

Household behavior below zero

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Project description

One of the most salient long-run macroeconomic developments in the past fifty years is the dramatic drop in interest rates. Recent years have seen central banks resorting to negative policy rates and retail banks passing the cost on to households and firms as negative deposit rates. With the secular decline in real interest rates reflecting deep structural changes in the economy such as demographic ageing and low productivity growth (Platzer and Peruffo, 2022) and with central banks firmly committed to low inflation, negative nominal rates may become a recurring phenomenon in future decades despite the recent increase in nominal rates.

In this project, we analyze empirically how negative nominal interest rates affect household financial behavior. While the interplay between interest rates and household choices is a classical theme in economics, there are several reasons why interest rate changes within negative territory (e.g. from 0% to -0.5%) may induce very different responses than analogous changes within positive territory (e.g. from +0.5% to 0%). On the one hand, conventional theory holds that consumers will switch to cash holding when nominal deposit rates hit zero. Further decreases will only reinforce this response, with little to no effect on consumption. This is the fundamental idea behind the famous “zero lower bound” hypothesis, which posits that monetary policy becomes ineffective when interest rates go below zero.

On the other hand, the risks associated with cash holding (e.g., theft, fire) and the convenience of electronic payment methods may prevent consumers from switching to cash in the face of negative deposit rates. Furthermore, central insights from behavioral economics suggest that responses in other dimensions, including consumption decisions, may actually be stronger in the negative domain. First, individuals commonly exhibit *loss aversion* whereby the subjective pain associated with losses is larger than the pleasure associated with gains of the same size (Kahneman and Tversky, 1979). Such individuals may respond strongly when exposed to negative interest rates: They may consume more or invest in stocks or housing to limit losses in the form of interest payments. Second, households may suffer from *nominal illusion*, confounding nominal and real returns (Fehr and Tyran, 2001). This implies that a nominal interest rate of zero is the reference point that delineates gains and losses on deposits, thus bringing loss aversion into play at this point.

By implication, the effects of negative rates on household behavior are a priori unclear, and past evidence on the transmission of monetary policy in positive territory may provide little guidance.

We aim to address this issue in two ways. First, we will use data from Danish administrative registers to estimate the impact of negative deposit rates on a range of household outcomes, including consumption, investment behavior and asset composition. Second, to shed light on the mechanisms behind the observed responses, we plan to conduct a survey of Danish households asking them about their exposure and behavioral responses to negative interest rates, as well as the motives driving these responses.

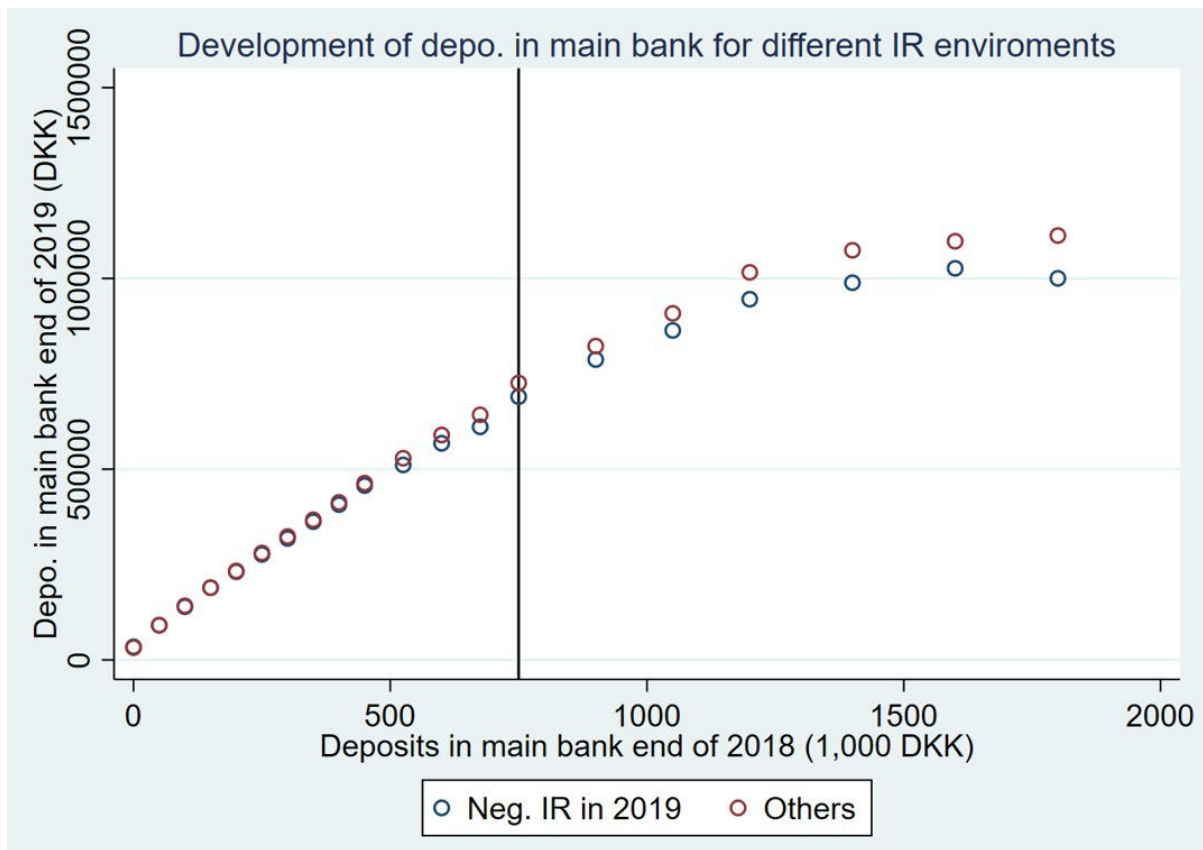
We are not aware of existing papers that study household responses to interest rate changes in the negative domain in a real-world setting. A large number of papers estimate the effect of negative policy rates on bank outcomes such as lending rates, loan volumes and profitability (e.g. Bottero et al., 2022). In addition, one paper considers transmission to the real economy through corporate investment and employment (Abildgren and Kuchler, 2020). Finally, a few studies conduct laboratory experiments and find no significant effect of negative rates on portfolio choices in this setting (e.g. Bracha, 2021).

Empirical analysis using register data

Our proposed empirical design uses rich data from Danish administrative registers. From tax records, we can link each member of the population to their main bank. We combine this information with hand-collected data on each bank's deposit rates in the years 2019-2021 when Danish banks introduced negative rates on deposits. Exploiting the fact that some banks introduced negative rates sooner than others, this allows us to estimate the effect of negative deposit rates on consumer behavior by comparing individuals exposed to such rates with similar individuals who are not (yet) exposed.

The figure below illustrates the basic idea behind the research design and provides a proof of concept. It shows the relationship between deposits held at the main bank at the end of 2018 and deposits held at the same bank one year later, at the end of 2019, for two groups of individuals: Blue circles represent individuals who, due to their choice of bank, were already exposed to negative interest rates by the end of 2019, provided they had deposits of at least 750,000 DKK. Red circles represent customers in banks that had not yet introduced negative rates by the end of 2019. We observe a clear difference between the two groups for individuals with deposits around or above the 750,000 cut-off, while there is no difference at lower levels. This suggests that consumers do in fact respond to negative interest rates by reducing their deposits. The key questions, then, are what households do with the money, and what their motivations are.

To answer the first question, we will exploit the full variation in when and how banks introduced negative deposit rates. Using high-frequency data on car purchases and real estate trades, we can use event study methods to analyze the dynamic impact on important subcomponents of consumption. From annual tax records, we can also estimate the extent to which consumers redirect funds towards other banks, to spouses or family members, to investment in risky assets such as stocks, or towards debt repayment.



Online survey

To shed light on the mechanisms underlying the responses detected in the register data, we plan to conduct a survey with about 4,000 households. We will contact respondents through their e-boks using CPR numbers provided by DST. Their answers will subsequently be merged with register data at the individual level at DST's servers.

In the survey, we will ask respondents whether the interest rates on at least part of their deposits went negative in 2019-2021. Among those who report having been subject to negative interest rates, we will subsequently ask whether this increased, decreased, or did not affect their household's consumption and stock investment.

Our main measures of interest will be open-ended survey questions, in which respondents are asked to write down why they adjusted their consumption spending or stock holdings in a particular way. Open-ended elicitations have become increasingly common to understand the mechanisms underlying economic beliefs and decisions (Haaland et al, 2024). A key advantage compared to more structured question formats is that open-ended elicitations do not prime individuals on the available response options, which should make these elicitations immune to concerns such as ex-post rationalization.

In our context, the open-ended questions provide a lens into the motives driving the behavioral adjustments to negative interest rates. We will follow state-of-the-art approaches and hand-code the open-ended responses using a pre-designed coding scheme. The open-ended responses will provide insights on the importance of behavioral factors,

such as nominal loss aversion, but also of more traditional factors, such as intertemporal substitution or income effects, in driving households' adjustments.

While open-ended measures offer unique advantages, they are less suited to capture more nuanced mechanisms, which some respondents may be unable to articulate. We therefore supplement the open-ended questions with more traditional, structured survey questions, in which respondents can select which mechanisms on a list presented to them were important in their responses to negative rates.

We will use the survey data for two sets of exercises. First, we will provide descriptive evidence on the mechanisms driving behavioral adjustments based on the open-ended data. Second, we will exploit our ability to link the answers to register data to examine how mentioning specific mechanisms in the survey relates to the actual behavioral adjustments made during the period of negative interest rates.

Output and timeline

We expect that the project will produce a high-quality research paper on household behavior beyond the zero lower bound. The combination of highly granular register data and detailed survey data on individuals' subjective motivations is unique in this context. Consequently, our ambition is that the paper will be of sufficient quality to have a real chance of publication in a top-5 journal in economics or a top-3 journal in finance.

We have completed much of the preparatory data work for the register-based analysis, including the data collection on negative rate implementation dates across banks, as well as a preliminary proof-of-concept analysis (see the figure above) but the actual analysis remains to be done. We aim to continue the work on this for the remainder of 2024, run a pilot survey in the fall of 2024, followed by the full survey in early 2025. We expect to have a first draft of a working paper by fall 2025.

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