

Collective Myopia and Habit

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Sunday 11th February, 2018
[preliminary and incomplete]

Abstract

We characterize the equilibrium dynamics of a class of linear, incomplete-information models that feature forward-looking behavior, recurring shocks, slow learning, and rich higher-order uncertainty. We present an observational equivalence result that recasts this dynamics as that of representative-agent model featuring two distortions: extra discounting of the future; and anchoring of the current outcome to the past outcome, as in models with habit or adjustment costs. This provides a unified micro-foundation of various bells and whistles that the literature has used in order to match salient features of the macroeconomic time series. Furthermore, the as-if distortions are predicted to be more pronounced at the macro level than at the micro level, helping explain the disconnect between micro and macro estimates of consumption habit. We finally illustrate the quantitative potential of our insights in the context of inflation.

1 Introduction

The macroeconomic data, at least when seen through the lenses of structural VARs or DSGE model, indicate that a variety of macroeconomic outcomes, including inflation and the aggregate levels of employment, consumption, and investment, responds sluggishly to the underlying impulses, such as technology or monetary shocks. Baseline macroeconomic models, such as the textbook version of the New Keynesian model, are unable to capture this salient feature of the data. To address this failure, the DSGE literature has relies on a number of “bells and whistles,” essentially a different one for each variable of interest.

For example, the sluggish response of aggregate consumption has been accommodated by assuming a specific form of habit, and that of investment by assuming that it is costly to adjust the rate of investment (as opposed to the more palatable assumption that it costly to adjust the capital stock. Similarly, the sluggishness of inflation has been “explained” by replacing the standard version of the New Keynesian Philips Curve (NKPC) with an ad hoc variant that ties the current level of inflation to the past one, known as the hybrid NKPC.

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These mechanism find little support in micro-economic data. For instance, (?) conduct a meta-analysis of empirical estimates of consumption habit and document that the estimates obtained in macroeconomic studies are way lower than those required to fit the macroeconomic time series. This suggests that the strong form of habit assumed in the DSGE literature is most likely a proxy for some other, missing mechanism. Similarly, the microeconomic data on prices can well be accounted by menu-cost models. Such models can be seen as micro-foundations of the standard NKPC, but do not produce the kind of sluggish response captured by the hybrid NKPC.

In this paper, we offer a potential resolution to this kind of disconnect between microeconomics and macroeconomics. We consider a class of models in which behavior is purely forward looking, as in the standard formulation of the NKPC or of the intertemporal consumption problem. We then show that a an informational friction—namely dispersed private information, or rational inattention, and the associated higher-order uncertainty—can cause the economy to respond to aggregate shocks *as if* the representative agent was myopic in the double sense of discounting the future more heavily than it is rational at the individual level and of anchoring her current behavior on her past behavior. This is precisely the kind of aggregate behavior patterns that the literature has sought to capture with the aforementioned bells and whistles.

To illustrate, consider the NKPC. Its standard version is given by

$$\pi_t = \kappa x_t + \beta \mathbb{E}_t [\pi_{t+1}], \quad (1)$$

where π_t denotes inflation, x_t denotes the output gap (or the real marginal cost), $\kappa > 0$ parameterizes the responsiveness of inflation to innovations in the gap, and $\beta \in (0, 1)$ is the subjective discount factor. This condition follows from aggregating the optimal price-setting decisions of the firms and hinges on the forward-looking nature of these decisions. In particular, because the firms that have the option to reset their prices today understand that they are likely to be stuck with the same price for a while, they set their prices in proportion to their expectation of the discounted present value of the real marginal costs that they are likely to face in the future. It then follows that π_t depends, not only on the current value of x_t , but also on the firms' expectations of its future path, which in turn explains why the forward-looking nature of the NKPC.

These points are well understood. What is not well understood, however, is how the version of the NKPC given in condition (1) depends on the assumption that the firms have common knowledge of the current value x_t and a common belief about the future path of that variable and of inflation too. Without this assumption, this condition no more holds. The reason is that the optimal reset price of a firm depends on her expectations of the future prices sets by other firms, which may no more coincide with her expectations of the real marginal cost. As a result, inflation cannot be expressed as the present discounted value of future real marginal costs. By the same token, condition (1) has to be modified: an economy with the information friction is observational equivalent to a variant economy in which that friction is replaced with

Our main theoretical result is to obtain a convenient, and insightful, modification of this con-

dition under appropriate assumptions about the informations structure. Suppose, in particular, that x_t follows an AR(1) process, or a random walk, and that the information of every firm can be represented by a series of Gaussian private signals about x_t . We show that the inflation dynamics of this incomplete-information economy coincide with those of a complete-information, representative-agent economy in which the standard NKPC is replaced with a hybrid NKPC. Namely, inflation satisfies the following equation:

$$\pi_t = \kappa' x_t + \beta' \mathbb{E}_t [\pi_{t+1}] + \gamma \pi_{t-1},$$

where the scalars $(\kappa', \beta', \gamma)$ are pinned down by the underlying parameters (κ, β) and the information structure. These scalars satisfy $\beta' < \beta$ and $\gamma > 0$. It is therefore as if the firms discount the future more heavily ($\beta' < \beta$) and, in addition, condition their current price increases on the past inflation ($\gamma > 0$).

The first property represents a form of discounting: by arresting the adjustment of the expectations that the firms form about the behavior of other firms and the resulting inflation (a GE mechanism), the informational friction causes the economy to behave *as if* the firms were myopic. The second feature is due to the interaction of learning with higher-order uncertainty: as time passes and firms accumulate more information about the state of the economy and about one another's responses, beliefs adjust only slowly towards their frictionless counterpart. It is therefore *as if* current beliefs and outcomes are anchored to past outcomes.

These features—discounting of the future and anchoring to the past—induce the kind of empirical patterns that the DSGE literature have sought to capture, not only with hybrid NKPC, but also with the specific forms of habit in consumption and adjustment costs in investment popularized by [Christiano, Eichenbaum, and Trabandt \(2015\)](#) and [Smets and Wouters \(2007\)](#).

We demonstrate this point in three steps. First, we establish the basic insights in a flexible class of recursive, forward-looking games. Second, we explain how the impact of the informational friction, both in terms of the extra discounting of the future and in terms of the backward-looking effect, intensifies with the degree of strategic complementarity. Finally, we show how our insights can be applied to three different contexts: the dynamics of inflation; the dynamics of consumption; and the dynamics of investment. The information friction manifests as the hybrid NKPC in the first case, as consumption habit in the second, and as investment adjustment costs in the third.

We complement these theoretical results with one that indicates the likely empirical relevance of our theory. Consider the estimates of the hybrid NKPC obtained Gali and Gertler (1999). Our observational equivalence result directly implies that there is a level of the informational friction that reconciles those estimates with the standard NKPC. We show that the level of the informational friction that does this job also matches the persistence of the average forecast errors documented in Coibion and Gorodnichenko (2015). In this sense, our theory passes a critical over-identification test. By contrast, the more conventional model that replaces the information friction with a true hybrid NKCP fails this test miserably, because that model can not explain the strong serial autocorrelation

of the average forecasts.

Related Literature. [Woodford \(2003\)](#) also emphasizes the inertia in the adjustment of beliefs, but does not identify the aforementioned discounting because he abstracts from forward-looking behavior. Conversely, [Angeletos and Lian \(2017\)](#) document a similar kind of discounting in a setting with a time-invariant fundamental and no learning, but do not document the kind of backward-looking effect we obtain here. Finally, [Gabaix \(2016\)](#) and [Farhi and Werning \(2017\)](#) consider two distinct departures from the rational-expectations hypothesis, both of which boil down to discounting future outcomes but, unlike the approach described here, do not generate the backward-looking element that the data call for.

Throughout, I have focused on the implications of adding informational frictions in the New Keynesian framework while maintaining the usual formalization of nominal rigidity. The works of [Woodford \(2003\)](#), [Mankiw and Reis \(2002\)](#), [Mackowiak and Wiederholt \(2009\)](#) and [Chung, Herbst, and Kiley \(2015\)](#) make complementary but different contributions by showing how informational frictions may substitute for Calvo-like sticky prices and menu costs as sources of nominal rigidity. Also note that these works abstract from the forward-looking aspect in the firms' price-setting behavior, which instead is central to the results reviewed here. Finally, for additional work on the usefulness of introducing incomplete information and higher-order uncertainty in the New Keynesian framework, see [Nimark \(2008\)](#) and [Wiederholt \(2016\)](#).

For the other paper.

We complement these results few additional results that help connect the theory to the data. In particular, we characterize how the theory ties the dynamics of the aggregate outcome (say, inflation) to the dynamics of the average forecast errors and we explore how the latter can help identify the informational friction.

Prior work has suggested that the persistence of these forecast errors can alone identify the level of the friction. But this work has treated the outcome of interest (inflation) as an exogenous stochastic process, while a core point of our paper—and of any macroeconomic model—is the endogeneity of this process. Once this endogeneity is taken into account, the lessons of that earlier work have to be modified: while the evidence provided in that earlier work is suggestive of informational frictions, that evidence cannot be mapped to the theory in the way suggested by that work. The reason is the observed persistence of the forecast errors depends, not only on the underlying informational friction, but also on the general-equilibrium mechanism (equivalently, the degree of strategic complementarity) that drives the *joint* determination of the actual inflation and of the forecasts of inflation.

A similar logic applies if one looks at the noise-to-signal ratio in the forecasts of the outcome. When the complementarity is large enough, the friction can be severe and nevertheless *appear* to be negligible in the sense that the incomplete-information outcomes can be very different from their complete-information counterparts and nevertheless the aforementioned noise-to-signal ratio can be close to zero.

What is more, while the existing approach requires the relevant adjustment friction—say, habit

formation—to be equally present at the micro and the macro level, my approach explains why the friction appears to be much larger when looking at the macroeconomic data than when looking at the microeconomic data . Last but not least, my approach is consistent with the available evidence on the inertia of expectations, such as that documented in [Coibion and Gorodnichenko \(2012, 2015\)](#) and [Vellekoop and Wiederholt \(2017\)](#).

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