A naïve sticky information model of households' inflation expectations

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A R T I C L E   I N F O

A B S T R A C T

This paper shows that the Michigan survey data on inflation expectations is consistent with a simple sticky information model where a significant proportion of households base their inflation expectations on the past release of actual inflation rather than the rational forward-looking forecast. In particular, the model can explain both the mean and cross-sectional distribution of households' inflation expectations.

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1. Introduction

In recent years there has been an increasing interest in explaining agents' inflation expectations formation process (see e.g. Mankiw and Reis, 2006, 2007; Branch, 2004, 2007), mainly inspired by the evidence against the rational expectation hypothesis provided by survey expectations (see e.g. Mankiw et al., 2003; Pesaran and Weale, 2006, for discussion). Within this literature, Mankiw and Reis (2002) propose a simple sticky information model where agents know the true probability distribution of the economy, that is, they have access to rational expectations, but update their information set each period with certain probability. Carroll (2003, 2006) and Reis (2006a, b) seek microfoundations for sticky information models, while Branch (2007) bridges the sticky information and heterogeneous expectations literatures by presenting empirical evidence in favor of both model heterogeneity and limited information flows (see Branch, 2007, and references therein).

Mankiw et al. (2003) and Carroll (2003, 2006) find evidence based on survey data supporting sticky information models. Nunes (2006), instead, obtains empirical evidence against these models, while Coibion (2007) provides results favoring the basic sticky price model over the sticky information model. Finally, the results of Pickering (2004) and Nunes (2006), and the new results presented in this paper, indicate that the assumption of limited information flows is not the reason for the

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observed poor empirical performance of sticky information models, but rather the assumption of convergence to rational expectations.

That it is the assumption of convergence to rational expectations that lies behind the rejection of the sticky information models becomes more understandable when we take into account the finding that inflation forecasts, which are based on traditional forecasting approaches, have been inferior to the naïve forecasts given by the inflation rate over the previous year (see e.g. Atkeson and Ohanian, 2001; Fisher et al., 2002; Sims, 2002; Stock and Watson, 2002, 2007; Brave and Fisher, 2004). In addition, Atkeson and Ohanian (2001) found that since 1984 the one-year-ahead inflation forecast of professionals[1] has not been better than the naïve forecast. It is, therefore, natural to question the rationale for searching for relatively rarely published professional forecasts (suggested by Carroll, 2003) or to form one's own rational forecast (as in Mankiw and Reis, 2002), when the most recently reported past inflation statistic provides a competitive 'forecasting model' for future inflation. Hence, in this paper, we propose a model where agents adopt with certain probability the latest release of past actual inflation, rather than the rational forward-looking forecast, as typically suggested in the literature. We refer to this model as a naïve sticky information model, and contrast it empirically to the standard sticky information approach using quarterly US data. Specifically, we compare the posterior probabilities of the alternative models in which households update their expectations either to the forward-looking boundedly rational professional forecast or to the most recently reported past inflation statistic. As will be seen, the population level US data strongly support the latter, giving one explanation to Coibion's (2007) evidence against the sticky information model of price-setting, since his result relies on the assumption of boundedly rational forecasts.

Based on our empirical findings, we extend the agent-based epidemiological sticky information model proposed by Carroll (2006), by deriving a relative simple adaptation, suitable for estimation. The model assumes a constant personal probability for each agent to learn about inflation in the news media. This variation in their exposure to inflation news could explain the differences in survey expectations across demographic groups, documented in Bryan and Venkatu (2001a, b) and Souleles (2004). Three versions of the model are estimated with quarterly household-level survey data from 1981/3 to 2001/4 constructed by the Survey Research Center (SRC) at the University of Michigan. The first model assumes nearly rational agents in the spirit of Mankiw and Reis (2002). In the second model, agents simply adopt the past release of actual inflation, which corresponds to the approach common in the earlier literature with the traditional backward-looking autoregressive process for the aggregate level expectations (see e.g. Rudd and Whelan, 2005, for discussion). The third model nests the competitive models by allowing households to base their expectations either on the professional forecasts or the past inflation statistic. Furthermore, since sticky information models are not likely to be able to explain certain outliers (such as expectations greater than 40% or less than −40%), a proportion of the population is allowed to form their expectations randomly according to a simple white noise model.

The evidence indicates that the Michigan survey data on inflation expectations is consistent with the agent-based sticky information model. In particular, the key posterior results show that 51% of households behave according to the naïve model, 43% according to the rational expectations model and 6% according to the white noise model. Interestingly, the proportion of agents using naïve forecasts is approximately equal to the proportion of individuals consuming their current income rather than their permanent income, estimated by Campbell and Mankiw (1990). Finally, our results also indicate that households update their expectations slightly less frequently than two times per year on average, while their personal probabilities of observing the news article about inflation varies from 0.07 to 0.88.

This paper is organized as follows. In Section 2, we discuss and estimate two alternative models where agents update their expectations either to the forward-looking newspaper forecast or to the most recently reported past inflation statistic. Section 3 provides an adaptation of the agent-based sticky information model and estimates it using household-level survey data. Finally, Section 4 concludes the paper.

2. Population mean analysis

In this section, we compare two alternative sticky information models. The benchmark model follows Carroll (2003) in using mean expectations data from SPF as a proxy for rational expectations. In the competitive model we relax the assumption of rational expectations by assuming that households update their expectations in a backward-looking manner.

2.1. Naïve sticky information model

Let us consider a situation where, in each period, a fraction λ of agents obtain new information on the state of the economy and form their forecasts of the inflation rate for future periods. This sticky information structure, proposed by Mankiw and Reis (2002), leads to the following equation for the population mean of the inflation expectations over the following year:

$$M_t[\pi_{t,t+4}] = \lambda F_t[\pi_{t,t+4}] + (1-\lambda)\{\lambda F_{t-1}[\pi_{t,t+4}] + (1-\lambda)(\lambda F_{t-2}[\pi_{t,t+4}] + \cdots)\}, \tag{1}$$

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[1] Specifically, Federal Reserve's Greenbook forecasts.