

# Households' Inflation Expectations

## Expectations of households and professional forecasters

### 1. Introduction

Economists have long known that expectations are crucial determinants of future developments in the economy. For example, central banks typically try to anchor inflation expectations at a level consistent with price stability, because the dynamics of future inflation are substantially affected by what people currently expect them to be (via new wage contracts that are negotiated based on expected inflation among other things). While both theoretical and empirical economic literature in the past forty years has recognized the importance of expectations, there has been relatively little research analyzing the survey-based data on expectations. In the recent years a number of academic papers have appeared that attempt to fill this gap, mostly concentrating on the United States data. Our research, just published in the Bundesbank Discussion Paper series, Döpke et al (2005), extends the focus to the evidence on inflation expectations in major European countries. This note summarizes our main findings.

In our paper we test a model of “epidemiological” relationship between the expectations of households and professional forecasters due to Carroll (2003). Carroll finds that households expectations in the US are remarkably well captured with a simple model in which every quarter a fraction of households learns the most up-to-date inflation forecast from rational experts, while the remaining households stick to their forecasts from the previous quarter. This is in sharp contrast to an alternative model of “rational” expectations model, which has in the last several decades dominated the economic thinking and in which all households are assumed to form rational forecasts by constantly analyzing all available information. Carroll (2003) argues that in reality many households may find this very costly and undergo such a process only once each year or so.

We apply the Carroll methodology to investigate survey-based inflation expectations in France, Germany, Italy and the United Kingdom. We document that the epidemiological model adequately captures the dynamics of inflation expectations of European households. Similarly to Carroll (2003), we estimate that a typical household updates its inflation expectations roughly once a year. The updating speed varies little across the countries in our sample. In addition, we find evidence that households update their information from rational, forward-looking experts rather than actual past inflation. The epidemiology model of expectations thus provides a middle-ground ap-

proach between two polar views: complete rationality and complete backward-lookingness.

### 2 The Epidemiology of Household Inflation Expectations

Households in Carroll's (2003) model update their expectations about macroeconomic variables (including inflation) in the following “epidemiological” way. Suppose the experts collect relevant information on future inflation every period and make rational inflation forecasts, i.e., forecasts that incorporate all available information and are the best guesses about the future variables given this information. These forecasts are published in newspapers. Households, on the other hand, find it costly to read the newspapers every instant of time and to stay completely up-to-date (or make rational inflation forecasts). For that reason, in each quarter only fraction of households (denoted  $\lambda$ ) follows the latest inflation stories in the newspapers and updates its inflation expectations. The remaining  $1 - \lambda$  households stick to their forecasts from the previous quarter. The evolution of household inflation expectations can be formally described as 1:

$$E_t^{HH}\pi_{t+1} = \lambda E_t^{EX}\pi_{t+1} + (1-\lambda)E_{t-1}^{HH}\pi_{t+1}$$

In the above equation  $E_t^{HH}\pi_{t+1}$  denotes households' expectation as of time  $t$  of inflation rate between quarter  $t$  and  $t+1$ . Similarly,  $E_t^{EX}\pi_{t+1}$  is experts' expectation about future inflation. Relationship (1) implies that the current households' expectations are composed of those who have read the current newspaper (and updated from experts,  $\lambda$ ) and those who have not and kept their past expectations ( $1-\lambda$ ). Thus, news about inflation can be thought of as a disease that spreads slowly across the population, infecting  $\lambda$  households in each period.

Our discussion paper uses a number of econometric techniques to test alternative versions of the above equation against various other models of household expectation formation. These alternatives include also one that incorporates the possibility that households are backward-looking in that they form forecasts based on actual data from the past rather than experts' predictions of future inflation.

### 3. Inflation Expectations Data

To test the model of the information diffusion, two kinds of inflation expectation data are needed: inflation forecasts of households and professional forecasters. Both expectations are constructed based on the survey data. These surveys are conducted monthly in most European countries and ask a sample of experts and households about their

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[http://www.bundesbank.de/vfz/vfz\\_diskussionspapiere\\_2005.php](http://www.bundesbank.de/vfz/vfz_diskussionspapiere_2005.php)

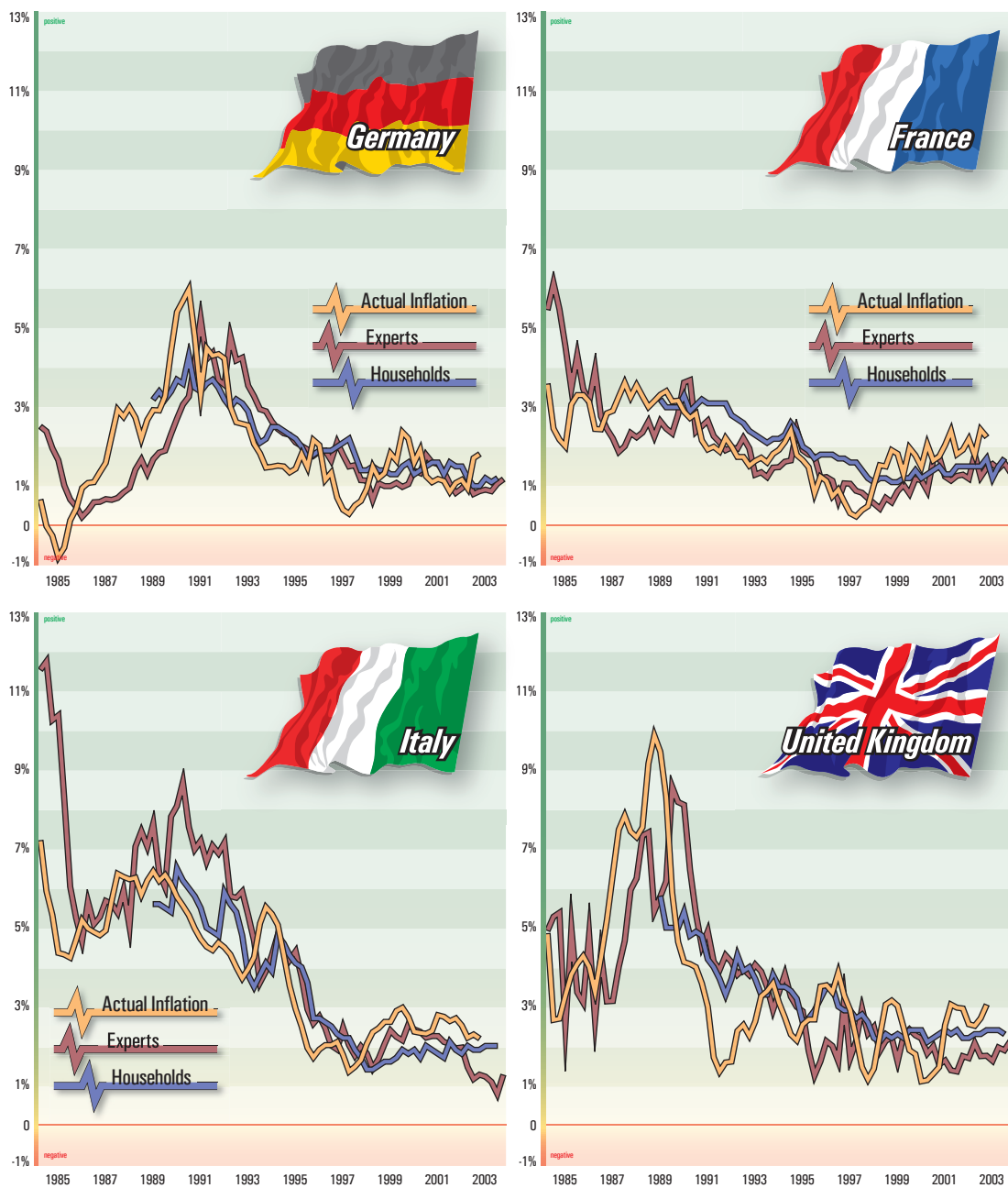
predictions about the developments of inflation and other economic variables. The forecasts of households were obtained from the European Commission's consumer survey and those of professional forecasters from Consensus Economics, a London-based macroeconomic survey firm. Experts' expectations were measured as a "consensus" forecast, the mean of individual experts' predictions. Households' expectations were constructed by rescaling the consensus households' responses so that their level matches actual inflation (see Döpke et al

(2005) for technical details). Figure 1 compares the household and expert inflation expectations with the actual inflation rate.

4. Empirical Results

The paper implements a number of estimation strategies that are relevant depending on the statistical properties about our data. We run a relatively large number of pre-estimation checks with the aim to find preliminary evidence about various features of the data. In particular we find that (i) the experts' fore-

1 Figure 1: Household and expert expectations and actual inflation.



casts are substantially more precise than the households forecasts and (ii) that changes in experts' forecasts precede the changes in households' forecasts. Our interpretation of the latter result is that experts' new information influences households. At the same time we do not find much evidence on the causality in the opposite direction: households do not seem to have much effect on experts. Both of these findings provide some encouraging evidence that the epidemiology model may be valid for Europe (as well as for the US, as found previously).

How Fast Do Households Update Expectations?

The statistical techniques we implement make it possible to test the epidemiology model (1) against a number of alternatives. In particular, we consider alternative representations of household expectations, which can be summarized as (2):

$$E_t^{HH} \pi_{t,t+1} = \lambda_0 + \lambda_1 E_t^{EX} \pi_{t,t+1} + \lambda_2 E_{t-1}^{HH} \pi_{t,t+1} + \lambda_3 \pi_{t-1,t},$$

where  $\pi_{t-1,t}$  denotes inflation from the previous quarter. Household inflation expectations in this, less restricted model are allowed to depend on the actual past inflation,  $\pi_{1,t+1}$ . This equation allows us to see whether (2) fits data substantially better than the previous restricted model (1). In particular, note that model (2) reduces to model (1) if the following restrictions are imposed (3):

$$\lambda_0=0, \lambda_2=1-\lambda_1+\lambda_1, \lambda_3=0.$$

Given the data, we can thus freely estimate parameters  $\lambda_0, \dots, \lambda_3$  in (2) and then test these restrictions to see how good an approximation the epidemiology model (1) is to household inflation expectations.

We run a battery of estimations and statistical tests and find the following main results:

- Restrictions (3) are typically satisfied in the data (for all countries considered). This provides evidence that the epidemiology model (1) quite adequately represents reality (or at least does not do a worse job than the general model (2)).
- The speed of updating is estimated to be between 0.15-0.25 in quarterly data. This implies that a typical European household updates its inflation expectations roughly once in 1-2 years. This is in line with findings reported in Carroll (2003) and other studies for the US. The estimated speed of updating is slightly lower than in the US, which can be explained, for example, by the fact that the monetary policy of the European Central Bank has recently been quite predictable. Households in an environment with little uncertainty

thus may see only small benefits from following the news frequently.

- We find little heterogeneity across the four countries. Households appear to behave similarly irrespective of the country they live in.

5. Conclusion

We think our findings are interesting for a number of reasons. First, we extend the findings of previous studies and gather new evidence on how the European households form expectations about economic variables. Second, our results may be relevant for central bankers. If households update expectations relatively rarely, these expectations do not change abruptly and are thus persistent. This highlights the importance for a central bank to anchor expectations at a low level because otherwise it might be difficult, costly and time-consuming to wipe out inflation from expectations once it is present. Third, our findings can be used as a supportive piece of evidence for a number of other economic models that have recently appeared and that find the idea of costly information processing useful for understanding various empirical facts in economics and finance.

In the future, we plan to extend our research in the following directions. It would be interesting to go one step further and model how the speed of updating is determined. Carroll for example finds that the media play an important role in the transmission of information from experts to households. Households tend to update inflation information more frequently when inflation is covered more extensively in the newspapers and on TV. In addition, the data we have make it possible to further explore the heterogeneity among experts and households. Our data might help shed light on the question: Do some households update their information more frequently? Finally, one can of course examine whether the epidemiology model is relevant for households' expectations in other respects than inflation or economic variables in general.

6. References

Carroll, Christopher D. (2003), Macroeconomic expectations of households and professional forecasters. *Quarterly Journal of Economics* 118, pp. 269-298.

Döpke, Jörg, Jonas Dovern, Ulrich Fritsche, and Jirka Slacalek (2005), European Inflation Expectation Dynamics, *Deutsche Bundesbank Discussion Paper* 37, available from: [http://www.bundesbank.de/vfz/vfz\\_diskussionspapiere\\_2005.php](http://www.bundesbank.de/vfz/vfz_diskussionspapiere_2005.php)



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