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COMMUNICATION AND MONETARY POLICY

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Communication and Monetary Policy[*]

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1 Introduction

Communication is an integral part of modern monetary policy. Central banks have placed growing emphasis during the past decade towards greater transparency by expanding the modes of communication and the amount of information revealed to the public. Three factors have been particularly responsible for this development. First, greater independence granted to many central banks has been accompanied by a need for increased accountability. In general, greater accountability has meant an increase in communication with the public regarding the beliefs of policymakers and the operations of monetary policy. In turn, fair evaluation of central bank performance can

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only be achieved through greater transparency. As a result, the discourse between independent central banks, the government and the public has become of primary importance. The creation of the ECB, which is arguably further removed from the influence of elected officials, is a pertinent example. Second, many industrialised and emerging market countries have adopted inflation targeting since its introduction by New Zealand in 1990. While the specific structure of these regimes has differed across countries (see, e.g., Bernanke et al. (1999) and Schaechter et al. (2000)), in all cases the adoption of formal inflation targets has placed unprecedented emphasis on the communication practices of central banks. Third, financial markets have grown in importance in many countries. Market prices are driven by the expectations of market participants. Shaping and managing market expectations is thus an important part of monetary policy. This is a task that would be impossible without an effective channel of communication with market participants.

Blinder (1998, p.70) notes that "central banks generally control only the overnight interest rate, an interest rate that is relevant to virtually no economically interesting transactions. Monetary policy has important macroeconomic effects only to the extent that it moves financial market prices that really matter - like long-term interest rates, stock market values and exchange rates." The links from the direct lever of monetary policy (the overnight rate) to the prices that matter depend almost entirely upon market expectations. For instance, one-year rates are, in the first instance, affected by the market's expectations of overnight rates over the year as a whole. To this extent, market expectations of the intentions of the central bank are pivotal in determining prices, and communication between the central bank and the market is critical. Blinder goes on to argue that this expectational mech-

anism works best in an environment of central bank transparency. Since market expectations are shaped in part by the future course of action of the central bank, monetary policy is more effective if it is more effective in coordinating market expectations[1].

> If the gear linking the overnight bank rate to long-term interest rates keeps slipping, the central bank will find it hard to predict the effects of its own actions on the economy. But the reaction of long rates to short rates depends critically on expectations of future short rates, which are, in turn, heavily influenced by *perceptions* of what the central bank is up to. A central bank which is inscrutable gives the markets little or no way to ground these perceptions in any underlying reality - thereby opening the door to expectational bubbles that can make the effects of its policies hard to predict. [Blinder 1998, p.71]

The upshot is that a more predictable monetary policy, *ceteris paribus*, is more effective.[2]

However, if the effectiveness of the coordinating role of central bank disclosures has the potential to do good, then by the same token it also has the potential to do ill if expectations are coordinated away from the fundamentals. On the one hand central banks, in principle, have the opportunity to signal the future stance of monetary policy, and so the coordinating role of

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[1]A more recent and forceful statement of this position is the paper by Blinder, Goodhart, Hildebrand, Lipton and Wyplosz (2001).

[2]In a full information rational expectations economy, better welfare outcomes can be achieved by a central bank commiting to a fixed rule. Woodford (1999) further demonstrates conditions under which it is desirable to explicitly introduce inertia into interest rate setting. An inertial policy means that future interest rate changes are more predictable, and hence that any given interest rate change has a larger impact on variables mainly driven by forward-looking expectations.

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disclosures related to future overnight rates would be effective in aligning beliefs. On other matters, such as the appropriate level of equity prices, or the dawning of the new economy, it is far from clear that central bankers have the monopoly of wisdom. Nevertheless, their coordinating role will imply a disproportionate impact of their judgements on the final outcome, whether for good or ill. If their judgement is faulty, the consequent detrimental impact will be that much larger. To the extent that the central bank is effective in influencing the actions of economic agents through signalling their intentions, and thereby shaping the outcome as a result, the informational value of this outcome for the purpose of inferring something about the underlying state of the economy would be impaired. This is because the actions of economic agents will reflect in part the central bank's own assessment of the underlying state, and the mirror that is held up to the economy may simply reflect the central bank's own assessment of the same issue. The more authority that the central bank commands among the economic agents, the greater is the danger that the aggregate outcome is tinged with the central bank's own prior beliefs.

On a more mundane level, the dilemma posed by the potential for over-reaction to public pronouncements is a familiar one to policy makers that command high visibility in the market. Central bank officials have learned to be wary of public utterances that may unduly influence financial markets, and have developed their own respective strategies for communicating with the market. In formulating their disclosure policies, central banks and government agencies face a number of interrelated issues concerning how much they should disclose, in what form, and how often. Frequent and timely dissemination would aid the decision making process by putting current information at the disposal of all economic agents, but this has to be set against

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the fact that the judgements of policy makers about the state of the economy are likely to be reversed with the benefit of hindsight.

The same issues apply to the release of economic statistics, which in most cases are imperfect measurements of sometimes imprecise concepts. This raises legitimate concerns about the publication of preliminary or incomplete data, since the benefit of early release may be more than outweighed by the disproportionate impact of any error. This trade-off between timely but noisy information and slow but more accurate information is a familiar theme. There are many examples of debates that revolve around this trade-off. In the 1980s, the publication of monthly "flash GDP estimates" was the subject of much heated debate in the U. S. (Corrado (1986)). The same debate has resurfaced in Japan about whether preliminary GDP figures should be published. Australia moved from a monthly calendar in reporting its balance of trade figures to a quarterly calendar because it was felt that the noise in the monthly statistics were injecting too much volatility into the price signals from financial markets[3]. The flaws in the United Kingdom's earnings data have been credited with provoking unjustifiably tight credit conditions in the U.K. in the spring and summer of 1998[4].

The challenge for central banks and other public organizations is to strike the right balance between providing timely and frequent information to the private sector so as to allow it to pursue its goals, but to recognize the inherent limitations in any disclosure and to guard against the potential damage done by noise. This is a difficult balancing act at the best of times, but this task is likely to become even harder. As central banks' activities impinge more and more on the actions of market participants, the latter have reciprocated by stepping up their surveillance of central banks' activities and

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[3]We are grateful to Philip Lowe for this example.
[4]See, for instance, "Garbage in, garbage out" *Economist magazine*, October 15th 1998.

pronouncements. The intense spotlight trained on the fledgling European Central Bank and the ECB's delicate relationship with the press and private sector market participants illustrate well the difficulties faced by policy makers. In the highly sensitized world of today's financial markets populated with Fed watchers, economic analysts, and other commentators of the economic scene, disclosure policy assumes great importance.

In what follows, we will review some recent theoretical developments on the impact of public information in economies with imperfect common knowledge, and draw some lessons for the signalling role of monetary policy. Our discussion draws on the analysis of public information in Morris and Shin (2000). Public information has attributes that make it a double-edged instrument. On the one hand, it conveys information on the underlying fundamentals, but it also serves as a focal point for the beliefs of the group as a whole. When prevailing conventional wisdom or consensus impinge on people's decision making process, public information may serve to reinforce their impact on individual decisions to the detriment of private information. A central bank that relies on signals from the economy in its role as a vigilant observer of developments will find itself without a compass if the private information of the individual agents is prevented from finding an expression in their decisions. Assessing the social value of public information entails recognizing its dual role - of conveying fundamentals information as well as serving as a focal point for beliefs.

The next section discusses communication by central banks more generally, before turning in Section 3 to a concrete example of the relative importance of public and private information on agents' actions and the signalling role of monetary policy decisions.

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2 Communication in practice

A remarkable change towards greater transparency has occurred in the past decade regarding central banks' objectives, policy instruments, decision-making procedures and policy decisions. The development of inflation targeting frameworks in particular has changed standards. Inflation targeting involves more than just the announcement of a numerical inflation objective. A significant feature of the regime *is* the communication structures put in place. This has opened a host of issues for policy makers to consider in regard to their overall communication strategies. Objectives and instrument targets have been announced; interest rate decisions are explained in a range of fora; and there is greater recognition of the interaction between the tactics of monetary policy and communication policies.

Before the advent of formal inflation targeting regimes, the ultimate goals of monetary policy were rarely specified explicitly. While secondary stabilisation goals are typically not formulated precisely, the primary goal of low and stable inflation is now clearly enshrined in numerical point targets and ranges. The United States and Japan are two notable exceptions. Even the ECB felt compelled to provide the public with a numerical definiton of its price stability objective. A publicly announced numerical target for inflation, if credible and feasible, can be an extremely powerful anchor for coordinating expectations. However, the confusion generated by the ECB's two-pillar monetary framework serves as a partial warning of the dangers in releasing numerical guidelines for policy. More often than not, the reference value for broad money growth has come into conflict with the ECB's general views of inflation developments. Communication surrounding the two pillars has been a delicate issue at best. In some countries, such as the United Kingdom, an official explanation of the circumstances surrounding a breach of the inflation

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target must be provided either to the government or public. Even in those countries not obliged to do so, the central bank is often eager to explain the reasons for target misses in order to help preserve its credibility. However, such explanations themselves become an important part of public knowledge.

Similarly, operational targets for the overnight rate were rarely disclosed prior to the 1990s (e.g. the Federal Reserve and Reserve Bank of Australia), whereas now most central banks announce targets for the overnight rate typically right after policy decisions have been made. This has eliminated guessing on the part of market participants about whether a policy change has actually occurred. Policy decisons are explained in press conferences and speeches. Minutes are published, with a delay, following policy meetings. More generally, the views of the central bank are elaborated upon in monthly or quarterly periodicals, such as the Bank of England's *Inflation Report* or the ECB's *Monthly Bulletin*. Technical descriptions of its knowledge of the economy are sometimes dispensed in working papers. Central banks perhaps reach the widest audience through the popular press. Developing relationships with members of the press may be crucial in ensuring that an undistorted picture of the central bank's views is given a proper airing. But care must be taken by the central bank in explaining its past actions relative to past events in order to avoid introducing greater noise into the pool of current public knowledge. The problems involved are an order of magnitude greater when the views of a committee of independent members are to be explained. The revelation of disagreements among committee members may confuse markets, causing more harm than good.

A trickier issue concerns the release of numerical forecasts of macroeconomic variables or indications of the future stance of monetary policy. Forecasts typically assume constant policy rates over the forecast horizon. But

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this assumption is unrealistic in most situations: both policy makers and economic agents alike often have good reason to expect that policy rates will be changed during the period of concern. This makes the interpretation of such forecasts more difficult than may appear at first. Alternatively, the Reserve Bank of New Zealand has published projections with an endogenous path for policy. While this approach is arguably more consistent internally, it suffers from the possibility that agents do not fully appreciate that projections are made conditional on the data at hand. In the end, more confusion may result when policy rates inevitably depart from a path projected previously, not to mention the potential for damage to the central bank's credibility. Nevertheless, central banks do provide indications of their views of future economic conditions and the future stance of policy. For instance, one device used by the Federal Reserve is to announce a "bias" along with a decision on the target for the federal funds rate. The bias provides a qualitative indication of the perceived risks to the economic outlook, and hence the more likely future course of monetary policy actions.

3 Policy as a signal

The previous section briefly touched upon the myriad of ways policy makers can communicate with the public, and many of them introduce issues that go beyond our brief discussion in this paper. Geraats (2002), Winkler (2000) and Jensen (2002) are some recent discussions that attempt to classify the various dimensions of the problem.

Most communication by the central bank is qualitative in nature and difficult to quantify. However, in an environment of imperfect information, a central bank's interest rate decisions themselves become a communication tool. The policy rate serves a dual purpose. First, it plays the traditional

allocative role as discussed above: current and expected future short-term interest rates largely determine the rates at which agents can save and borrow to undertake consumption and investment. It also plays a *signalling* role: the policy rate target is public information and an indicator of the central bank's views of the state of the economy.

Here, we sketch a simple example drawn from Morris and Shin (2000) that illustrates the signalling role of monetary policy actions. Our framework need not only apply to the central bank's main policy instrument. In principle, it can be extended to incorporate any signal sent by policy makers that can be quantified and is relevant for agents' in forming expectations about variables of fundamental concern.[5] The context is the 'island economy' model of Lucas (1972, 1973) and Phelps (1970) where a large population of agents have private information on the underlying fundamentals, and aim to take actions appropriate to the underlying state. However, the example incorporates a zero-sum race to second-guess the actions of other individuals in which a player's prize depends on the distance between his own action and the actions of others. The smaller is the distance, the greater is the prize. This imparts a coordination motive to the decision makers as well as the desire to match the fundamentals. The spillover effects of one individual's actions on other's actions can be motivated in terms of the market share effects in a price-setting game as examined by Woodford (2001), and suggested by Phelps (1983).

The detrimental effect of public information arises from the fact that the coordination motive entails placing too much weight on the public signal

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[5] Two examples of (many) other signals sent by central banks and which are quantifiable are the voting records of policy committees, such as the Monetary Policy Committee of the Bank of England, or the "bias" of the Federal Reserve (discussed above), which could be quantified as an indicator taking values 1, 0 or -1 depending upon the stance adopted.

relative to weights that would be used by the social planner. The impact of public information is large, and so is the impact of any noise in the public signal that inevitably creep in. In short, although public information is extremely effective in influencing actions, the danger arises from the fact that it is *too effective* at doing so. Agents overreact to public information, and thereby magnify the damage done by any noise. The important point is that such 'overreaction' need not be predicated on any wishful thinking or irrationality on the part of agents.

We will see that public sources of information may actually *crowd out* private information by rendering the public information detrimental to the policy maker's goals. The heightened sensitivities of the market could magnify any noise in the public information to such a large extent that public information ends up by causing more harm than good. If the information provider anticipates this effect, then the consequence of the heightened sensitivities of the market is to push it into reducing the precision of the public signal. In effect, private and public information end up being *substitutes*, rather than being cumulative.

Let us suppose that there is a large number of small 'islands', which can be interpreted either as distinct geographical regions, or different sectors of the economy. There is a single good in this economy, and the supply of this good on island i is denote by q_i^s. The supply of the good is increasing in the different between the price on island i and the perceived average price across all islands. In particular, we take the linear supply function:

$$q_i^s = b\left(p_i - E_i\left(\bar{p}\right)\right) \tag{1}$$

where p_i is the price on island i, $\bar{p}$ is the average price across all islands, and $b > 0$ is a supply parameter. The expectations operator $E_i\left(.\right)$ denotes the expectation with respect to the information available to residents of island i.

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The demand for the good on island i is a decreasing linear function of the price on the island, but the demand also depends on the best estimate of some underlying fundamental variable θ. There are several possible interpretations of θ. Here we assume that demand represents the intended course of future policy by the central bank. Demand on island i is given by

$$q_i^d = E_i(\theta) - p_i \tag{2}$$

where θ is the money supply. Summing across all firms i in (2) results in a familiar looking equation relating aggregate demand to expected real money balances. Market clearing then implies

$$p_i = (1 - r) E_i(\theta) + r E_i(\bar{p}) \tag{3}$$

where $r = b/(b + 1)$.

A question that arises in this context is how the profile of prices $\{p_i\}$ across the economy are affected by the shifts in information on θ. Does greater information precision on the fundamentals θ mean that the prices $\{p_i\}$ are tied closer to the fundamentals θ? We may pose the question more precisely by asking what happens to the distance between the set of prices $\{p_i\}$ across islands and the underlying fundamentals given by θ. We will suppose that there is a continuum of islands indexed by the unit interval $[0, 1]$. Then this distance can be written as

$$\int_0^1 (p_i - \theta)^2 \, di \tag{4}$$

If there is no uncertainty about θ, we have $E_i(\theta) = \theta$ in (3) so that prices are identical across all islands and equal to θ itself. Suppose, however, that economic agents face uncertainty concerning θ, and that the information available about θ differ across islands. Let us suppose that θ itself is drawn

from a uniform prior over the real line[6]. There are two sorts of signals on θ.
The first is a public signal that is commonly observed by the residents of all
islands. The public signal is given by

$$y = \theta + \eta \tag{5}$$

where η is normally distributed, independent of θ, with mean zero and vari-
ance σ_η^2. The signal y is 'public' in the sense that the actual realization of y
is common knowledge to all agents. The fundamental, θ, is the "true" value
of the money supply, whereas y, for example, could be the central bank's
instrument, either a monetary aggregate or the overnight rate, that serves as
a noisy signal of the true money supply.

In addition to the public signal y, residents of island i observe the real-
ization of a *private signal*:

$$x_i = \theta + \varepsilon_i \tag{6}$$

where ε_i is normally distributed with zero mean and variance σ_ε^2, independent
of θ and η. The noise in the private signals are independent across islands.
The private signal on island i is not observed by residents on other islands.
This is the sense in which these signals are private. The information available
to residents of island i consists of the pair (y, x_i), and no more. We denote
by α the precision of the public information, and denote by β the precision
of the private information, where $\alpha = \dfrac{1}{\sigma_\eta^2}, \beta = \dfrac{1}{\sigma_\varepsilon^2}$. Then, based on both
private and public information, the expected value of θ based on information
available on island i is:

$$E_i\left(\theta\right) = \frac{\alpha y + \beta x_i}{\alpha + \beta} \tag{7}$$

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[6]This distribution will be "improper" in the sense that its integral is undefined. It is
as an approximation to a case where there is very little prior information about θ.

We can solve for the prices across islands by repeated substitution of p_i in (3). Writing $\overline{E}(\theta)$ for the average expectation of θ across islands we have

$$p_i = (1 - r) \sum_{k=0}^{\infty} r^k E_i \left(\overline{E}^k (\theta) \right) \tag{8}$$

The iterated expectations can be solved out[7] to yield a solution for the price p_i. In particular,

$$p_i = \frac{\alpha y + \beta (1 - r) x_i}{\alpha + \beta (1 - r)} \tag{9}$$

This explicit solution allows us to address the important question of how the price deviations around the fundamental variable θ is affected by the precisions of the agents' signals. In particular, will this price deviation be decreasing in the precision α of the public signal? From the solution for p_i, we can solve for the equilibrium strategies in terms of the basic random variables θ, η and $\{\varepsilon_i\}$.

$$p_i = \theta + \frac{\alpha \eta + \beta (1 - r) \varepsilon_i}{\alpha + \beta (1 - r)} \tag{10}$$

If $r = 0$, the two types of noise (private and public) would be given weights that are commensurate with their precision. That is, η would be given weight equal to its relative precision $\alpha / (\alpha + \beta)$ while ε_i would be given weight equal to its relative precision $\beta / (\alpha + \beta)$. However, the weights in (10) deviate from this. The noise in the public signal is given relatively more weight, and the noise in the private signal is given relatively less weight. The price deviation $E\left[(p_i - \theta)^2\right]$ is given by

$$\frac{\alpha^2 E(\eta^2) + \beta^2 (1 - r)^2 E(\varepsilon_i^2)}{(\alpha + \beta (1 - r))^2}$$

$$= \frac{\alpha + \beta (1 - r)^2}{(\alpha + \beta (1 - r))^2} \tag{11}$$

[7] See Morris and Shin (2000, section 2)

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By examining (11), we can answer the comparative statics questions concerning the effect of increased precision of private and public information. Figure 1 illustrates the pairs of points in (α, β)-space that give rise to the same levels of price deviation. In other words, the contours represent (α, β) pairs that satisfy $E\left[(p_i - \theta)^2\right] = C$, for constants C.

$$\beta = \frac{\alpha}{(2r - 1)(1 - r)}$$
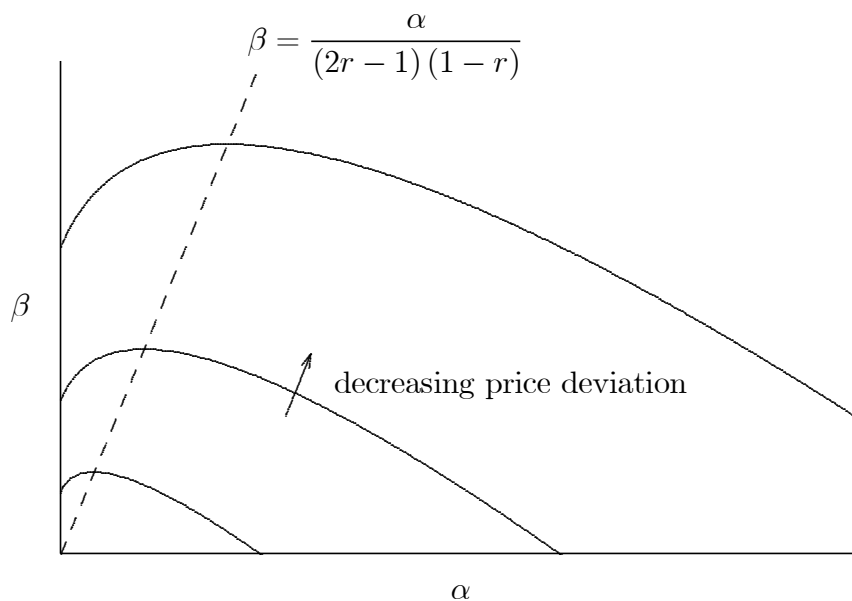
decreasing price deviation

Figure 1: Price Deviation across Islands

Price deviation is decreasing in the precision of the private signals. This is reflected in the fact that any upward shift in β leads to a lower contour. So, the more precise are the private signals at the individual islands, the closer are the prices to the fundamental variable θ. However, the same cannot be said of increased precision of the public signal. As can be seen from figure 1, when $\beta > \alpha/\left[(2r - 1)(1 - r)\right]$, the contours are upward sloping, indicating that price deviation is *increasing* in the precision of public information. More

formally, the derivative of (11) with respect to α is:

$$-\frac{\alpha - (2r-1)(1-r)\beta}{(\alpha + \beta(1-r))^3} \tag{12}$$

so that the derivative with respect to α is negative if and only if

$$\frac{\beta}{\alpha} \leq \frac{1}{(2r-1)(1-r)}$$

When $r > 0.5$, there are ranges of the parameters where increased precision of public information actually *increases* price dispersion. Increased precision of public information is beneficial only when the private information of the agents is not very precise. If the agents have access to very precise information (so that β is high), then any increase in the precision of the public information will be harmful.

Some intuition for this result can be gained by re-writing price p_i as

$$
\begin{aligned}
p_i &= \frac{\alpha y + \beta(1-r)x_i}{\alpha + \beta(1-r)} \\
&= \frac{\alpha y + \beta x_i}{\alpha + \beta} + (y - x_i)\left(\frac{\alpha}{\alpha + \beta}\right)\frac{\beta r}{\alpha + \beta(1-r)}
\end{aligned} \tag{13}
$$

The first term is the conditional expectation of θ, representing the best estimate of the fundamentals in island i. However, there is an additional (positive) term involving the public signal y, while there is a corresponding negative term involving the private signal x_i. Thus, the price p_i "overreacts" to the public signal while the information content of the private signal is suppressed.

Perhaps a more illuminating intuition is obtained by considering the role of higher order expectations. This intuition also brings out well the unease expressed by Phelps (1983) (justified, it turns out) concerning the overly simplistic treatment of iterated expectations. The key to our result is the fact

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that the 'average expectations' operator $\bar{E}(\cdot)$ violates the 'law' of iterated expectations. In our model,

$$\bar{E}(\theta) \neq \bar{E}\left(\bar{E}(\theta)\right) \quad \text{and} \quad E_i\left(\bar{E}(\theta)\right) \neq E_i(\theta) \tag{14}$$

These properties are key, since if we had equality between $\bar{E}(\theta)$ and $\bar{E}\left(\bar{E}(\theta)\right)$ and between $E_i\left(\bar{E}(\theta)\right)$ and $\bar{E}(\theta)$ then all higher order level expectations collapse to the first order, so that (8) would become

$$
\begin{aligned}
E_i\left(\bar{E}(\theta)\right)(1-r)\sum_{k=0}^{\infty} r^k &= E_i\left(\bar{E}(\theta)\right) \\
&= E_i(\theta)
\end{aligned}
$$

which coincides with the simple expectation of the fundamental θ. Thus, it is this failure of the law of iterated expectations for the expectations operators that entails the overreaction to public information. The importance of shared knowledge in the promulgation of policy was emphasized by Phelps in his 1983 paper, and our results could be seen as giving this assertion formal backing. More recently, Woodford (2001) has argued that the persistence exhibited by many macroeconomic time series can be explained by the relative inertia of higher order beliefs as compared to first order beliefs. This feature of higher order beliefs is a consequence of the underweighting of private information.

4   Concluding Remarks

Our discussion here has attempted to highlight the double-edged nature of public information when used for policy purposes. Whilst it is very effective at influencing the actions of agents whose actions are strategic complements, the trouble is that it is *too effective* in doing so. Agents overreact to public

information, and hence any unwarranted public news or mistaken disclosure may cause damag. More generally, when public information becomes entrenched in the prevailing "climate of opinion", it begins to take on a life of its own, suppressing the private information of individual agents, and disrupting the channel through which the market mechanism aggregates and disseminates information on the economic fundamentals. The lessons are general, but the effects described here seem particularly pertinent to the instruments of monetary policy, which serve a signalling role in addition to their allocative role. The underweighting of private information may be even worse if the acquisition of information is costly for the individual agents. Given the diminished role of private information in the game, the ex ante value of such information will be devalued, as would any incentive to acquire such information if it is costly.

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