

# Optimal Policy Intervention and the Social Value of Public Information

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**Abstract:** Svensson (2006) argues that Morris and Shin's (2002) analysis is, contrary to what is claimed, actually pro-transparency. This paper re-examines the issue but with an important modification to the original Morris and Shin framework. Recognizing that central banks impact on the economy not only indirectly via their public announcements, but also directly through their policy actions, we consider the social value of public information in the presence of active policy intervention. Our results strengthen Morris and Shin's conclusions considerably: in particular we find that public disclosure of the central bank's information is always undesirable.

*Keywords:* Heterogeneous private information; optimal disclosure; policy intervention; strategic complementarities

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## Introduction

Considerable debate has been prompted by Morris and Shin's (2002) analysis of the social value of public information. Their key finding relates to the possibility that, when individual agents have access to heterogeneous private information, the availability of more precise public (i.e. shared) information might be damaging to welfare. This important result has attracted critical comment on two distinct grounds. First, a number of studies where heterogeneous private information is present have found, contrary to Morris and Shin, that better public information is unambiguously beneficial (see, for example: Woodford, 2003; Hellwig, 2005; Roca, 2005); second, in the context of the original Morris and Shin framework, the practical relevance of their main result has been questioned by Svensson (2006).

The basis of the apparently conflicting conclusions drawn by different studies where heterogeneous private information plays an important role has subsequently been clarified by Angeletos and Pavan's (2007a) contribution. Their work makes clear that the phenomenon identified by Morris and Shin, while certainly not completely general, may nonetheless be an important feature within particular economic contexts. Svensson's arguments, on the other hand, while more specific, also appear more damaging, at least so far as the policy conclusions which seem to follow from Morris and Shin's analysis are concerned. He contends that for 'reasonable parameter values' the Morris and Shin framework implies that social welfare is increasing in the precision of public information and, in their subsequent response, Morris, Shin and Tong (2006) are led to concede the validity of Svensson's case.

The present study revisits the principal issue in this debate but, in so doing, introduces an important modification to the original Morris and Shin analysis. The conclusions drawn from the latter have been widely interpreted as counseling caution to central banks in their disclosure of information to the wider public. However, in focusing on the indirect impact which monetary institutions potentially have on the economy via their public announcements, Morris and Shin abstract from the direct role which central banks play in shaping macroeconomic outcomes through active policy intervention.<sup>1</sup> In the light of this, and recognizing the contribution such

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<sup>1</sup> In this respect, their approach is distinct from that of the wider literature on central bank transparency, which typically considers the interrelationship between central bank disclosure and optimal stabilization policy. Examples of this literature include: Cukierman and Meltzer (1986); Faust and

intervention is likely to make to macroeconomic management in practice, we extend Morris and Shin's analysis to consider the relationship between the quality of public information and social welfare in the presence of stabilization policy.

This modification has significant implications for the conclusions to be drawn with regard to the desirability of central bank disclosure. Specifically, introducing a 'policymaker' into the Morris and Shin framework, we demonstrate that, when policy is conducted according to an optimally-designed rule, greater precision in the information content of the policymaker's announcements is detrimental to welfare. This is the case in both a local and a global sense, and regardless of parameter values: hence our findings can be viewed as substantially strengthening the conclusions arrived at by Morris and Shin. Underlying our key result is the role which we find policy intervention to play in substituting for the absence of an effective mechanism to ensure an appropriate degree of coordination in respect of private sector responses to heterogeneous information.

The organization of the remainder of the paper is as follows. Section I incorporates stabilization policy into the Morris and Shin framework and outlines the informational assumptions which underlie the subsequent analysis. In Section II, we solve for the equilibrium of the model given the presence of a policymaker and identify the principal result of the paper, relating to the welfare consequences of the precision of public information. Our findings are discussed and interpreted in Section III, where we also show that the optimal policy rule, combined with zero disclosure of the policymaker's information, achieves the socially-efficient outcome. We end by summarizing our results and briefly discussing some of the qualifications to which the conclusions drawn from our analysis are likely to be subject.

## **I. The Morris and Shin Framework with Activist Policy**

As discussed in the Introduction, our adaptation of Morris and Shin (2002) incorporates a potential role for stabilization policy, allowing the government, or its

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Svensson (2001, 2002); and Jensen (2002). We note that Amato and Shin (2003) incorporate stabilization policy in the form of a targeting rule into a model where heterogeneous private information amongst price-setting firms plays a crucial role. However, the nature of their framework, as well as the assumption that the central bank has perfect information, leads their analysis to have a quite different focus than that of the present contribution.

agent (e.g. the central bank)<sup>2</sup>, referred to in what follows simply as ‘the policymaker’, to influence outcomes directly by its own actions, as well as indirectly via the provision of information to the private sector.

Following Morris and Shin, we assume a continuum of private sector agents, indexed by  $i$  and uniformly distributed over the unit interval: in addition, there is a single policymaker. Agent  $i$  chooses his or her action  $a_i \in \mathbb{R}$  to maximize the following payoff function:

$$(1) \quad u_i = -(1-r)(a_i - \theta - g)^2 - r(L_i - \bar{L})$$

where  $r \in (0,1)$  is a constant;  $\theta$  is a random variable representing the underlying state of the economy and assumed, as in Morris and Shin, to be drawn from a uniform distribution over the real line;  $g$  is the policymaker’s instrument setting and:

$$L_i \equiv \int_0^1 (a_j - a_i)^2 dj$$

$$\bar{L} \equiv \int_0^1 L_j dj$$

Other than the presence of  $g$ , equation (1) corresponds exactly to Morris and Shin’s formulation of the payoff function. The first component of (1) represents a fundamentals-related element, while the second is a ‘beauty contest’ term which penalizes departures of agent  $i$ ’s action from those of other private sector agents: it is the presence of this second term which is responsible for the distinctive nature of Morris and Shin’s results. The precise fashion in which policy is incorporated into the model is natural, given the original representation of the objective function. It implies, of course, that appropriate adjustments in  $g$  can fully neutralize the consequences of variations in  $\theta$ . Such a formulation is likely to be especially relevant in a macroeconomic context, where  $\theta$  might, for example, be taken to correspond to a particular aggregate demand shock realization.

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<sup>2</sup> We interpret the model as an abstract representation of the macroeconomy: other interpretations are possible and, in such cases, alternative terminology might be appropriate.

While the appropriate choice of  $g$  can, in principle, offset the impact of  $\theta$  on private sector agents' payoffs, when choosing  $g$  the policymaker is assumed not to have full information on the realization of  $\theta$ . Likewise, when deciding on  $a_i$ , agent  $i$  is uncertain about the true state  $\theta$ . To proceed, we now discuss the informational assumptions which characterize our analysis.

Prior to making its choice of  $g$ , the policymaker observes a noisy signal,  $z$ , of  $\theta$ , where:

$$(2) \quad z = \theta + \phi$$

with the noise term,  $\phi \sim N(0, \sigma_\phi^2)$ , assumed to be independent of  $\theta$ . The policymaker can, at its own discretion, publicly reveal its observation of  $z$ . However, to permit us to consider the consequences of differing 'degrees of disclosure', we allow the policymaker to introduce additional noise into any announcements it makes: hence we distinguish between the information on which policy is based, and that which is released to the public. The public signal,  $y$ , observed by all private sector agents is thus determined according to:

$$(3) \quad y = \theta + \phi + \xi$$

where  $\xi \sim N(0, \sigma_\xi^2)$  is assumed independent of both  $\theta$  and  $\phi$ . The case of full disclosure of its own information by the policymaker is then captured by  $\sigma_\xi^2 = 0$ , while zero disclosure arises as  $\sigma_\xi^2 \rightarrow \infty$ : more generally, the implications of variations in the quality of public information can be determined by considering the consequences of the value of  $\sigma_\xi^2$  for equilibrium.

Each private sector agent observes  $y$  prior to deciding on its own action. In addition, before making its choice of  $a_i$ , agent  $i$  observes its own idiosyncratic noisy signal of  $\theta$ : each agent's signal is private in the sense that it cannot be observed by any other agent. We denote the signal received by agent  $i$  by  $x_i$ , where:

$$(4) \quad x_i = \theta + \varepsilon_i$$

The noise term,  $\varepsilon_i \sim N(0, \sigma_\varepsilon^2)$  is assumed independent of  $\theta$ ,  $\phi$  and  $\xi$ , with  $E(\varepsilon_i \varepsilon_j) = 0$  for  $j \neq i$  and  $\int_0^1 \varepsilon_i di = 0$ .

We assume that neither the policymaker, nor any private sector agent, is able to observe the chosen action of any other agent before making its own decision. Thus agent  $i$  cannot observe any  $a_j (j \neq i)$  or  $g$  prior to choosing  $a_i$ , while the policymaker cannot observe any  $a_i$  before setting  $g$ . Consequently, agent  $i$ 's expectation of any variable is conditioned only on the observed values of  $y$  and  $x_i$ , while that of the policymaker is conditioned solely on  $z$ .

From the properties of  $\theta$ ,  $y$  and  $x_i$ , agent  $i$ 's expectation of  $\theta$ , which we denote by  $E_i(\theta)$ , is given by:

$$(5)^3 \quad E_i(\theta) = \frac{\sigma_\varepsilon^2 y + (\sigma_\phi^2 + \sigma_\xi^2) x_i}{(\sigma_\varepsilon^2 + \sigma_\phi^2 + \sigma_\xi^2)}$$

Also of significance to private sector agents is the value of the signal,  $z$ , observed by the policymaker. By combining  $y$  and  $x_i$  optimally, agent  $i$  can improve the estimate of  $z$  compared to that obtained using the public signal alone. Denoting agent  $i$ 's expectation of  $z$  by  $E_i(z)$ , its value is described by:

$$(6) \quad E_i(z) = \frac{(\sigma_\varepsilon^2 + \sigma_\phi^2) y + \sigma_\xi^2 x_i}{(\sigma_\varepsilon^2 + \sigma_\phi^2 + \sigma_\xi^2)}$$

Finally, the policymaker's expectation of  $\theta$ , which we represent by  $E_g(\theta)$ , is simply the value of  $z$  itself, i.e.:

$$(7) \quad E_g(\theta) = z$$

From (1), the optimal action of agent  $i$  is determined according to:

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<sup>3</sup> Defining  $\eta \equiv \phi + \xi$  and letting  $\alpha = 1/\sigma_\eta^2$ ,  $\beta = 1/\sigma_\varepsilon^2$ , then this is equivalent to  $E_i(\theta) = (\alpha y + \beta x_i)/(\alpha + \beta)$ , as in Morris and Shin.

$$(8) \quad a_i = (1-r)[E_i(\theta) + E_i(g)] + rE_i(\bar{a})$$

where, following the notational convention employed above,  $E_i(\cdot) = E(\cdot | y, x_i)$ . The policymaker is assumed to set its policy instrument according to the rule:

$$(9) \quad g = \rho z$$

where the value of the rule parameter,  $\rho$ , is public knowledge and is chosen to maximize the expected value of (normalized) social welfare,  $W$ , defined as

$$W \equiv \frac{1}{(1-r)} \int_0^1 u_i di.$$

We note that the characterization of policy in terms of commitment to a rule is important for the uniqueness of equilibrium: in the present context, discretionary policymaking would give rise to an indeterminate solution.

## II. Equilibrium

To solve for equilibrium, we first determine each agent's action, taking the value of the rule parameter and the quality of the public signal as given. We then identify the value of  $\rho$  which maximizes social welfare as a function of  $\sigma_\xi^2$ . Having fully described equilibrium, we are then in a position to consider the welfare implications of the precision of the public signal provided by the policymaker.

### A. *Equilibrium private sector actions*

Following Morris and Shin, we posit agent  $i$ 's action to be a linear function of the two signals,  $x_i$  and  $y$ , i.e.:

$$(10) \quad a_i = \kappa_1 x_i + \kappa_2 y$$

Given  $\int_0^1 \varepsilon_i di = 0$ , it follows  $\bar{a} = \kappa_1 \theta + \kappa_2 y$ , implying:

$$(11) \quad E_i(\bar{a}) = \kappa_1 E_i(\theta) + \kappa_2 y$$

Substituting (11), together with  $E_i(g)$  from (9), into equation (8) and using (5) and (6) to substitute for  $E_i(\theta)$  and  $E_i(z)$  respectively, we derive an expression for agent  $i$ 's optimal action as a function of the two signals. Equating coefficients on  $x_i$  and  $y$  between this equation and (10), we solve for  $\kappa_1$  and  $\kappa_2$ :

$$\kappa_1 = \frac{(1-r)[\sigma_\phi^2 + (1+\rho)\sigma_\xi^2]}{[\sigma_\varepsilon^2 + (1-r)(\sigma_\phi^2 + \sigma_\xi^2)]} \quad \kappa_2 = \frac{[(1+\rho)\sigma_\varepsilon^2 + (1-r)\rho\sigma_\phi^2]}{[\sigma_\varepsilon^2 + (1-r)(\sigma_\phi^2 + \sigma_\xi^2)]}$$

where, we note,  $\kappa_1 + \kappa_2 = 1 + \rho$ . Agent  $i$ 's equilibrium action is therefore described by:

$$(12) \quad a_i = \frac{[(1+\rho)\sigma_\varepsilon^2 + (1-r)\rho\sigma_\phi^2]y + (1-r)[\sigma_\phi^2 + (1+\rho)\sigma_\xi^2]x_i}{[\sigma_\varepsilon^2 + (1-r)(\sigma_\phi^2 + \sigma_\xi^2)]}$$

In the absence of policy intervention, i.e. with  $\rho \equiv 0$ , the expression for  $a_i$  defined by equation (12) is equivalent to the corresponding expression in Morris and Shin, with identical welfare implications. Specifically, in equilibrium, greater precision of the public's private information (corresponding to a reduction in  $\sigma_\varepsilon^2$ ) is invariably beneficial: in contrast, and notwithstanding Svensson's (2006) questioning of the practical significance of this finding, increased accuracy of the public signal (represented by a decline in  $\sigma_\xi^2$ )<sup>4</sup> is potentially (that is, for particular combinations of parameter values) detrimental.

## B. Optimal Policy

To determine the value of  $\rho$  which maximizes welfare, (10) is first substituted into (1) before aggregating (note aggregation eliminates the beauty contest term) and taking expectations to find<sup>5</sup>:

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<sup>4</sup> Note that, without active policy intervention, there is no significance in the distinction between the policymaker's private signal and that disclosed publicly by the policymaker.

<sup>5</sup> Using the fact, noted earlier, that  $\kappa_1 + \kappa_2 = 1 + \rho$ .



$$(13) \quad E(W | \theta) = -[\kappa_1^2 \sigma_\varepsilon^2 + (\kappa_2 - \rho)^2 \sigma_\phi^2 + \kappa_2^2 \sigma_\xi^2]$$

where the values of  $\kappa_1$  and  $\kappa_2$  are as identified immediately prior to equation (12). Differentiating equation (13) with respect to  $\rho$  and setting the resulting expression to zero yields, after substituting for  $\kappa_1$  and  $\kappa_2$  and some straightforward algebraic manipulation:

$$(14) \quad \rho^* = -\frac{[\sigma_\varepsilon^2 + (1-r)^2(\sigma_\phi^2 + \sigma_\xi^2)]\sigma_\varepsilon^2}{\{[\sigma_\varepsilon^2 + (1-r)\sigma_\phi^2]^2 + (1-r)^2(\sigma_\varepsilon^2 + \sigma_\phi^2)\sigma_\xi^2\}}$$

We note from (14) that, outside the special cases of perfect policymaker or private sector information,  $-1 < \rho^* < 0$ . Hence, any non-zero observation of  $z$  will invariably elicit some policy response, in terms of an appropriate adjustment of  $g$ : on the other hand, this response is smaller than that necessary to fully neutralize the policymaker's expectation of  $\theta$ . This latter feature of policy, which plays an important role in ensuring the optimal outcome, is discussed further in Section III.

### C. The Optimal Degree of Disclosure

To determine expected welfare with  $\rho$  chosen optimally, we substitute our expressions for  $\kappa_1$ ,  $\kappa_2$  and  $\rho^*$  into (13) and find:

$$(15) \quad E(W | \theta)|_{\rho=\rho^*} = -\frac{[\sigma_\varepsilon^2 + (1-r)^2(\sigma_\phi^2 + \sigma_\xi^2)]\sigma_\varepsilon^2\sigma_\phi^2}{\{[\sigma_\varepsilon^2 + (1-r)\sigma_\phi^2]^2 + (1-r)^2(\sigma_\varepsilon^2 + \sigma_\phi^2)\sigma_\xi^2\}}$$

The focus of our interest is how the quality of the signal provided to the public by the policymaker impacts on welfare. Hence, we differentiate the above expression with respect to  $\sigma_\xi^2$ :

$$(16) \quad \frac{\partial E(W | \theta)|_{\rho=\rho^*}}{\partial \sigma_\xi^2} = \frac{(1-r)^2 r^2 \sigma_\varepsilon^4 \sigma_\phi^4}{\{[\sigma_\varepsilon^2 + (1-r)\sigma_\phi^2]^2 + (1-r)^2(\sigma_\varepsilon^2 + \sigma_\phi^2)\sigma_\xi^2\}^2}$$

This expression is strictly positive for  $\sigma_\varepsilon^2 > 0$ ,  $\sigma_\phi^2 > 0$ . From this observation, Proposition 1 follows:

**Proposition 1:** *Perfect information cases apart, social welfare is monotonically increasing in  $\sigma_\varepsilon^2$ : hence, increased precision of public information is unambiguously detrimental in both a local and a global sense.*

Proposition 1 indicates that the introduction of activist policy into the Morris and Shin framework substantially strengthens their key finding with respect to the potentially damaging effects of better public information. In the next section we consider the economic logic which underlies this result, but before this we find the value of social welfare to which the optimal policy of zero disclosure gives rise. From (15):

$$(17) \quad \lim_{\sigma_\varepsilon^2 \rightarrow \infty} E(W | \theta) \Big|_{\rho=\rho^*} = -\frac{\sigma_\varepsilon^2 \sigma_\phi^2}{(\sigma_\varepsilon^2 + \sigma_\phi^2)}$$

### III. Interpretation and Discussion

As explained by Morris and Shin, the key factor underlying their anti-transparency result is a strategic complementarity, in the sense of Cooper and John (1988), associated with the beauty contest term in each agent's payoff function. This complementarity leads private sector agents to place excessive weight on public information, and it is this that gives rise to the possibility that an improvement in the quality of public information might be damaging.

The meaning of 'excessive weight' in this context can be given more precision by identifying the collectively-optimal response of individual agents to private and public information in the absence of government intervention. Specifically, assuming agent  $i$ 's action to be determined according to:

$$(18) \quad a_i = \tilde{\kappa}_1 x_i + \tilde{\kappa}_2 y$$

we identify the values of  $\tilde{\kappa}_1$  and  $\tilde{\kappa}_2$  which maximize the expected value of

$W = -\int_0^1 (a_i - \theta)^2 di$ , i.e. the ‘true’ social welfare measure when  $g \equiv 0$ . In fact, as

Morris and Shin indicate, the efficient outcome requires that the private and public signals are each assigned weights consistent with their relative accuracy. It is straightforward to show that:

$$\tilde{\kappa}_1 = \frac{\sigma_\phi^2 + \sigma_\xi^2}{\sigma_\varepsilon^2 + \sigma_\phi^2 + \sigma_\xi^2} \qquad \tilde{\kappa}_2 = \frac{\sigma_\varepsilon^2}{\sigma_\varepsilon^2 + \sigma_\phi^2 + \sigma_\xi^2}$$

Comparing  $\tilde{\kappa}_1$  and  $\tilde{\kappa}_2$  with the values of  $\kappa_1$  and  $\kappa_2$  described immediately prior to equation (12) (with  $\rho$  set to zero), it is evident that  $\kappa_1 < \tilde{\kappa}_1$  and  $\tilde{\kappa}_2 < \kappa_2$ . Expected welfare given efficient private sector responses to private and public information, which we denote by  $E(\tilde{W} | \theta)$ , is then:

$$(19) \qquad E(\tilde{W} | \theta) = \frac{-\sigma_\varepsilon^2(\sigma_\phi^2 + \sigma_\xi^2)}{(\sigma_\varepsilon^2 + \sigma_\phi^2 + \sigma_\xi^2)}$$

Differentiation of equation (19), in turn, with respect to  $\sigma_\varepsilon^2$  and  $\sigma_\xi^2$  readily establishes that  $E(\tilde{W} | \theta)$  is strictly increasing in the precision of both private and public signals. If all agents’ actions are consistent with achievement of the socially efficient outcome, better information, whatever its type, is invariably welfare-improving (see Angeletos and Pavan, 2007a).

It follows from the latter observation that an appropriate benchmark against which to judge the welfare properties of optimal stabilization policy can be provided by evaluating (19) when the noise in the public signal is set by the policymaker at its irreducible minimum, i.e.  $\sigma_\xi^2 = 0$ . From (19), we find directly:

$$(20) \qquad E(\tilde{W} | \theta) \Big|_{\sigma_\xi^2=0} = \frac{-\sigma_\varepsilon^2 \sigma_\phi^2}{(\sigma_\varepsilon^2 + \sigma_\phi^2)}$$

From comparison of equation (17) with (20), Proposition 2 follows:

**Proposition 2:** *Appropriately designed policy intervention, as described by equations (9) and (14), with zero public disclosure of the policymaker's private information, achieves the social optimum.*

Thus, not only is zero disclosure desirable in the context of optimal stabilization policy, but it also allows achievement of the best possible outcome, i.e. that which would be attained if all private sector agents could be induced to respond to private and public information in a socially efficient manner.

To explain these findings, we refer back to the basis of the original Morris and Shin result, i.e. the fact that, within the framework, private sector agents place an unduly large emphasis on any public signal: the obverse of this, of course, is that their own private signals are not accorded sufficient weight. By completely withholding its own information from the private sector, but itself responding appropriately to it in terms of its policy setting, the policymaker can induce individual agents to react to their private signals in such a way that the net outcome of policy and private sector actions is consistent with the efficient exploitation of all available information.<sup>6</sup> It is significant in this context that the policymaker does not attempt to fully offset the impact of its own expectation of  $\theta$ . If it did so, private sector agents would not respond at all to their own information since in this instance, with  $E(z | x_i) = E(\theta | x_i) = x_i$ , the expectation of each individual would be that policy alone would fully neutralize the effect of the shock on his or her payoff. Consequently, the information contained in each private sector agent's own private signal would remain unexploited. By 'under-reacting' to its own information, the policymaker elicits the appropriate response by private sector individuals to their agent-specific signals.

The above interpretation suggests that our findings may be relevant beyond the specific setting of the Morris and Shin model and extend to other contexts in which the interaction between private and public information gives rise to socially suboptimal outcomes. As discussed, the factor underlying Morris and Shin's original

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<sup>6</sup> Note, from (14),  $\lim_{\sigma_\varepsilon^2 \rightarrow \infty} \rho^* = -\sigma_\varepsilon^2 / (\sigma_\varepsilon^2 + \sigma_\phi^2)$ , while  $\lim_{\sigma_\varepsilon^2 \rightarrow \infty} \kappa_1 |_{\rho=\rho^*} = \sigma_\phi^2 / (\sigma_\varepsilon^2 + \sigma_\phi^2)$ . Hence  $\lim_{\sigma_\varepsilon^2 \rightarrow \infty} (a_i - g) |_{\rho=\rho^*} = (\sigma_\phi^2 x_i + \sigma_\varepsilon^2 z) / (\sigma_\varepsilon^2 + \sigma_\phi^2)$ , replicating the efficient private sector response to private and public information in the case of full disclosure but no policy intervention.

result is the presence of a strategic complementarity. However, Angeletos and Pavan's (2007a) subsequent contribution makes clear that strategic complementarity *per se* is neither necessary nor sufficient to imply that an excessive weight (relative to the efficient benchmark) is placed on public information in determining individual actions. Rather, what is crucial is what Angeletos and Pavan refer to as the 'equilibrium degree of coordination' relative to the 'socially optimal degree of coordination'.<sup>7</sup> In Morris and Shin, the beauty contest term in individual payoff functions leads the former to exceed the latter, and it is this fact which gives rise to the possibility that greater precision of public information might be damaging. To conclude our discussion, we briefly sketch the implications of an alternative payoff function, formulated to be directly comparable with that of Morris and Shin, but with different implications in respect of the relative values of the equilibrium and socially optimal degrees of coordination.

Consider the following function:

$$(21)^8 \quad u_i = -[a_i - (1-r)(\theta + g) - r\bar{a}]^2$$

where the interpretation of variables and parameters is identical to that in the Morris and Shin model. Whilst there is no explicit beauty contest term present in (21), the payoff to agent  $i$  is nonetheless dependent on the choices made by other agents. In the present case, this dependence might be taken to reflect intrinsic structural linkages which characterize the economy, as opposed to an extrinsic psychological or economic motive to 'do as others do'.

The specification of (21) implies the presence of a strategic complementarity similar to that associated with (1). However, unlike that arising from the latter, in the current instance the nature of the complementarity is such as to lead the equilibrium degree of coordination to lie below the socially optimal degree of coordination.<sup>9</sup> In the absence of policy intervention (i.e. with  $g \equiv 0$ ), this has the consequence that, in contrast to Morris and Shin, greater precision of public information is invariably beneficial;

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<sup>7</sup> Both concepts can be summarized in terms of a single parameter, or combination of parameters. In the Morris and Shin framework, the equilibrium degree of coordination is  $r$ , while the socially optimal degree of coordination is zero.

<sup>8</sup> Like Morris and Shin's payoff function, this is simply an example of a more general class of functions associated with strategic complementarity or substitutability.

<sup>9</sup> The former is  $r$ , the latter can be shown to be given by  $(2-r)r$ .

conversely, an improvement in the quality of private information may be detrimental. Nonetheless, despite these contrasting implications, the introduction of stabilization policy leads to identical conclusions to those derived in Section II. Specifically, given the implementation of an optimally-designed policy rule, zero public disclosure of the policymaker's own information maximizes welfare. Although the payoff function described by (21) implies, for  $g \equiv 0$ , better public information is always advantageous to welfare, the equilibrium is still characterized by an inefficient use of available information. As with the Morris and Shin payoff function, activist policy combined with zero disclosure can correct this inefficiency by ensuring all information is exploited in an optimal fashion.

We conclude this section with brief reference to the recent study of Angeletos and Pavan (2007b), which examines the possible contribution that Pigovian-type corrective taxes might make in inducing a socially-optimal private sector response to heterogeneous information. They demonstrate, using a direct adaptation of Morris and Shin's (2002) model, that an appropriate tax structure can, by influencing private sector agents' incentives to react to information, support the socially-efficient outcome.<sup>10</sup> Their analysis assumes the private sector to observe directly any public signal, without the intermediation of the policymaker and, consequently, the issue of optimal disclosure lies outside the remit of their paper.<sup>11</sup> Notwithstanding this difference in focus, their study and our own can be regarded as complementary in nature, in the sense that both highlight the role which policy can play in correcting the inefficiencies which arise in the context of diverse private sector information.

#### **IV. Conclusions**

The degree to which it is desirable for central banks to disclose their private information to the wider public is clearly an issue which is fundamental to sound macroeconomic management. Although Morris and Shin's (2002) analysis appears, at first sight, to provide an important objection to the case for central bank transparency,

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<sup>10</sup> Their approach is developed within a framework of considerable generality in Angeletos and Pavan (2007c).

<sup>11</sup> In fact, given the optimal tax system, the issue becomes trivial since, with informational inefficiencies fully addressed, social welfare is strictly increasing in the quality of both private and public information.

this view is put into question by Svensson's (2006) subsequent critique. The intention of the present contribution has been to examine how the balance of this argument is affected when account is taken of the part which central banks play in influencing the evolution of the economy through their conduct of stabilization policy.

We have shown that the introduction of a policymaker, whose actions influence welfare outcomes directly, into Morris and Shin's framework considerably strengthens their conclusions. In particular, in the context of an optimally-designed policy rule, social welfare becomes strictly decreasing in the degree of accuracy of the public signal provided by the policymaker. Of significance from a wider theoretical perspective is the fact that the optimal rule combined with zero disclosure together ensure that, subject to the given degree of information dispersion, all such information is exploited in a socially-efficient manner. Moreover, as we have demonstrated, these findings are not specific to the particular relationship between the equilibrium and socially efficient degrees of coordination which characterize the Morris and Shin model.

Of course, in order to maintain a precise focus for our analysis, we have abstracted from a number of issues which are relevant to the question of optimal disclosure. For example, the assumption that the policymaker is the sole source of public information allows us to take the minimum degree of the latter to be zero. However, as Svensson indicates, this is unrealistic, since other channels of public information are inevitably present in modern economies. A further caveat to our findings derives from our modelling of policy, which assumes instrument adjustments are not subject to any costs or constraints. While this appears appropriate in respect of monetary policy, it is likely to be less so in other policy contexts. Finally, the multiplicity of objectives typically faced by policymakers in practice is inadequately captured by the representation of social welfare which follows from equation (1). The policy trade-offs which inevitably emerge in such a context might then lead to some beneficial role for public disclosure. Each of these issues points to an interesting avenue for further research. Nonetheless, we judge it unlikely that extending our work in these directions would challenge the key message conveyed by our study: that is, taking account of the potential policy response to public information can significantly modify the welfare consequences of its disclosure.

**References:**

**Angeletos, G.-M., Pavan, A.** 2007a. "Efficient Use of Information and Social Value of Information." *Econometrica* 75, 1103-1142.

**Angeletos, G.-M., Pavan, A.** 2007b. "Socially Optimal Coordination: Characterization and Policy Implications." *Journal of the European Economic Association* 5, 585-593.

**Angeletos, G.-M., Pavan, A.** 2007c. "Policy with Dispersed Information." MIT working paper.

**Amato, J., Shin, H.S.** 2003. "Public and Private Information in Monetary Policy Models." Bank of International Settlements and LSE mimeo.

**Cooper, R., John, A.** 1988. "Coordinating Coordination Failures in Keynesian Models." *Quarterly Journal of Economics* 103, 441-463.

**Cukierman, A., Meltzer, A.H.** 1986. "A Theory of Ambiguity, Credibility, and Inflation under Discretion and Asymmetric Information." *Econometrica* 54, 1099-1128.

**Faust, J., Svensson, L.E.O.** 2001. "Transparency and Credibility with Unobservable Goals." *International Economic Review* 42, 369-397.

**Faust, J., Svensson, L.E.O.** 2002. "The Equilibrium Degree of Transparency and Control in Monetary Policy." *Journal of Money, Credit and Banking* 34, 520-539.

**Jensen, H.** 2002. "Optimal Degrees of Transparency in Monetary Policymaking." *Scandinavian Journal of Economics* 104, 399-422.

**Morris, S., Shin, H.S.** 2002. "Social Value of Public Information." *American Economic Review* 92, 1521-1534.

**Morris, S., Shin, H.S., Tong, H.** 2006. "Social Value of Public Information: Morris and Shin (2002) is Actually Pro Transparency, not Con: Reply." *American Economic Review* 96, 453-455.

**Hellwig, C.** 2005. "Heterogeneous Information and the Welfare Effects of Public Information Disclosures." UCLA mimeo.

**Roca, M.** 2005. "Transparency and Monetary Policy with Imperfect Common Knowledge." Columbia University mimeo.

**Svensson, L.E.O.** 2006. "The Social Value of Information: Morris and Shin (2002) is Actually Pro Transparency, not Con." *American Economic Review* 96, 448-451.

**Woodford, M.** 2003. "Imperfect Common Knowledge and the Effects of Monetary Policy", in P.Aghion, R.Frydman, J.Stiglitz and M.Woodford, eds., *Knowledge, Information, and Expectations in Modern Macroeconomics: In Honor of Edmund S. Phelps*. Princeton, NJ: Princeton University Press, 25– 58.