Interest Rate Expectations and Economic Behavior: Evidence From Firms and Households

Application for the EPRN Network

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Introduction Governments and central banks around the world have recently turned to unconventional policy measures in order to stimulate the economy. For instance, with interest rates at the zero lower bound, central banks have used measures of forward guidance, which are based on communicating to the public that the central bank will leave interest rates at low levels for an extended period into the future. Although forward guidance should in theory have large effects on the behavior of households and firms, empirical evidence on the effect of forward guidance has been mixed, a phenomenon which has come to be known as the "forward guidance puzzle" (McKay et al., 2016; Del Negro et al., 2012). So far there is limited empirical evidence on how expectations about future interest rates causally affect the decisions of households and firms. In this project we conduct information experiments embedded in surveys with households and firms to shed light on how expectations about the future path of policy rates affect consumption and saving decisions of households and investment decisions of firms.

Policy relevance Our research is of key interest for policy makers because it provides causal evidence on how households and firms change their expectations and behavior in response to unconventional monetary policy. Our project will also shed light on which subgroups of the population can be expected to react most strongly to changes in their expectations about future interest rates, and should therefore be targeted by monetary policy communication. This could help in designing policy interventions that make monetary policy more effective. Finally, expectations about future interest rates should generally be relevant for the decisions of households and firms, and not only when they are shifted by policymakers through communication. Thus, studying the effects of interest rate expectations helps to better understand individual behavior and ultimately aggregate dynamics.

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Experimental design and setting We draw on two sources of data. First, we make use of a unique survey of German firms, the ifo Investment Survey, run by the Munich-based ifo Institute. Second, we plan to collect data from a representative sample of German households.

Even though our project is conducted on samples of German households and firms, we believe that our findings will have a high level of external validity and should be directly applicable to the Danish context. With the Danish krone being pegged to the euro, ECB policies are directly relevant for households and firms in Denmark. In addition, there is no reason to expect expectation formation in the context of monetary policy to differ systematically between Danish and German individuals and firm managers.

Our main surveys proceed in three parts. In the baseline stage we elicit firms' and households' prior expectations about the average ECB policy rate in 2021. In the treatment stage we experimentally manipulate firms' and consumers' expectations about future interest rates by providing a random subset of them with a professional forecast of the policy rate in 2021. In the final stage we elicit different measures of firms' and households' behavior, including expectations about own consumption/saving decisions and investment decisions. We also elicit a set of expectations about macroeconomic outcomes and about households' and firms' own economic circumstances, such as the interest rates they will personally face for saving and borrowing. We conduct follow-up surveys one month (for households) as well as three and nine months (for firms) after the main survey in which we elicit self-reported measures of households' and firms' realized consumption and investment decisions following the treatment. In addition, our unique setting allows us to link survey responses of firms with administrative data on their actual investment and employment decisions.

Margins of adjustment Our experimental design generates exogenous variation in expectations about future interest rates. Given that current professional forecasts of the ECB policy rate in 2021 are very close to 0 percent, we expect our information treatment to lead to a downward adjustment of interest rates expectations among the treated respondents. By comparing treated respondents with respondents in the control group we can measure the causal effects of a reduction in expected future interest rates on expectations about own actions and other outcomes.

Modern Heterogeneous Agent New Keynesian (HANK) models imply that expected future interest rates affect current behavior both through reevaluation effects due to inflation and real substitution and income effects (Ampudia et al., 2018; Auclert, 2019; Hagedorn et al., 2019; Kaplan et al., 2018; Lenza and Slacalek, 2019). By eliciting the households' and firms' expectations about not only interest rates but also inflation as well as employment and wages (for households) and demand (for firms), we can quantify the relative importance of the various channels.

The size of the reevaluation effects should furthermore depend not just on inflation

expectations, but also on how the households and firms are exposed to inflation (their net balance of nominal assets). The size of the income effects will also vary by initial portfolio positions. Using cross-sectional variation we can explore whether the observed heterogeneity fits the theoretical predictions.

Mechanisms moderating the effect of interest rate expectations on behavior In our surveys we include tailored questions that allow us to shed light on a range of reasons why the effectiveness of forward guidance may be limited in practice.

First, learning that the central bank is planning to leave interest rates low for longer than previously thought could make firms and households more pessimistic about the economy, as the central bank's decision to keep interest rates low for longer could be perceived as a reaction to negative economic news (Wiederholt, 2015). If such effects are important, the net effect of unconventional policy measures on investment and consumption decisions may be muted or even negative. We shed light on this channel by studying how households and firms update their expectations about GDP growth and inflation in response to our information treatment.

Some papers argue that imperfect common knowledge about how other economic agents react to changes in expected future rates reduced the effectiveness of forward guidance in shifting economic agents' behavior (Angeletos and Lian, 2018). Our unique setting with both firm and household surveys which are conducted simultaneously allows us to provide direct evidence on this mechanism. Specifically, we ask respondents to the household survey how they expect firms to change their investment expenditure and their hiring when firms' expectations about interest rates are reduced. Similarly, we ask respondents to the firm survey how they expect households to change their spending when households' expectations about interest rates are reduced.

Finally, we include measures of liquidity constraints and cognitive constraints which have been brought forward as explanations for why forward guidance may have limited effects (Farhi and Werning, 2017; García-Schmidt and Woodford, 2019; McKay et al., 2016).

Literature and contribution Our project contributes to a growing literature studying firm expectations (Bachmann and Elstner, 2015; Bachmann et al., 2018, 2013; Cloyne et al., 2016; Coibion et al., 2018a,b,c; Frache and Lluberas, 2017). We will also contribute to a literature studying how monetary policy communication affects consumer expectations (Coibion et al., 2019, 2018d; Haldane and McMahon, 2018).

Our paper is novel in several respects. Our paper provides the first direct causal evidence on how expectations of future nominal interest rates are related to (i) firm investment decisions and consumer behavior and (ii) the formation of expectations about unemployment and inflation. One key selling point of our paper is that we provide the first evidence on how both consumers and firms learn from information, and how they change

their behaviors, using almost identical survey questions and information treatments. This allows us to compare how expectation formation and behavioral responses to information differ between firms and consumers and to study higher-order beliefs about other agents' decisions in response to changes in expected interest rates. Finally, our paper studies in detail potential channels and factors that have been brought forward as explanations of the forward guidance puzzle, i.e. the limited effectiveness of policy communication about future interest rates on economic behavior.

Expected output and publication potential We expect to produce one or two strong academic papers. Related papers were published in top 5 journals or in the very best field journals. We have studied expectation formation of households in previous projects, such as in the context of expectations about the likelihood of a recession (Roth and Wohlfart (2019), forthcoming in the *Review of Economics and Statistics*), the German reunification (Goldfayn-Frank and Wohlfart (2019), forthcoming in the *Journal of Monetary Economics*), and beliefs about the effects of macroeconomic shocks (Andre et al., 2019). Given the richness of our data, which combines unique expectation data from firms and consumers, and which links survey data on firms with administrative data on their investment decisions, we expect our paper(s) to make contributions at the same level as the other papers in the existing literature.

Table 1: Timeline

Date	Item
December 2019-January 2020	Field work and data collection
February-March 2020	Data analysis
April-May 2020	Write-up working paper
June 2020-December 2020	Presentation at workshops and conferences
January 2021	First submission to academic journal

Budget The firm survey is conducted by the ifo Institute, which has allowed us to include our own module free of charge. The budget therefore only concerns the household survey. To keep the context of our data collection constant, we plan to field the household survey with a representative sample of the German population at the same time as the firm survey. The first wave of the survey would recruit 7,500 respondents and the second wave of the survey, conducted 4 weeks after the first wave, would recontact all initial respondents. We would expect 4,500 respondents to complete both waves of the survey. We have a quote from a representative online panel provider who offered us this data collection for 40,081 €, i.e. approximately DKK 300,000, which we attach to this proposal. We already have designed full sets of experimental instructions for both the household and the firm survey. We would be ready to launch the project as soon as the funding is approved.

Table 2: Budget overview

Item	Amount in euro	Amount in DKK
Main and follow-up household survey	40,081 €	DKK 299,466
Overhead	8,016 €	DKK 59,893
Total	48,097 €	DKK 359,359

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