Comment on "Forward Guidance: Communication, Commitment, or Both?" by Marco Bassetto

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1 A brief historical perspective and some context

The problem of central banks' time inconsistency has been recognized and studied at least since the beginning of the rational expectations revolution of the 1970s. Time inconsistency occurs when past decisions that were optimal at the time they were made are suboptimal from today's perspective, creating an incentive to deviate from the past decisions. The seminal works of Kydland and Prescott (1977) and Barro and Gordon (1983) showed that if the central bank has an "inflationary bias," then it will be tempted to overstimulate the economy with surprise inflation. With rational expectations, the private sector correctly anticipates the intended inflationary actions of the central bank, negating the stimulative effect. The result is higher inflation without higher growth. The original inflationary bias analysis is as much positive as it is normative, influenced by the stagflation of the 1970s and the subsequent Volcker disinflation.

One solution to the inflationary bias problem is for the central bank to commit to never surprising the private sector with high unexpected inflation. If the private sector believes that the central bank will follow through on its commitment, and the central bank indeed follows through, the inflationary bias disappears. In practice, it is difficult for central banks to truly commit to future actions that are time inconsistent.

Another idea to counter the inflation bias, proposed by Rogoff (1985), is to delegate monetary policy to a central banker who has an intrinsic dislike for inflation, sometimes called a "conservative" central banker. Concretely, such a central banker places a utility weight on inflation stabilization that is larger than the social welfare function's weight. This delegation scheme can bring down the level of time-consistent inflation, resolving (or at least mitigating) the inflation bias problem. Unfortunately, this kind of conservative central banker will let unemployment fluctuate more than is socially desirable, making this

delegation scheme not fully optimal. In addition, as many countries achieved impressive disinflations in the 1980s and 1990s without appointing new central bankers and without significant institutional reform (such as modifying the central bank's objective function), interest in delegation declined.

A third strand of the literature considers whether central bank communication with the private sector can be used to overcome the time inconsistency and inflation bias problems. The main challenge is that central bank communication is, for the most part, *cheap talk*. Bassetto (2019) clearly explains that "Cheap talk refers to a situation in which a player in a game has the possibility of sending messages that have no direct consequences on the set of future actions available to the players nor on their payoffs." Game theorists insist that cheap talk is usually understood to also be cost-less and unverifiable. In most models with rational expectations, given the option of cheap talk, central banks have an incentive to lie to the private sector. Knowing this, the private sector will always be skeptical of central bank announcements.

The literature started by thinking about a central bank that wants to be perceived as being tough on inflation. The private sector entertains the possibility that the central bank is tough on inflation, but also that it is of some other type. Having a reputation for being inflation-averse helps all central bank types lower inflation expectations through the same mechanism as in Rogoff (1985). Cheap talk is rather ineffective in this setting. All central bank types prefer to be considered tough on inflation, so they all benefit from announcing they are tough on inflation, making communication non-credible.

Stein (1989) had the innovative idea that different types of central banks may want different levels of inflation which are not known by the public. Some central banks want to convince the public that inflation will be higher, while others that it will be lower. In this situation, cheap talk turns out to be helpful. Interestingly, the optimal form of communication is not to reveal your type, but to only report some imprecise or ambiguous information (former Federal Reserve chair Greenspan must have read Stein's paper). For example, instead of reporting its true inflation targets, central banks may find it optimal to only report a range for them. Cheap talk then serves the purpose of managing expectations but neither builds credibility nor enforces the commitment needed to address the time inconsistency problem.

A fourth strand of the literature focuses on reputation. A typical reputation model has the Barro and Gordon (1983) game played repeatedly infinitely often. If the central bank "cheats" the private sector in some period and sets inflation higher than what the private sector expected, it achieves an increase in output with little inflation costs. The private sector can then decide, in subsequent periods, to stop trusting the central bank and "punish" it by setting inflation expectations to a high level forever after. Under this threat, the central bank has to weigh the short-term benefits of stimulating the economy with surprise inflation

against the long-term cost of having to deal with high inflation expectations in the future. Naturally, the discount factor of the central bank plays a key role, as long-term costs always become larger when the discount rate is low enough (by Folk theorem logic). A central bank that does not "cheat" in the Barro and Gordon (1983) stage-game builds a good reputation that helps maintain private sector inflation expectations contained. Unfortunately, it has been argued that these reputational mechanisms can be fragile and difficult to implement in practice (for example, see Goodhart (1994)).

The ideas put forth in the literature to overcome the inflation bias problem, in addition to the theoretical challenges mentioned above, had to also be confronted with reality. As disinflation was being achieved by many central banks around the world throughout the 1980s and 1990s, a general belief emerged that the inflationary bias can be overcome. But none of the ideas mentioned above – including the idea of using central bank communication – were seriously implemented or all that consistent with the facts. Instead, a strong correlation between central bank independence and low inflation was observed. If causal, the implication is that the inflationary bias is somehow imposed from outside the central bank; insulating central banks from this outside influence is a crucial step in solving the inflationary bias problem. As with most things economics, central bank independence was not a perfect explanation. For instance, more independent central banks did not find it less costly to reduce inflation, contrary to what the theory of independence would suggest (Cukierman (1992), Debelle and Fischer (1994)).

The more coherent and detailed New Keynesian microfoundations that emerged throughout the 1990s and 2000s revealed that at least one kind of inflationary bias can stem from cost-push shocks rather than from some purposeful influence that emerges outside the central bank. An additional important finding was that even when the inflationary bias problem is absent or solved, there can still be a "stabilization bias" that also gives rise to time inconsistency. Stabilization bias is the tendency of a central bank to respond to to shocks suboptimally when it cannot commit to future policies. With the inflation bias problem perceived to be largely solved in many advanced economies, the literature started focusing more on the stabilization bias. Proposed solutions were similar to those conceived for the inflation bias problem and mostly involved delegation or commitment to time-inconsistent behavior.

When the short-term interest rates in the US flirted with its effective lower bound (ELB) around 2003, and with the Japanese economy having spent several years with low interest rates and deflation, the literature started paying attention to how to deal with the ELB. Eggertsson (2003) and Jung et al. (2005) characterize the optimal policy in a standard version of the New Keynesian model augmented with a lower bound for the short-term nominal interest rate. The optimal policy while constrained by the ELB is forward guidance:

the central bank commits to keeping interest rates low for a time longer than justified solely by contemporaneous economic conditions. The low levels of future interest rates that are expected to prevail in the future should create higher future inflation and output. While at the ELB, despite monetary policy being unable to further stimulate the economy by reducing interest rates, the expectation of higher future inflation and output in the future percolates backward in time and stimulates the economy today. And then time-inconsistency rears its ugly head again. After the ELB ceases to bind, the promise of inflation and output that are higher than prevailing economic conditions warrant is clearly suboptimal. All the benefits of higher inflation and output expectations have already been reaped, and all that lays ahead is a costly overheating of the economy. A central bank without commitment or a purely forward looking central bank – a central bank that lets bygones be bygones – will then decide to renege on its past promise and act optimally from today's point of view. Rational agents, expecting this outcome, will be reluctant to believe the central bank's time inconsistent promise while at the ELB, once again negating the benefits of forward guidance.

After the 2008 financial crisis, interest rates in many advanced economies spent years at their ELB. Interest in how to address the ELB-induced time inconsistency intensified, and with it the volume of the corresponding academic literature. The Federal Reserve and many other central banks did engage in forward guidance by announcing that the intended path of interest rates would be low for many quarters into the future. This forward guidance was, in practice, not the iron-clad commitment that the models advocated, as central banks were keenly aware of their own inability to fully commit to time-inconsistent policies. Communication took center stage, since at the time of announcement, forward guidance is just words. How can "open mouth operations," being essentially just cheap talk, have any effect on expectations? Whatever the answer to this question, the empirical literature finds meaningful causal effects of forward guidance announcements on financial asset prices and the real economy alike.[1]

An illuminating article by Campbell et al. (2012) framed the discussion of forward guidance communication in terms of Odyssean versus Delphic forward guidance. Odyssean guidance involves the iron-clad commitment advocated by models. The central bank announces a (perhaps state-contingent) path of interest rates it intends to implement and then ties its hands so that it cannot reverse course, just as Odysseus did to avoid being lured by sirens. Delphic guidance, on the other hand, involves announcing the central bank's best guess for the path of interest rates. Importantly, such an announcement is just a forecast and involves no commitment at all. Like the announcements from the Oracle of Delphi, they foresee the future but do not create it. Even if there is no promised action, Delphic guidance does reveal some of the central bank's private information, which can change how the private sec-

[1]For a survey of the literature, see Borio and Zabai (2018).

tor behaves and therefore also have an effect on the economy. Empirically, Campbell et al. (2012) identify both Odyssean and Delphic components in the Federal Reserve's post-crisis communication of forward guidance.

2 Contributions of Bassetto (2019)

Bassetto (2019) generalizes the model in Stein (1989) in two main dimensions. First, it considers an infinitely-repeated version of the game. Interestingly, Stein (1989) shies away from an infinite horizon because he deems it "implausible." I am less concerned with infinite horizons not being literally true. To me, it is just a very fruitful modeling device. Second, Bassetto (2019) allows for an incredibly general form of asymmetric information and an equally general message space. In contrast to most of the literature, neither the central bank nor the private sector are required to have better or more accurate information (although these two cases are certainly allowed and even examined). This generality allows for cases in which, for example, the private sector and the central bank both believe that each other's forecasts are wrong. Irrespective of who is right, cheap talk can be useful because it is valuable for the private sector to know the central bank's forecast, or at least how its policy is affected by it. In addition, the information asymmetry can be about any of the variables of the model.

In this rich setting, it is possible to analyze the whole set of issues discussed in the last section – reputation, communication, time inconsistency, forward guidance – all in a single, coherent, maximizing framework with rational expectations. This alone is a tremendous feat and an important contribution to the literature. Bassetto (2019) also provides the appropriate toolkit to understand and solve the model, always with very clear exposition. I certainly hope that the literature notices and values the fertile grounds Bassetto (2019) has left for the rest of the profession.

Out of the myriad questions that could have been studied in this framework, Bassetto (2019) decides to offer a new way to understand the Odyssean and Delphic versions of forward guidance. One of his main messages is that Odyssean and Delphic forward guidance cannot be understood as independent from each other. Without asymmetric information, communication by the central bank is redundant. With asymmetric information, although Delphic forward guidance is certainly useful, it is all the more powerful when the central bank builds up credibility over time by following through on its announced promises. One way to understand this idea is to first notice that the best possible equilibrium, the one that could be attained if the central bank had full commitment and could reveal all private information, features actions that are linked through time. When the central bank has no commitment, it can use its reputation to induce persistence in the private sector's otherwise

myopic beliefs. In the context of communication, the notion of reputation translates to credibility of messages. So even though Delphic forward guidance is helpful because it can reduce asymmetric information, Odyssean forward guidance enhances the Delphic revelation of information by coupling actions, beliefs and messages through time, mimicking the full-information commitment outcome. This is a very illuminating insight that is new to the literature.

In addition to this more theoretical insight, Bassetto (2019) offers one main practical takeaway, proposing that forward guidance is better suited to communicate private information about the central bank's preferences and beliefs, while more general transparency is better suited to communicate the central bank's private information about the state of the economy. In his framework, forward guidance means disclosing inflation π_t, which is the policy choice variable of the central bank (as in Barro and Gordon (1983)). In contrast, general transparency means disclosing private information about variables that are not under the direct control of the central bank, that is, information about any variables except for π_t. In the next section, I discuss how the conclusion of when forward guidance is best was reached and propose some alternative ways to think about it.

Then, in the last section, I examine the applicability of the framework when the ELB is explicitly taken into account. Given that forward guidance has been used as a response to the ELB (and is likely to be used again in the next visit to the ELB), it is important to understand whether the insightful understanding of forward guidance and the practical recommendations of Bassetto (2019) continue to hold in this case.

3 When to use forward guidance

3.1 What type of communication is more natural?

Bassetto (2019) analyzes the case in which the central bank has private information about its objective. In the model, this means private information about the inflation target π_t^*. Bassetto (2019) states that: "[...] households have all the information about the underlying state of the economy that they need to make decisions, given government policy. While the government could report its underlying information that leads it to prefer π_t^*, this is more information than necessary: all they need is to know the policy choice that the government will take. In other words, what the private sector needs is precisely forward guidance about monetary policy." Because talk is cheap and there are no communication frictions, the model has no notion of what "more information than necessary" entails. Although computing a conditional expectation to figure out π_t certainly *feels* harder than just reading off π_t in the newspaper, both are strictly equivalent (including for optimal decisions and for welfare) in

the model.

Bassetto (2019) also studies the case in which the central bank has private information about its beliefs about potential output y_t^*. The private sector knows the true value of potential output and knows this is the true value, but understands that the central bank may have a different estimate. The only reason why the private sector wants to know the central bank's estimate of potential output y_t^* is to forecast the path of interest rates, that is, central bank policy. It is then quite natural to think that it is better (in some sense) to just disclose the path of interest rates and save the private sector the headache of inferring the path of interest rates from the central bank's estimate of y_t^*. Bassetto (2019) explains that: "[...] the government's report could be about the information that led it to choose its policy actions; in this case, this would be [...] y_t^* [...]. However, this information is redundant [...]. Once again, in this setting forward guidance is a natural message space for the government to communicate the information that can coordinate households towards desirable equilibria." Just as before, however, the model has no role for "redundant information." Indeed, once y_t^* is revealed, it is the path of interest rates that would be redundant, but that is not a good argument to choose to communicate y_t^*.

I do sympathize with the idea that, within the framework, forward guidance seems more natural in both of the cases just discussed. I would just like to be able to see it in the model, or to have a model that delivers forward guidance not just as a more "natural" option, but as the option with the highest welfare. Perhaps a slight modification of the setup is all that is required to deliver a welfare ranking for forward guidance versus more general types of transparency. Adding some small information processing cost to the model seems like a good option to explore. The challenge is to check that all the other results and intuitions in the paper continue to hold in such slightly modified setup. A more ambitious idea is to find a reasonable equilibrium selection mechanism that picks forward guidance as the only equilibrium message when private information is about the central bank's preferences or beliefs, but picks general transparency as the only equilibrium message when private information is about the state of the economy. It would be interesting, for example, to check whether the selection criteria in Chen et al. (2008) – or any other reasonable selection criteria – can achieve this.

3.2 A New Keynesian perspective

Another consideration related to when forward guidance is more desirable than general transparency arises after I explicitly map the setup in Bassetto (2019) to the standard New Keynesian formulation like the one in Clarida et al. (1999). I set $\theta = 1$ for simplicity.[2] Under

[2]Indeed, θ does not seem to play any significant role in any of the results. It is included to allow for "strategic complementarity among private households," which is a nice feature to have but probably belongs

a simple transformation of variables, the central bank optimization problem can be written as

$$\begin{aligned} & \max_{\pi_t \in [\underline{\pi}, \overline{\pi}]} (1-\beta) E \sum_{t=0}^{\infty} \beta^t \left[(\hat{y}_t - k)^2 + \alpha \hat{\pi}_t^2 \right] \\ & s.t. \\ \hat{\pi}_t &= \frac{1}{\lambda} \hat{y}_t + \hat{\pi}_t^e + \hat{u}_t \end{aligned} \tag{1}$$

where equation (1) can be interpreted as a Phillips Curve (PC) with exogenous cost-push shocks $\hat{u}_t$.[3]

When the central bank has private information about π_t^* and sends the message $m_t = \pi_t$, Bassetto (2019) highlights the usefulness of forward guidance in revealing the central bank's private information about its objectives. Through the lens of the New Keynesian model, this example can be alternatively understood to be revealing something about cost-push shocks, which are arguably more connected to the state of the economy than to the central bank's objectives.

3.3 The central bank picks interest rates instead of inflation

One more difficulty in differentiating forward guidance from more general forms transparency arises when a demand-side equation is added to the model. As in Barro and Gordon (1983), Bassetto (2019) assumes for simplicity that instead of picking the short-term nominal interest rate or the supply of money, the central bank picks inflation outcomes directly. From a New Keynesian perspective there is, in general, no problem with this strategy. In the baseline log-linear New Keynesian model one can always back out the interest rate consistent with any given paths for inflation and output by using the IS equation (the log-linearized Euler consumption equation of the household, after imposing market clearing for goods):

$$y_t = -\left(i_t - \pi_t^e\right) + y_t^e + g_t \tag{2}$$

In equation (2), as in Bassetto (2019), y_t is aggregate output (or an output gap), y_t^e is the expectation of y_{t+1} conditional on time t information, and π_t^e is the expectation of inflation π_{t+1} conditional on time t information. The variable i_t is the short-term nominal rate of interest and g_t is an exogenous disturbance.[4] Of course, equilibria remain unchanged

in the IS curve (the Euler equation of the households) rather than the Phillips Curve (the first-order condition of the firms).

[3]The transformation is given by $u_t = \pi^* - \pi_t^*$, $\hat{u}_t = u_t - u_t^e$, $\hat{\pi}_t = \pi_t + u_t - \pi^*$, $\hat{y}_t = y_t - y_t^*$ where $\pi^* = E[\pi_t^*]$ and $y^* = E[y_t^*]$.

[4]I have also assumed that the elasticity of intertemporal substitution is equal to 1 to keep notation light.

when, instead of picking π_t, the central bank chooses i_t (and equation (2) is added as a constraint in the central bank's maximization problem). However, when discussing how forward guidance differs from general transparency, whether the government picks π_t or i_t directly can sometimes change the interpretation of results. When i_t is the choice variable of the bank, forward guidance should be understood as messages about the path of interest rates, and no longer as messages about the path of inflation.

Consider the case in which the central bank has private information about π_t^*, which is part of its objective function. Because π_t^* does not enter the equations that govern the dynamics of the economy (the IS equation and the PC), information about π_t^* is not information about the state of the economy. The results in Propositions 4 and 5 in Bassetto (2019) still hold, since equilibria are unchanged. The message $m_t = \pi_t$ is still all that the private sector needs to know to make its best possible decisions and is, arguably, just as "natural" or as "simple" as before. Nevertheless, this message is no longer representative of forward guidance, as it is not about i_t. Of course, the message $m_t = i_t$ is just as good. Forward guidance remains a good option but no longer seems to be, by using essentially the same evaluation criteria as in Bassetto (2019), the only good option. It is not easy to see how one could introduce a slight modification, such as a small information processing cost that makes $m_t = i_t$ more preferable than $m_t = \pi_t^*$. Conversely, consider a situation in which the central bank has private information about the "demand shock" g_t. This is private information about the state of the economy but not about its objectives or beliefs. Then a forward guidance message $m_t = i_t$ can bring about the full revelation equilibria, just as much as a message $m_t = g_t$ can, and I don't see a way to decide which one is "simpler" or more "natural," even using economic intuition from outside the model.

4 Considerations about the lower bound on interest rates

The introduction of the IS curve also brings to the fore issues related to the ELB, which are bypassed when the central bank picks inflation directly and the IS curve is omitted. Given that Bassetto (2019) uses ELB episodes as motivation to study forward guidance and central bank communication, it is perhaps initially surprising that the ELB is absent from the model. However, although some of the details may change, I do not see a high value in explicitly adding an IS equation and an ELB. The idea that communication through cheap talk is useful only if there is asymmetric information, and the way to think about forward guidance versus more general transparency, would certainly remain unchanged.

It is less clear whether one would obtain the results that require a sufficiently high upper bound for inflation $\bar{\pi}$, such as parts (ii) in Propositions 3, 5 and 7. In these propositions,

a high enough level of inflation is required so that the the worst possible threat is a strong enough threat. All parts of all propositions would continue to hold if, rather than a high enough $\bar{\pi}$, the lower bound for inflation, $\underline{\pi}$, were sufficiently low. So for the ELB to really overturn these results, it should restrict both high and low levels of inflation simultaneously, which seems highly unlikely. Given a path for output, the IS curve and the ELB together impose a *lower* bound on expected inflation. The more difficult question is whether one can obtain a sufficiently high or low inflation when the path of output is not just given, but determined endogenously and at the same time as the path for inflation.

A different issue is that the ELB makes central banks be concerned about low inflation, but the inefficiency and time inconsistency in the setup arise from inflation being too high. Communication in the model is intended to convince the public that inflation will be low. A quick fix is to pick a negative value for the inflation bias parameter k. All results would go through and the central bank would use messages to induce higher inflation expectations. I have not seen any microfoundations for $k < 0$, but perhaps it is a good reduced-form way to introduce the low-inflation problem at the ELB anyway. Many central banks invested years to achieve a hard-earned credibility for being tough on inflation. They still worry about losing their hawkish credentials by "credibly promising to being irresponsible," as Krugman eloquently put it. Some policymakers are probably thinking that k is still positive and that the low inflation is a separate problem coming from somewhere else. If this is the case, they would have to modify the framework accordingly.

The nature of time inconsistency also seems somewhat different when it arises because $k \neq 0$ than when it arises because of the ELB. The time inconsistency arising from $k \neq 0$ is always there (as is the stabilization bias, which would be interesting to analyze in the framework of Bassetto (2019)). In some studies, such as Werning (2011), the ELB is binding because the natural rate of interest is negative for some finite (and known) amount of time. Once the natural rate becomes positive, it stays positive forever. In addition, once the natural rate turns positive, the divine coincidence holds (loosely speaking, we have $k = 0$ after some fixed time T). In such a world, the time-inconsistency problem eventually disappears and with it the benefit of commitment. At that point, there is no benefit from having had built credibility, reducing the incentive to build credibility before then. An interesting question is whether this type of reasoning unravels some (all?) equilibria with informative messaging. In more realistic settings with shocks, the threat of a recurring ELB implies that there is always a future time in which the central bank will benefit from having built credibility. Given that this is likely the situation in which some of the largest world economies find themselves, I would encourage academics and policymakers alike to read Bassetto (2019).

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