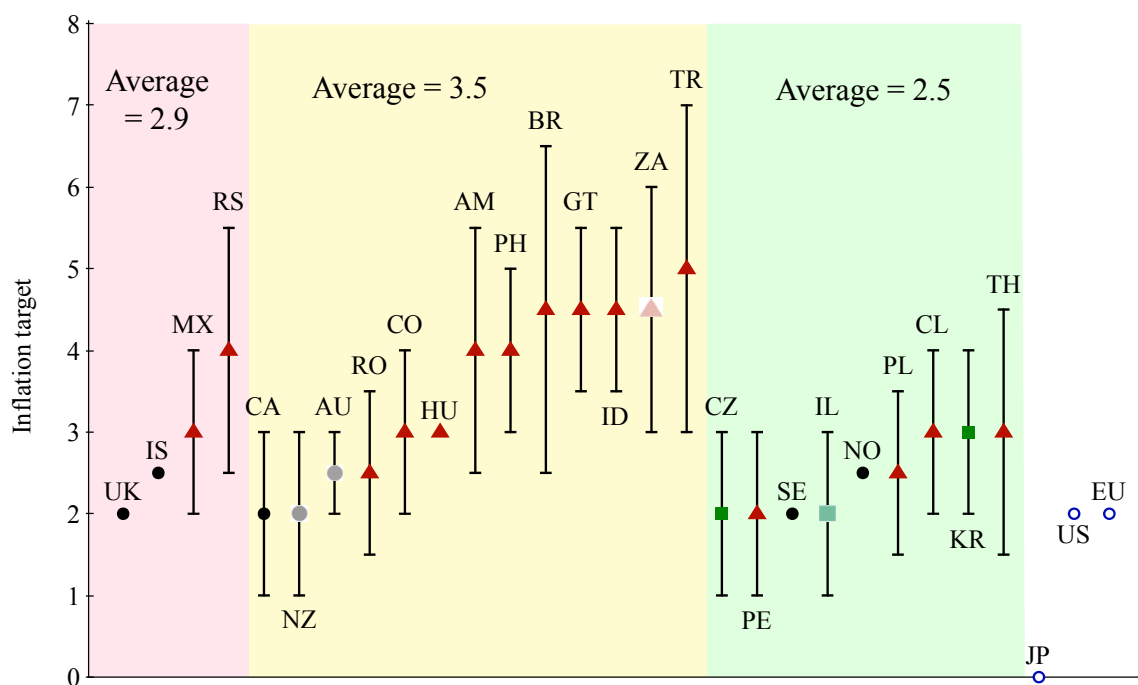


Figure 1: Inflation targets as of 2012

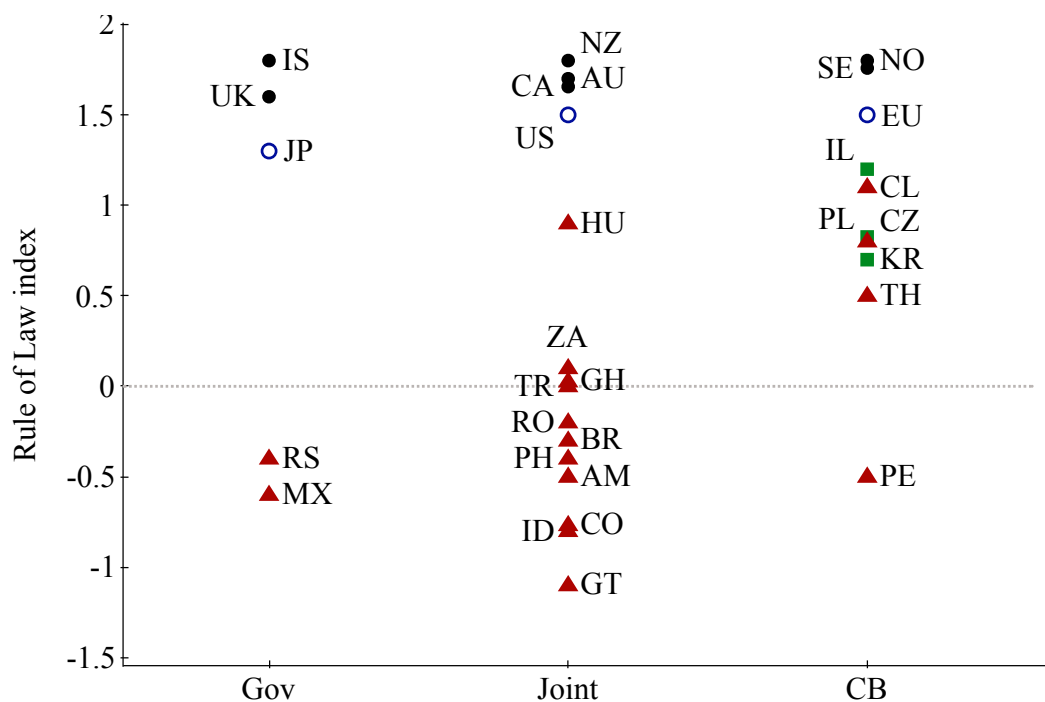


Figure 2: Rule of law and goal independence

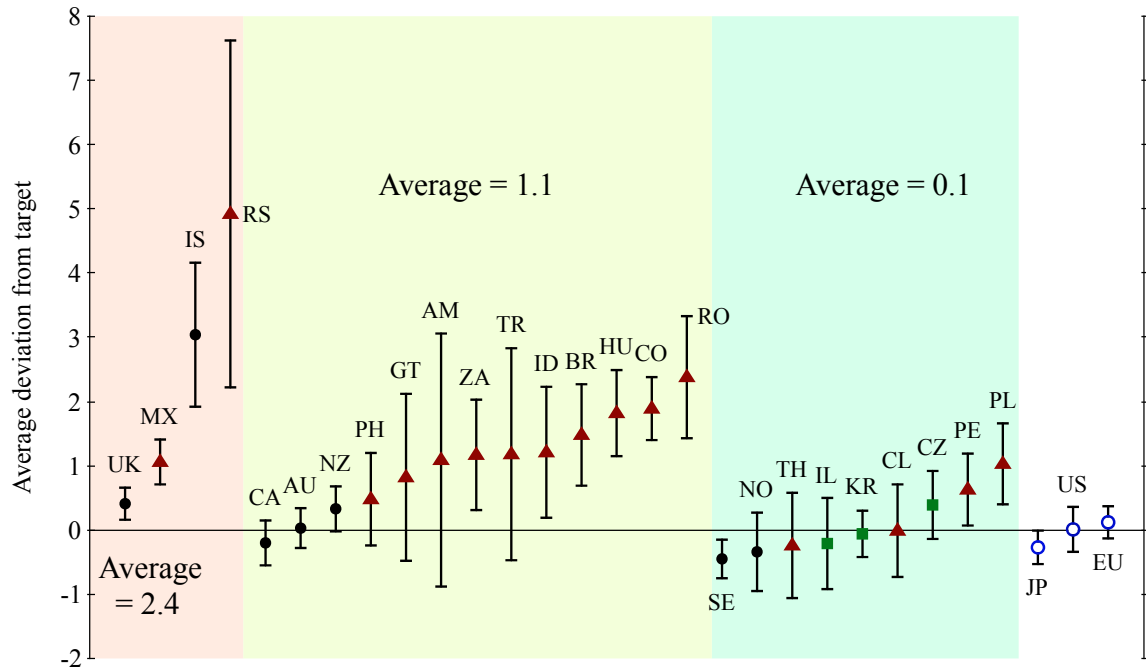


Figure 3: Average inflation target miss

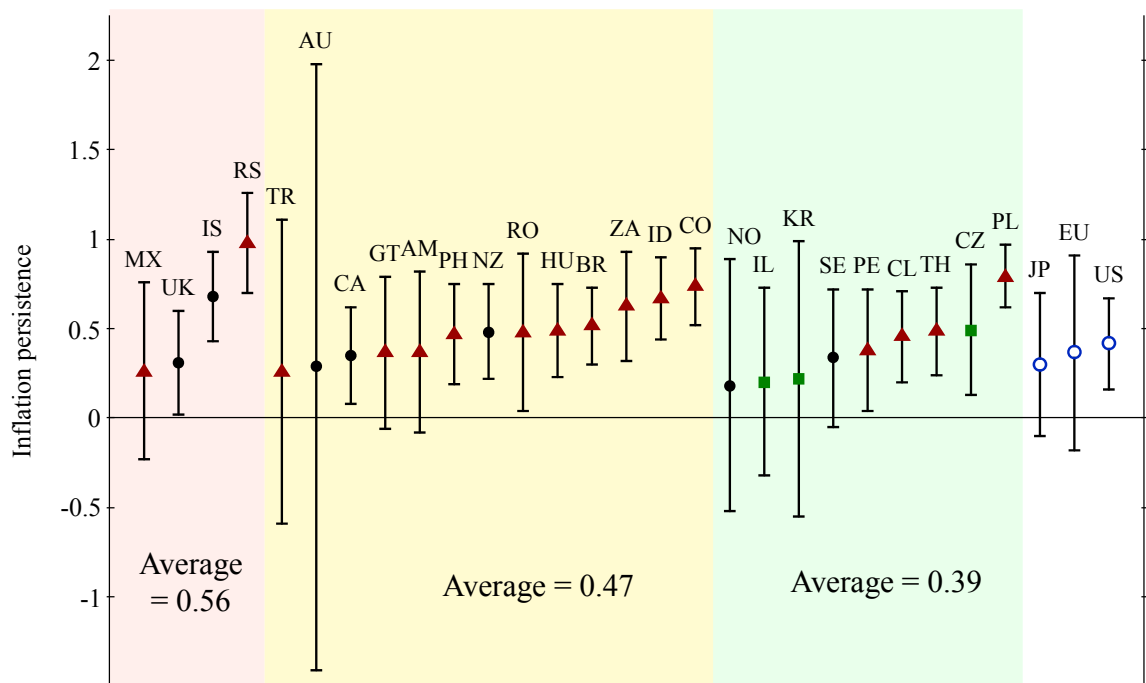


Figure 4: Estimated inflation persistence

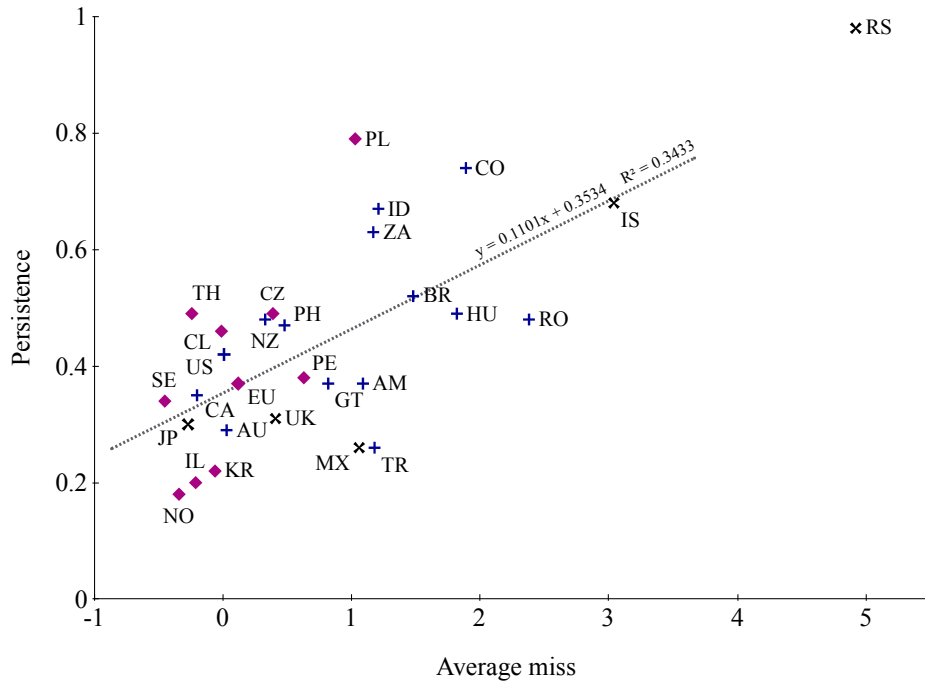


Figure 5: Average target miss versus inflation persistence

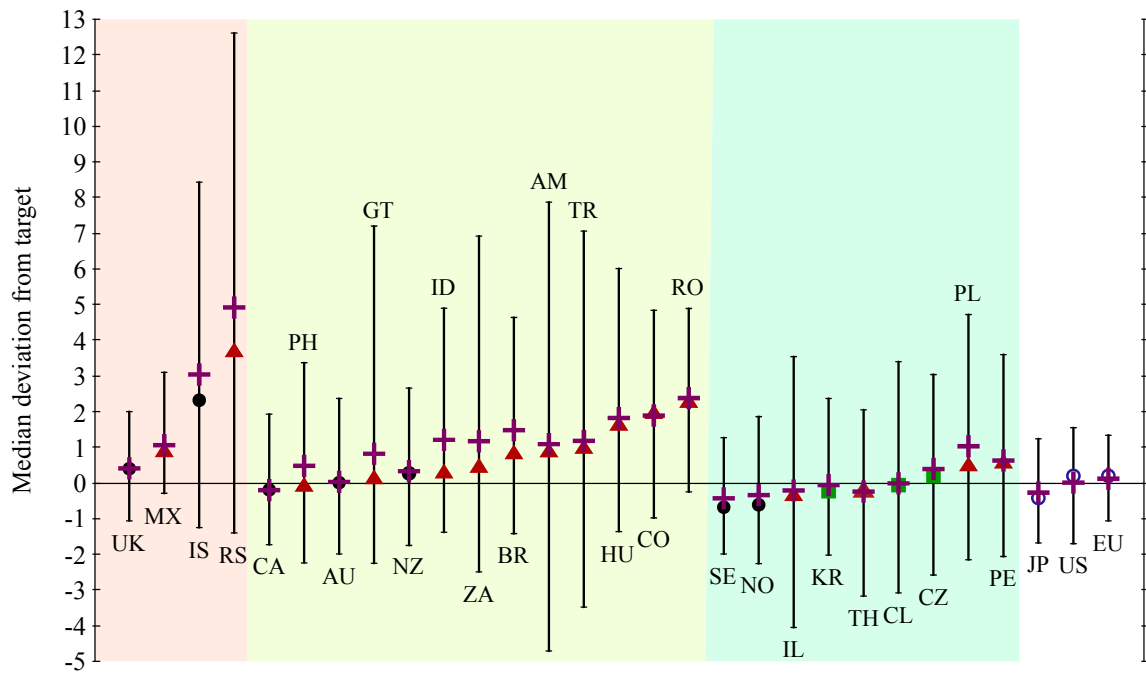


Figure 6: Median miss, average miss and 10% & 90% fractiles

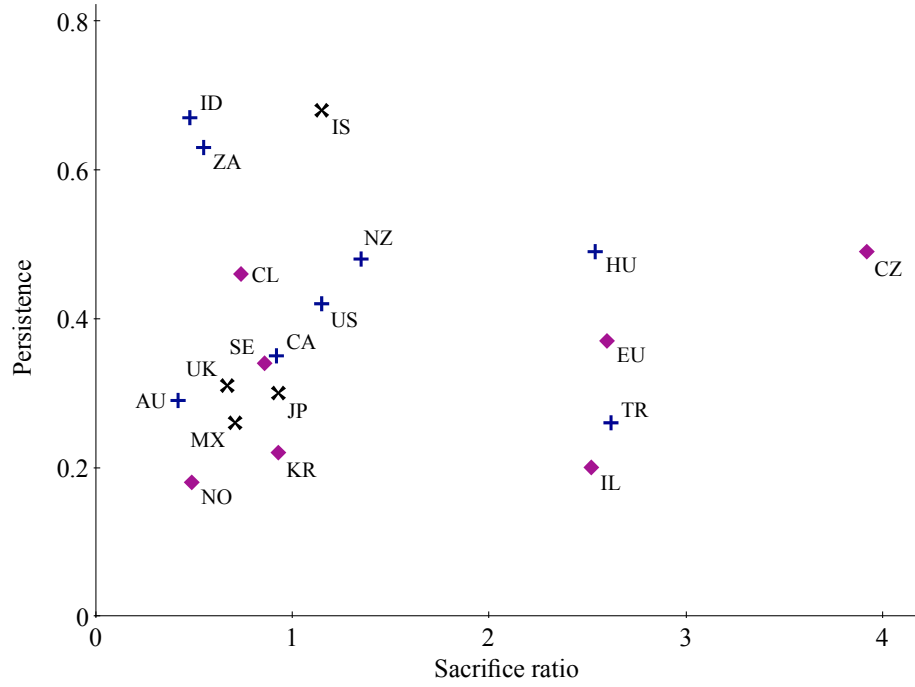


Figure 7: The sacrifice ratio versus inflation persistence

Table 1: Bond yields' response to inflation shocks

	Current quarter		Next quarter	
	Bond yield	Implied inflation	Bond yield	Implied inflation
U.K.	4	13	2	9
Mexico	12	14	23	22
Canada	0	5	-3	0
Australia	7	9	10	10
New Zealand	5	10	5	7
South Africa	7	5	11	6
Hungary	-4	-3	-8	-9
Sweden	6	8	8	7
Norway	1	4	-4	-3
Thailand	5	5	9	7
Israel	8	3	13	6
Korea	6	10	3	4
Chile	5	7	2	2
Czech Republic	4	5	6	6
Poland	10	12	23	22
United States	7	10	7	7
Japan	-1	1	3	3
Euro area	6	7	4	2

Note: the table gives the response, in basis points, of the long-term government bond yield and the implied average inflation rate over a ten-year horizon of a one percentage point inflation shock. The shock and the estimated responses are derived from a three-variable two-lag VAR with inflation, the policy rate and the long-term government bond yield, orthogonalized in that order. The period used for estimation runs from four quarters following the adoption of inflation targeting through 2013Q1.

Appendix – Towards an alternative view of central bank non-independence

The conventional framework

In the context of the usual Barro-Gordon framework, a common way to model government meddling in monetary policy is to assume that the central bank is weight-conservative relative to the government and/or that the government has more of an expansionary bias,

$$L_{cb} = (\pi - \pi^*)^2 + \lambda_{cb}y^2$$

$$L_g = (\pi - \pi^*)^2 + \lambda_g(y - k)^2$$

where y is the output gap, $\lambda_{cb} < \lambda_g$ and $k > 0$. Non-independence is a situation in which the central bank is not the government's objective function, so the central bank minimizes a convex combination of the two,

$$\omega\lambda_g + (1 - \omega)\lambda_{cb}$$

where ω represents the government's degree of influence over the central bank.

A sketch of an alternative framework

The key assumptions are:

- The central bank is weight conservative relative to society. This may come about for several different reasons. One is that monetary policy is typically made by committee, and committees are inherently conservative (in the sense of resisting change) or subject to groupthink. (Maier, 2010) Another is that central bank governors represent a narrow set of constituents (e.g. the financial sector) which tend to be more inflation averse than the rest of society. (Posen, 1995) Third, because inflation targeting central banks are accountable only for the inflation outcome, central banks have lexicographic preferences over inflation and output. (Friedman, 2004)
- There is no intrinsic inflationary bias, so $k = 0$.
- The government is averse to large output losses but is indifferent to higher-than-potential output.
- The government will override the central bank when there is a severe contraction (y falls below some threshold) and require the central bank to minimize the conventional quadratic objective function.

This can be modeled as follows:

- Aggregate supply: $\pi = E(\pi) + \gamma y + \varepsilon$
- Society's objective function is $L = (\pi - \pi^*)^2 + \lambda y^2$, which implies a targeting rule of the form: $y = -(\gamma/\lambda)\pi$.
- The central bank's λ is smaller than society's.

The analysis can be simplified by assuming the CB is an inflation nutter with $\lambda = 0$, in which case the outcomes are as follows:

- $\pi = 0$
- $y = -\gamma[E(\pi) + \varepsilon]$

The “override” (discretionary) outcomes:

- $\pi = \frac{\lambda}{\lambda + \gamma^2}[E(\pi) + \varepsilon]$
- $y = -\frac{\gamma}{\lambda + \gamma^2}[E(\pi) + \varepsilon]$

The government overrides when $y < y^*$ or alternatively when $\varepsilon > \varepsilon^*$ (large adverse shock).

Note that these expressions are functions of $E(\pi)$, which will depend on the probability of an override. Let $\text{Prob}(\varepsilon < \varepsilon^*) = F(\varepsilon^*)$, where F is the CDF of the relevant probability distribution. In this case,

$$E(\pi) = \text{Prob}(\varepsilon < \varepsilon^*) \times E(\pi | \varepsilon < \varepsilon^*) + \text{Prob}(\varepsilon > \varepsilon^*) \times E(\pi | \varepsilon > \varepsilon^*)$$

The first term on the right-hand side is zero by virtue of the assumption that for small shocks, the inflation-nutter central bank keeps the inflation rate at zero. So that means

$$E(\pi) = [1 - F(\varepsilon^*)] \left\{ \frac{\lambda}{\lambda + \gamma^2} [E(\pi) + E(\varepsilon | \varepsilon > \varepsilon^*)] \right\}$$

The $E(\varepsilon | \varepsilon > \varepsilon^*)$ term is recognizable as the mean of a truncated distribution. The preceding equation can be solved for $E(\pi)$. To simplify the notation, let

$$b = \frac{\lambda}{\lambda + \gamma^2}$$

and $P = 1 - F(\varepsilon^*)$, the probability of an override.

$$E(\pi) = \frac{Pb}{1 - Pb} E(\varepsilon | \varepsilon > \varepsilon^*)$$

In general, the inflation bias will be a function of λ , γ and the probability distribution of the shocks. To understand why, it is helpful to consider two special cases:

1. Never override, $\varepsilon^* \ll \infty$, $P \ll 0$, $E(\pi) = 0$. No inflation bias.
2. Override any time the economy experiences an adverse shock, $\varepsilon^* = 0$, $P = 0.5$ (assuming a symmetric distribution). If ε is distributed normally, then the mean of a normal distribution truncated at zero is approximately $0.8 \times \sigma$ where σ is the standard deviation. In this case,

$$E(\pi) = \frac{0.8b \cdot \sigma}{2 - b}$$

The inflation bias is a function of σ and ε^* : the larger the σ and the smaller the ε^* , the more frequent the overrides, and thus the higher the probability that inflation will be allowed to overshoot the target.

The main implication of this framework is that high-volatility economies will tend to overshoot the target more than those with low volatility. This differs from the standard model in which higher volatility increases the likelihood of missing the target, but does not increase the bias.

We conjecture that given the assumed structure of the relationship between the government and the central bank, allowing occasional overrides ($\varepsilon^* < \infty$) is optimal, just as in the Flood-Isard (1989) and Lohmann (1992) frameworks. What differs is that the overrides are (plausibly) asymmetric, which rationalizes inflation bias in the absence of the (irrational) objective of boosting output above its natural level. As yet undetermined are the circumstances (if any) under which the assumed delegation scheme would be optimal.

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