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The subjective wealth distribution: How it arises and why it matters to inform policy?

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WORKING PAPER 249

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Pirmin Fessler and Severin Rapp

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The subjective wealth distribution: How it arises and why it matters to inform policy?

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Abstract

Recently, the influence of income and wealth distribution on aggregate savings receives considerable attention. While most studies have focused on measured income distributions, we emphasize the critical role of individuals' subjective perceptions in economic decision-making. Our results largely align with standard economic theory, asserting the importance of wealth and (permanent) income for the savings rate. Additionally, our results introduce a potential new dimension: the relevance of an individual's perceived position within the wealth distribution. Using unique wealth survey data, we uncover a significant bias in self-assessed distributional ranks. Our estimates indicate that descriptively individuals who underestimate their wealth rank have a savings rate approximately 50% higher than those who assess their rank accurately. This robust finding persists in our predictive effects of smaller size (underestimating one's wealth rank by 1 wealth decile goes along with a 0.8 percentage point higher savings rate) even after controlling for wealth and income and a range of household and individual characteristics. To identify a causal effect of 2.3 percentage points per wealth decile underestimation, we introduce a novel Instrumental Variable (IV) approach, leveraging the implementation of a wage transparency law. Importantly, this IV approach is less prone to errors arising from common support issues, as it relies solely on the differences in perceived wealth ranks that are explainable by the policy. Our findings offer valuable insights for contemporary macroeconomic models and contribute to the understanding of how social segregation and information bubbles impact economic decisions, mediated through individual perceptions of relative wealth.

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0 Non-technical summary

Understanding individual savings behavior is at the core of economics and crucial for macroeconomic modeling. This study investigates the role of individuals' subjective perceptions of their wealth rank in society and its consequential impact on their savings rates. Utilizing unique survey data, our research uncovers a significant bias in self-assessed wealth ranks. We investigate an interesting empirical pattern, namely, that individuals who underestimate their wealth rank have a savings rate approximately 50% higher than those who accurately assess their position. This pattern suggests that individuals might care about their relative wealth ranks.

We first document this relationship descriptively, and then establish both predictive and causal effects. For the latter we use a novel instrumental variable (IV) approach, which leverages a wage transparency law to identify the causal relationship between (mis)perception of the wealth rank and savings. The predictive effect implies about 0.8 percentage points higher savings rate for each decile of underestimation of the wealth rank, while the causal effect based on our IV estimates lies at more than 2 percentage points respectively. While we also perform various robustness checks and sensitivity analyses, further strengthening the validity of the results, it's important to exercise caution when interpreting these findings. The overlap of individuals underestimating and overestimating their wealth rank across the wealth distribution is sparse, which suggests that the results need to be interpreted with care, particularly for specific segments of the wealth distribution. Our results rest on strong extrapolation for our predictive effects estimates and on the validity of our instrument for our causal effect estimates. This limitation opens avenues for future research to investigate the mechanisms behind our results more comprehensively.

The potential policy implications of our findings - assuming the validity of our causal effect - are substantial. Targeted informational interventions could be strategically employed to manage consumption patterns, thereby influencing the transmission mechanisms of monetary policy. In an environment increasingly influenced by information bubbles and social media, understanding these subjective perceptions becomes crucial for policy effectiveness.

The study raises questions about how these biases are shaped by social and informational landscapes. The research strongly advocates for the inclusion of behavioral biases and subjective perceptions in future macroeconomic models, arguing that a more comprehensive understanding of individual behavior is key to addressing broader economic questions. The results of our study generally align with standard economic theory: wealth and (permanent) income are relevant for the savings rate. But additionally they suggest a further channel: the relevance of the individuals' perceived rank in the wealth distribution.

1 Introduction

The role of the distribution of income and wealth in determining aggregate savings feeding into the decline in the natural interest rate receives considerable attention. While prior studies primarily address measured income distributions, we highlight the significance of individuals' subjective perceptions in economic decision-making. Capitalising on a novel survey instrument asking individuals to rank themselves in the national distribution of wealth, we estimate predictive effects that perceived relative wealth ranks are strongly related to savings. We also employ a novel instrumental variable approach by leveraging a wage transparency law's implementation to identify a causal effect. Our findings are at the core of economics, the saving decision in consumer demand, and therefore can inform contemporary macroeconomic models (predictive effect) and aid in evaluating the impact of social segregation and information bubbles on economic decisions influenced by individual social status perceptions or any other phenomena which changes the perception of relative social status (causal effect).

Findings Our findings reveal that survey respondents have substantial difficulties in assessing their own rank in the wealth distribution. There is a strong tendency towards the middle. While overestimation prevails approximately in the least affluent tercile of the net wealth distribution, respondents in the upper two terciles are prone to underestimate their wealth rank. At the same time, the share of individuals with accurate perceptions falls along the distribution of wealth. Comparing bias for perceptions of the wealth distribution with results from the realm of income, it turns out that people misconceive their rank in the wealth distribution by a much greater margin than their rank in the income distribution. Crucially, we find evidence that this is not an artefact of the survey setup and social desirability in the response behaviour, but that economic behaviour changes with biased perceptions. In particular, we document non-trivial differences in savings rates between those who accurately assess their rank in the wealth distribution, and individuals who over- or underestimate it. Our estimates indicate that individuals underestimating their wealth rank exhibit a savings rate roughly 50% higher than those accurately assessing their position. Our regression results show that underestimating ones wealth rank by 1 wealth decile goes along with a 0.8 percentage point higher savings rate. As the common support of underestimators and overestimators with regard to the wealth rank is sparse, our regression results to establish these predictive effects rest on strong extrapolation outside the common support. However, additionally we employ a novel instrumental variable approach and leverage a wage transparency policy which leads individuals to perceive themselves higher up in the wealth leader. Using this approach we establish a causal effect of 2.3 percentage points lower savings rate for one decile of higher self-perception in

the wealth distribution, which confirms and strengthens our original result. We are confident, that our instrumental variable is particularly credible as it is directly affecting income rank perceptions which we show to be tied in with wealth perceptions. Using survey data before the wage transparency law was in place, we also are able to show that the channel did not exist before the policy. The IV approach is less sensitive to the common support issue as it only rests on the differences in perceived rank explainable by the wage transparency law.

Macroeconomics This work informs recent debates in macroeconomics and the role of heterogeneity for the aggregate behaviour of economies. As the natural rate of interest (r^*) falls, trends such as the high savings rates at the top of changing income and wealth distributions have pivoted to the center of the debate (Mian, Straub, and Sufi 2021; Summers 2015). The crucial element of these explanations is the systematic variation of savings rates and the marginal propensity to consume among households, documented across different contexts (Fagereng, Holm, and Natvik 2021; Jappelli and Pistaferri 2020). One of the most robust findings on propensities to consume and heterogeneity is the strong association between income (Misra and Surico 2014) or cash-on-hand (sum of current income and wealth) and the savings (Gelman 2021; Jappelli and Pistaferri 2014). This paper documents heterogeneity in savings rates from a behavioural perspective (Gabaix 2020). We argue that macroeconomic models should consider that individual decisions are rooted in individuals' subjective realities. Consequently, it's crucial to incorporate perceived distributions alongside measured ones. To this end, we emphasize the significance of survey research, which provides insights into individuals' perceptions.

Microeconomics We also contribute to our understanding of the implications of social comparisons for economic behavior at the micro-level. For example, a large literature on conspicuous consumption and the effects of upward-looking comparisons ("keeping up with the joneses") suggests that individuals consider their relative position when making consumption decisions (Agarwal, Qian, and Zou 2021; Bagwell and Bernheim 1996). More recently, a set of studies considers economic choices beyond expenditure, including durable consumption and financial decisions (Bricker, Krimmel, and Ramcharan 2021; Roussanov 2010), as well as bankruptcies and borrowing activities upon shocks (Agarwal, Mikhed, and Scholnick 2020). In addition, others investigate the implications of relative pay for labor market behavior (Card et al. 2012). In political economy, social comparisons play an important role since the seminal Meltzer and Richard (1981) result. Research on political preferences in particular has moved on to look more closely at biased perceptions of social rankings among survey respondents, feeding into po-

litical preferences (Albacete, Fessler, and Lindner 2022; Fehr, Mollerstrom, and Perez-Truglia 2022; Cruces, Perez-Truglia, and Tetaz 2013). Increasingly, evidence on self-perceived ranking in the income distribution become available. A common finding is a tendency towards the middle, whereby individuals across the income distribution place themselves in the centre of the distribution (Cruces, Perez-Truglia, and Tetaz 2013; Hvidberg, Kreiner, and Stantcheva 2020; Hoy and Mager 2021). Windsteiger (2022) shows how residential segregation contributes to income rank perceptions clustering around the middle of the distribution, feeding into policy preferences.

Theory Lastly, this paper is related to several theoretical papers where (relative) wealth is introduced in the utility function. Most recently, models with utility from wealth feature in macroeconomics, where they can explain high savings rates prevailing in a low interest rate environment (Michaillat and Saez 2021). In public economics, utility functions with relative wealth matter for optimal capital and wealth taxation. Recent results employ this idea to generate a steady-stated elasticity of capital to taxation below infinity (Saez and Stantcheva 2018). In addition, modeling the role of wealth in utility functions and social comparisons can contribute to accounting for fat tails in wealth distributions (Carroll 1998), wealth-accumulation patterns over the life-cycle (Kopczuk and Lupton 2007), and stock-market volatility (Bakshi and Chen 1996).

Contribution In this paper, we break new ground by providing evidence on perceptions of relative wealth and their effects. We measure bias in wealth perceptions rather than income perceptions and deliver an analysis of the consequences of such biased perceptions for savings behavior. In contrast to other studies that have looked at consumption and cash-on-hand or the relationship between financial decisions and relative wealth shocks, we can disentangle the contribution of measured rank in the distribution and biased perceptions thereof. At the same time, models with macroeconomic heterogeneity, not least when they feature relative wealth in utility functions, do not address behavioural bias. Yet, relative status comparisons in particular are prone to the representativeness heuristic, arising from individual failure of applying Bayes' rule to information they receive (Kahneman and Tversky 1972). By providing our predictive effects we deliver a characterization of (conditional) differences between saving rates by perception of relative wealth rank which can be used to inform macroeconomic models. By identifying the causal part of this association using our novel instrumental variable approach we provide a tool to evaluate the effects of policy interventions, developments or events which have an impact on the saving rate which is mediated through the perception of relative wealth.

Policy The findings open up interesting questions for policy design. For example, it may be possible to employ targeted information treatments tools to manage consumption from a macroeconomic perspective. Moreover, as subjective assessments of people’s own position in the wealth distribution accounts for high savings rates in certain parts of the population, changes in the determinants of misconceptions could change the transmission mechanism of monetary policy. In addition, one may think of similar interventions in the area of financial stability and strengthening household resilience. At the same time, the rise of social media and AI may provide an even stronger amplifier of differences in perceptions and resulting differences in economic-behavior. Our causal estimates allow to quantify the effects on savings for any change in relative wealth rank perceptions.

Roadmap The remainder of the paper is organised as follows. Next, we introduce the data and provide descriptive statistics. Section 2 also documents the degree of bias in perceived ranks in the wealth distribution among respondents. Subsequently, Section 3 gives the main results. We complement the main results with robustness checks and additional results. Section 4 concludes.

2 Data

For the main analysis, we employ data from the second and third wave of the Austrian Household Finance and Consumption Survey (HFCS).¹ For our novel instrumental variable approach we additionally match data on firm size at the district level.

Main analysis Since 2010 the HFCS is an ongoing harmonised household survey conducted throughout the euro-zone as an initiative of the European Central Bank (ECB). Much like the Survey of Consumer Finances (SCF) in the US, the HFCS collects detailed information on the balance sheet of households. The HFCS aspires to follow the high data quality standards implemented in the SCF. Reliance on CAPI interviews, extensive consistency checks contribute to the data quality. Furthermore, the data providers offers multiple imputations to correct for non-response behaviour and complex survey weights. From a battery of questions on assets and liabilities of each household, we obtain net wealth as the sum of both real and financial assets minus all household debt. In addition, the HFCS provides information on portfolio choice, labour market outcomes, consumption, individual demographics. This paper relies mainly on balance sheet data as well as

¹To demonstrate the power of the instrument in Section 3.3, we also use data from the 2010 wave of the HFCS. Descriptive statistics are in the Appendix.

income flows. Table 1 provides provides a compact overview of key variables featuring in the analysis.

Table 1: Key variables descriptive statistics

Variable	Min	Median	Mean	Max
2014				
Male	0	1	0.6	1
Size	1	2	2.1	8
Age	18	54	54	85
Net income	498.4	2121.6	2449.9	18000
Savings	0	200	343.5	30000
Net wealth	-504	85.9	258.4	43733.7
2017				
Male	0	1	0.6	1
Size	1	2	2.1	8
Age	17	54	53.8	85
Net income	300	2400	2718.2	100000
Savings	0	200	432.4	100000
Net wealth	-636.6	82.7	250.3	42843.5

Note: This table provides summary statistics for key variables. Net wealth in thousands. Net income refers to monthly household net income. Size is household size. Male assumes unity for male reference person. Age refers to reference person. Savings are the sum of monthly active savings and debt repayment.

Source: HFCS 2014, 2017 - ECB and OeNB.

In addition to means, medians, maxima and minima, the table also documents the number of observations in each wave. The pooled sample size of all three waves we use is 8449 households. Income, wealth, savings and household size are household level statistics. Table 8 in the Appendix presents more detailed descriptive statistics for household wealth. We draw on a special variable in the Austrian survey that provides information on monthly net household income. The income measure includes wages, salaries, self-employed and property income, as well as monetary social transfers (including pensions). Taxes and social security contributions are deducted. For the most part, this paper uses equivalized income. To that end, we employ the modified OECD-scale. While the analysis refers to the household level, we include some individual characteristics of the main respondent. Across waves, the typical respondent is likely to be male and slightly above 50 years

in age.

To measure savings rates, data on savings flows is required. To construct a savings variable, we combine data on the amount of money set aside for savings purposes each month² with information on debt repayment (principal and interest). Monthly savings correspond to the sum of both components. The savings rate s for each household h follows from dividing the monthly savings flow S plus debt repayment R by monthly net household income Y :

$$s_h = \frac{S_h + R_h}{Y_h} \times 100 \quad (1)$$

Table 2 provides descriptive statistics for savings and savings rates. Across both HFCS waves, the share of households who engage in saving is relatively stable around three quarters. The most notable difference is that between waves, the mean and median savings among savers increased, while it remains constant across the whole population. Mean savings, as well as saving rates both in terms of means and medians increased between waves across both groups.

Table 2: Savings rates descriptive statistics

measure	2014		2017	
	savers	all	savers	all
Mean saving	446.7	343.5	576.4	432.4
Median saving	283.6	200	341	200
Mean savings rate	15.8	12.2	17.2	12.9
Median savings rate	11.9	8.6	13.2	9.6
Population share	76.9		75	

Note: This table provides summary statistics for savings. Savings derive from active monthly saving (AHI0420) and monthly debt repayment. Dividing by net monthly household income yields savings rates.

Source: HFCS 2014, 2017 - ECB and OeNB.

Capitalising on the flexibility of household surveys and their capacity to elicit subjective information, the Austrian HFCS also collects a wide range of information on individual attitudes, preferences and perceptions. This latter set of variables makes the HFCS an ideal data source for the purposes of this paper. We draw on a special question, asking the main respondent in each interview to situate their household in the national net wealth distribution.

²The survey question reads as: *How much money can you usually save or put aside each month, for example in order to fund large expenditures, for emergencies or to accumulate wealth?*

The question reads as follows: "If you consider the entire net wealth of your household, which position in the wealth distribution do you think your household occupies?" The respondents can then either name a decile rank, or choose the appropriate decile using a slider. Figure 1 plots a smoothed estimate of the difference between self-declared decile rank and decile rank based on the data on household wealth from the survey against the CDF of net wealth. The smoothed line is based on a generalised additive model with a penalised cubic regression spline. The spline is based on minimising the following expression:

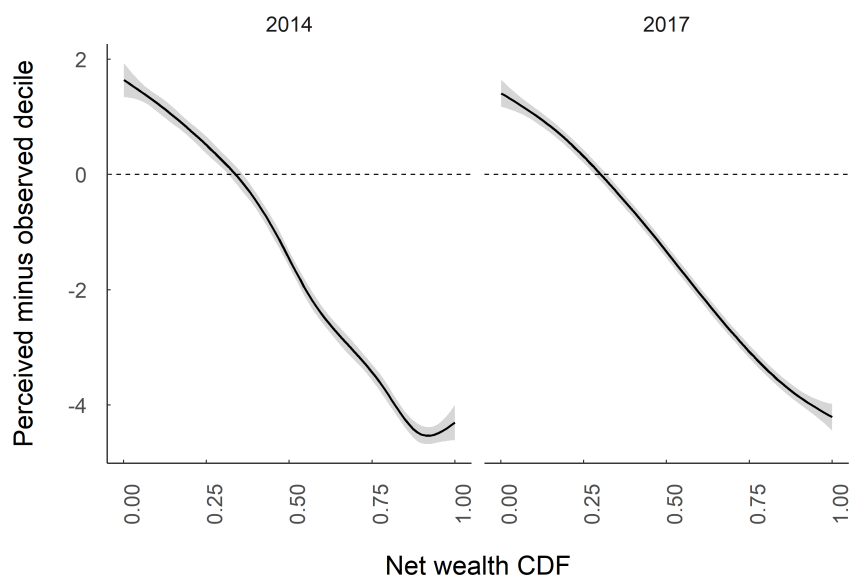
$$\sum_{i=1}^n \{y_i - g(x_i)\}^2 + \lambda \int g''(x)^2 dx \quad (2)$$

The smoother balances the model fit (the squared distance between y_i and the cubic spline's free parameters $g(x_i)$) and a penalty term for smoothness (Wood 2017) - the widely-used integrated square second derivative cubic spline penalty. We use ten knots, evenly spread throughout the covariate values.

Positive values of the smoothed estimate of the bias imply that respondents overestimate their rank in the distribution, whereas negative values result from underestimation. The graph illustrates a negative association between decile rank and biased perception of rank in the wealth distribution. This pattern is robust across different survey waves. Individuals overestimating their rank in the distribution tend to be biased to a lesser degree than underestimators. At the bottom of the distribution, the bias amounts to two deciles in difference to the actual distributional rank. At the other end of the wealth distribution, the bias is twice that size in absolute terms. Between the first and the second tercile, approximately, the bias changes from positive to negative in each wave. Notably, there is a small uptick at the top of the distribution, where the bias plateaus at approximately four deciles. Yet, overall, less than one percent of respondents situate their household in the top decile.

Common support One of the methodological challenges we encounter in our analysis is the issue of common support for over- and under-estimators of wealth rank. Naturally there are no overestimators in the highest decile and no underestimators in the lowest decile. However, the areas with sparse support including almost only under- or overestimators are much larger, making it difficult to draw reliable inferences about the effect of being an over- or underestimator at a particular point of the wealth distribution. In our case, the effect of interest is the impact of over- or under-estimating one's wealth rank on savings behavior. As we lack full common support, we are essentially forced to extrapolate the effect outside the range of the data, which can introduce bias and reduce the reliability of our estimates.

Figure 1: Self-perceptions along the net wealth distribution



Note: The x-axis represents the CDF of the net wealth distribution. Values on the y-axis plots a smoothed estimate of the mean difference between perceived decile and decile based on survey-elicited net wealth. Pooled observations for 2014 and 2017 HFCS waves. Savings rates are residualized with respect to survey waves. Estimates are constructed from averaging across implicates. Survey weights are taken into account.

Source: HFCS 2014, 2017 - ECB and OeNB.

To mitigate this issue, we also employ alternative specifications where we use the difference between perceived rank and measured rank as a continuous variable. This allows us to capture the nuanced variations in how far off individuals are in their wealth rank estimations, rather than crudely categorizing them as over- or under-estimators. Still, the issue of very sparse common support remains.

That is why our instrumental variable approach becomes particularly useful in this context. By leveraging the wage transparency law as an instrument, we can better isolate the causal effect of misperceptions on savings behavior. The IV approach is less sensitive to the common support issue as it only rests on the differences in perceived rank explainable by the wage transparency law.

See appendix [A.1](#) for detailed tables illustrating our problem with the common support.

Instrumental variable approach To generate random variation in misperceptions, we capitalise on a policy promoting wage transparency in Austria. See [3.3](#) for further details. We use data from Statistics Austria on enterprise demography (from 2011 onward) to address the absence of workplace employee data in the HFCS. Particularly we employ district-level data on the prevalence of large firms, defined as those with at least 100 employees among all firms with any employees in 113 geographical units. This approach has two limitations: it can't precisely measure firms just above the 150-employee threshold, and district-level firm size data for 2010 is unavailable. We address this limitation in appendix [A](#).

3 Results

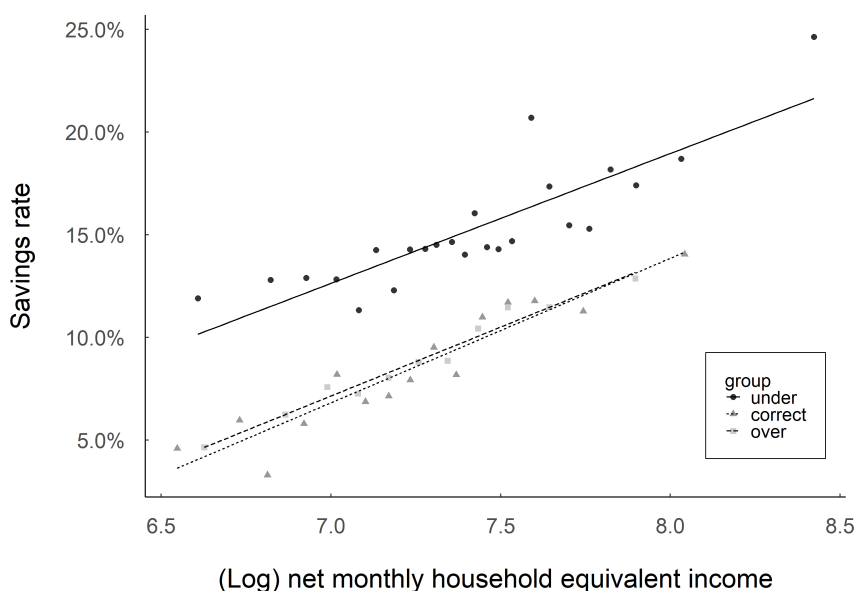
This section presents findings on biased perceptions and economic outcomes. Primarily, we focus on savings behaviour as the main result and estimate predictive effects. Subsequently, this section appraises the robustness of the findings, both in view of covariates and the operationalisation of the dependent variable. In addition, our results feature a causal analysis based on a novel instrumental variable approach.

3.1 Main results

Figure [2](#) displays the main result of this paper at a glance. It shows the savings rate as a function of (log) equivalized income. The graph plots this relationship for overestimators, underestimators and those who correctly assess their rank in the wealth distribution separately using a binned scatter plot. Figure [2](#) reveals that there is a strong correlation between biased perceptions and the amount of monthly savings. At all income levels,

respondents who underestimate their rank in the wealth distribution save most. Overall, this difference amounts to more than five percentage points. Given mean savings rates between 12% and 13%, this is an economically significant difference. In relative terms, savings among underestimators are by about 50% higher than among individuals who place themselves in the correct decile of the wealth distribution. Overestimators differ from individuals with correct assessments only to a limited extent. Their average saving ranges only slightly above average savings among respondents with accurate self-assessments. The slopes of the linear functions also differ between groups. The flattest relationship between income and savings flows prevails among underestimators. This implies a heterogeneous relationship between biased perceptions and savings, narrowing slightly as equivalized disposable income increases.

Figure 2: Average savings rate across the income distribution



Note: The x-axis refers to equivalized monthly household net income. The y-axis represents monthly savings as a fraction of household net income. The dashed line plots the relationship between income and savings for individuals who underestimate their household's position in the wealth distribution. Dotted refers to overestimators. The solid line is the savings rate as a function of income for individuals with correct assessments. Estimates are constructed from averaging across implicates. Survey weights are taken into account.

Source: HFCS 2014, 2017 - ECB and OeNB.

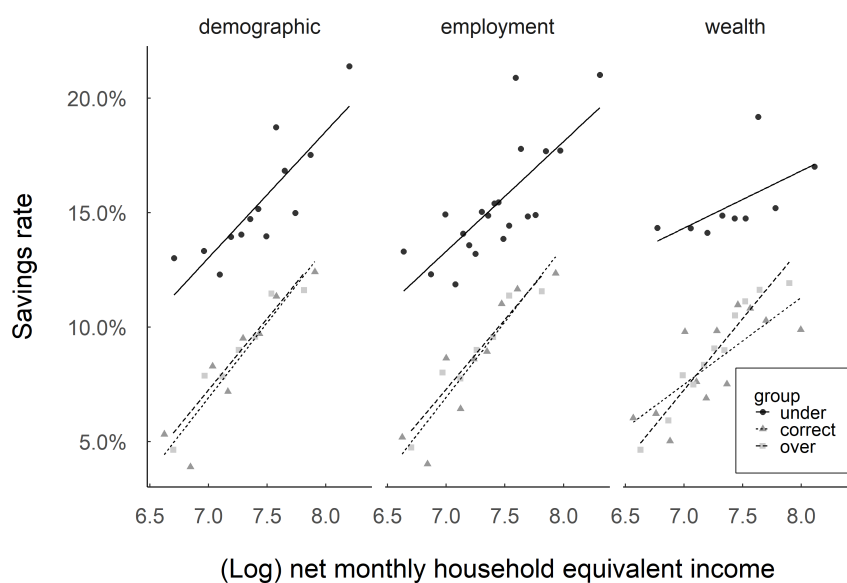
The next set of result introduces control variables and offers variants of Figure 2 with different residualizations. In the first panel of Figure 3,

we condition on demographic variables. They include the gender of the respondent, along with a second degree polynomial of their age. Considering savings conditional on these variables does not change the substantive conclusions drawn from Figure 2. The second panel shows that savings rates residualized for employment outcomes does not change the conclusions either. The labour-market related characteristics that feature in the second facet of Figure 3 are the employment status of the main respondent, whether they work on a temporary contract, and four ISCO-based occupational indicators. The third panel in Figure 3 introduces wealth controls. They include IHS-transformed³ net wealth and a second-order polynomial of net wealth. This allows us to address the argument that both a downward bias in perceived rank in the wealth distribution as well as high savings rates are correlated with wealth, leading to a spurious correlation between biased perceptions and saving. Conditioning on wealth leads to a small change in the slope of the fitted line among all groups. However, even with the flexible controls for net wealth, the relationship between savings, income and misperceptions remains present in the data. Conditioning on wealth leads to a small change in the slope of the fitted line among all groups.

In addition to the graphical evidence, Table 3 provides regression results supporting our findings. On the basis of the regression results, we consider not only economic, but also statistical significance of the results. In each column, the dependent variable is the savings rate in percent. Each result pools data from the 2014 and 2017 wave of the HFCS, adding a wave fixed effect. The first column provides the difference in mean savings rates for the different directions of the bias in perceptions. The reference group consists of individuals with correct assessments. Underestimators save by 6.23 percentage points more than individuals in the reference group. The estimate is statistically significant at conventional levels. The point estimate of the difference in savings rates between overestimators and respondents in the reference group is positive but statistically insignificant. The wave fixed effects and the group indicator variables explain 5% of the variance in savings rates. Moving on to the next column, we introduce wealth and income controls in the form of IHS-transformed income and net wealth. The point estimate of the additional savings among downward-biased individuals falls to 4.54 percentage points, though it maintains statistical significance. The results for survey respondents who overestimate their rank in the wealth distribution do not change substantially relative to the first column in Table 3. The R^2 doubles, indicating a substantially improved fit. In the final column, we add a set of personal controls to the specification. They include gender, a second order age polynomial, three educational dummies and seven industry dummies. Compared to the specification in column 2, the changes are marginal. Individuals who underestimate their position in the wealth

³Inverse hyperbolic sine transformation

Figure 3: Residualised average savings rate across the income distribution



Note: The x-axis refers to equivalized monthly household net income. The y-axis represents monthly savings as a fraction of household net income. The dashed line plots the relationship between income and savings for individuals who underestimate their household's position in the wealth distribution. Dotted refers to overestimators. The solid line is the savings rate as a function of income for individuals with correct assessments. The graph controls for a second-degree polynomial of age, alongside the gender of the respondent in the first panel. The second facet is based on savings residualized for employment outcomes (ISCO job classification, temporary contracts and whether the respondent is employed). Savings in the third facet are residualized based on \ln -transformed net wealth, and third-degree polynomial of net wealth. Estimates are constructed from averaging across imputates. Survey weights are taken into account.
Source: HFCS 2014, 2017 - ECB and OeNB.

Table 3: Perceptions and savings: Main results

	Uncond diff	OLS I	OLS II
Perceived below observed	6.23*** (0.22)	4.54*** (0.22)	4.57*** (0.25)
Perceived above observed	0.31 (0.25)	0.26 (0.22)	0.18 (0.21)
Net wealth (ihs)		0.12*** (0.02)	0.14*** (0.02)
Net eq. income (ihs)		6.10*** (0.26)	5.36*** (0.30)
Wealth and income controls	No	Yes	Yes
Personal controls	No	No	Yes
Wave fixed effects	Yes	Yes	Yes
R2	0.05	0.10	0.10
Nobs	6048	6048	6048

*Note: *** $p < 0.001$; ** $p < 0.01$; * $p < 0.05$. Multiple imputations taken into account. 100 replicate weights. All specifications feature the savings rate in percent as the dependent variable. Income and wealth controls refer to ihs-transformed household net wealth and monthly equivalent household net income. Personal controls include a second-degree age polynomial, three education dummies and seven industry dummies. Source: HFCS 2014, 2017 - ECB and OeNB.*

distribution have higher savings rates than their peers by a margin of 4.6 percentage points. The savings rates among overestimators are still close to the savings rates of respondents who accurately assess their decile rank. Note, that appendix A.4 includes table 19, which replicates table 3 but using a continuous measure of misperception, particularly the difference between the perceived and measured wealth rank. In the continuous case we find a 0.8 percentage point higher savings rate for a each decile of underestimation or less strong overestimation (-0.8 percentage points for each decile of overestimation or less strong underestimation). While the continuous result ties in with our findings from the discrete analysis of under- and overestimators, note that both rest on strong extrapolation outside of the sparse common support of these groups. This is especially true at the tails of the distribution where under- (in the case of the first decile) and over- (in the case of the tenth decile) can not exist logically.

Table 4 replicates the results in Table 3, adding interactions between wealth and the direction of bias in perceptions of respondents' rank in the wealth distribution. The third row in each column reports the estimates for the interactions of wealth (inverse hyperbolic sine transformed) and underestimation, whereas the fourth row refers to the group of overestimators. The results in the first and second row refer to the differences in savings behaviour across overestimators and underestimators relative to respondents with accurate self-assessments at zero net wealth. Across specifications, re-

spondents at zero net wealth save less if they underestimate their relative wealth position rather than if they overestimate it. However, the results at zero net wealth among underestimators need to be interpreted with care, since only a small group of individuals at zero net wealth underestimate their wealth. As wealth increases, the differences between groups becomes smaller and reverses. The first column shows bivariate associations without further control variables. In this specification, a unit increase in transformed wealth is associated with an increase in the difference in savings rates between underestimators and respondents with more accurate perceptions by 2.23 percentage points. This implies that underestimators start oversaving around a net wealth level of approximately €43,000. The effect is the opposite for overestimators, where savings fall by 0.39 percentage points relative to the reference group. Both estimates of the interaction effects are statistically significant at conventional levels. The results in the next column are of a similar order of magnitude. The interaction effect for individuals with low perceived ranks is 1.88 percentage points. It is -0.32 for overestimators. In qualitative terms, the coefficient estimates in the third column introducing a set of controls for personal characteristics are in line with the results in the other specifications. The interaction of downward-biased perceptions and wealth increases marginally to 1.94 percentage points, while the point estimate for overestimators is -0.32.

Note, that appendix [A.4](#) includes table [20](#), which replicates table [4](#) but using our continuous measure of misperception.

3.2 Sensitivity

The first step in appraising the sensitivity of our findings is replicating the baseline results while controlling for wealth and income (ranks) as flexibly as possible. Table [6](#) summarises this exercise. The first three columns control for wealth and income, introducing an interaction term between wealth and income. The second triple of columns substitutes the interaction term for a set of personal controls similar to those featuring in Tables [3](#) and [4](#). In the first column, we control for logarithmic net income and the CDF of wealth, as well as their interaction. Controlling for relative wealth reduces the effect of biased perceptions among underestimators substantially. According to this specification, the average additional saving among individuals that underestimate their relative wealth position is 0.42 percentage points. In contrast, the excess saving among overestimators increases relative to the specifications in Table [3](#). While the first effect is statistically significant only at the 10 percent level, the second can be distinguished from zero at the 5 percent level. The variance in biased perceptions explained by the model ranges at 0.14, according to R^2 . Note, that this specification has two major problems, as the use of the CDF instead of the (ihs) level of net wealth discards a lot of information on wealth and it does not include any personal

Table 4: Perceptions and savings: Interaction effects

	Uncond diff	OLS I	OLS II
Perceived below observed	-23.79*** (0.91)	-19.56*** (0.88)	-20.15*** (0.87)
Perceived above observed	3.35*** (0.44)	2.65*** (0.38)	2.52*** (0.40)
Perceived below observed X net wealth	2.23*** (0.09)	1.88*** (0.08)	1.94*** (0.08)
Perceived above observed X net wealth	-0.39*** (0.04)	-0.32*** (0.04)	-0.32*** (0.04)
Net wealth (ihs)	0.33*** (0.04)	0.22*** (0.03)	0.23*** (0.03)
Net eq. income (ihs)		4.57*** (0.24)	4.00*** (0.29)
Income controls	No	Yes	Yes
Personal controls	No	No	Yes
Wave fixed effects	Yes	Yes	Yes
R2	0.11	0.13	0.14
Nobs	6048	6048	6048

*Note: *** $p < 0.001$; ** $p < 0.01$; * $p < 0.05$. Multiple imputations taken into account. 100 replicate weights. All specifications feature the savings rate in percent as the dependent variable. Interaction terms are based on bias-dummies and ihs-transformed net wealth. Income refer to ihs-transformed monthly equivalent household net income. Personal controls include a second-degree age polynomial, three education dummies and seven industry dummies.*

Source: HFCS 2014, 2017 - ECB and OeNB.

controls.

In the next column, we substitute a household's tercile rank in the wealth distribution for the CDF, introducing dummy variables to distinguish between households in different terciles. Considering terciles rather than more granular measures of distributional rank ensures that the number of observations in each cell is sufficiently high. Compared to the specification in the first column, the coefficient on excess savings among underestimators increases again to 0.86 percentage points. At the same time, the effects among individuals who overestimate their rank in the net wealth distribution falls marginally. Statistically, both estimates are significant at the 1 percent level. The model fit in terms of R^2 is in the same order of magnitude as in the previous specification.

The third column also reports interactions between wealth terciles and net wealth. Thus, it is possible to investigate which part of the distribution drives the positive interaction effects from Table 4. While the association between underestimation and savings is positive but statistically insignificant in the first and third tercile of the wealth distribution, it is positive and significant in the second tercile. Among individuals with a positive bias, the positive correlation between bias and savings is driven by the first and third terciles, where the excess savings relative to unbiased individuals in the same tercile correspond to 1 percentage point and 11.15 percentage points respectively.

In an next step, column 4 reveals that controlling for other individual characteristics and the interaction between income and the CDF of wealth yields excess savings among underestimators of around 0.53 percentage points. The surplus savings of individuals with a positive bias ranges at 0.95 percentage points. Relative to the specification in the first column without personal controls, the fit of the model remains stable, increasing marginally by 1 percentage point.

Column 5 refers estimates a model with personal controls and terciles as dummy variables. Compared to to column 2, where we interact income and wealth instead of using full personal controls, we find that the coefficient among individuals who are more pessimistic about their relative wealth rank in society is larger, increasing to 1.2 percentage points. The coefficient for overestimators corresponds to 0.85 percentage points. Again, relative to the equivalent column in the first triple of Table 6, the R^2 is slightly higher at 0.14.

Finally, column 6 reports the results for the interaction effects in a model specification including personal controls. The substantive conclusion still holds. It is mostly individuals within the second tercile of net wealth who save more when they underestimate their relative wealth position. Compared to an individual in the second tercile with a correct assessment of their wealth rank, an underestimator in the second tercile will save an additional 1.64 percentage points of their income. Among respondents with

positive bias, it is still the group in the bottom and top tercile who accumulate surplus savings relative to their peers with more accurate ideas about their relative affluence. While less pronounced than in the third column, individuals in the first tercile with positively biased perceptions save almost 1 percentage point more than unbiased individuals, a result that is statistically significant at the 5 percent level. Those in the top tercile tend to save almost 11 percentage points more.

In a next step, we investigate whether the results are sensitive to the operationalisation of saving in our main specification. We appraise whether the results hold among saving households (intensive margin) only, and whether the decision to participate in positive savings is associated with perceptions. Finally, we also offer a different measure of savings. Table 5 summarises the results of this exercise, the selection of control variables paralleling that of the first column in Table 3.

In the first column, we limit the sample to households with positive monthly savings. Both statistical and economic significance of the baseline results in Table 3 do not change. Among individuals who underestimate their relative affluence, savings exceed those of the reference group (no bias) by five percentage points. Saving respondents with upwardly biased perceptions do not differ from the reference group in statistically significant orders of magnitude. The second column refers to a logit model. The outcome variable is an indicator distinguishing households who save from those with no monthly savings. The coefficient on underestimating one's rank in the wealth distribution is positive and statistically significant at conventional levels. Underestimators have 1.19 times the odds of being savers relative to individuals in the unbiased group. There is no effect among respondents who think they rank high compared to their position in the distribution of net wealth as measured by netting out household assets and liabilities. The final column of Table 5 tests for our finding's sensitivity to the measurement of the savings rate. Instead of summing debt repayments and self-declared monthly savings before dividing by disposable monthly net income, this specification rests on a savings measure constructed with the consumption variables in the HFCS. We aggregate monthly household expenses including rent, utilities, food and alimony payments, ignoring spending on consumer durables and payments for loan repayments and home improvement. Leaving the denominator of the savings rate unchanged, the alternative savings measure follows from the residual of consumption and disposable monthly net income. Compared to the baseline specification, the measurement of the savings rate affects our findings. The excess saving among underestimators almost triples. In contrast, the difference in savings behaviour between the reference group and individuals with positively biased perceptions of their ranking in the wealth distribution is remarkably stable. Both groups do not differ much in terms of savings. In terms of fit, the specification in the third column outperforms the other models ($R^2 = 0.12$).

Table 5: Perceptions and savings: Additional results

	Savers	Participation	Indirect savings
Perceived below observed	5.00*** (0.33)	0.17*** (0.01)	15.25*** (0.38)
Perceived above observed	0.34 (0.44)	0.01 (0.01)	0.36 (0.40)
Wealth and income controls	No	No	No
Wealth X income	No	No	No
Personal controls	No	No	No
Wave fixed effects	Yes	Yes	Yes
R2	0.04		0.12
Nobs	4522		6048

*Note: *** $p < 0.001$; ** $p < 0.01$; * $p < 0.05$. Multiple imputations taken into account. 100 replicate weights. The dependent variable in column 1 is the savings rate based on monthly net household income and monthly savings including debt repayment. The specification refers to the population with positive savings only. Column 2 refers to a logit model with participation in monthly saving as the dependent variable. Column 3 uses savings derived from household monthly consumption and monthly net household income as the dependent variable.*

Source: HFCS 2014, 2017 - ECB and OeNB.

Table 6: Perceptions and savings: Nonparametric models

	CDF I	Tercile I	Tercile X I	CDF II	Tercile II	Tercile X II
Perceived below observed	0.42 (0.21)	0.86*** (0.20)	0.19 (0.33)	0.53* (0.23)	1.20*** (0.23)	0.38 (0.38)
Perceived above observed	1.08** (0.22)	0.99** (0.23)	1.00** (0.27)	0.95** (0.23)	0.85** (0.22)	0.95* (0.30)
Perceived below observed X net wealth T2			1.02* (0.45)			1.24* (0.50)
Perceived below observed X net wealth T3			1.34 (2.66)			0.79 (2.50)
Perceived above observed X net wealth T2			-0.58 (0.66)			-0.95 (0.64)
Perceived above observed X net wealth T3			11.15** (3.57)			10.97** (3.67)
Income controls	Yes	Yes	Yes	Yes	Yes	Yes
Wealth X income	Yes	Yes	Yes	No	No	No
Personal controls	No	No	No	Yes	Yes	Yes
Wave fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
R2	0.14	0.13	0.13	0.15	0.14	0.14
Nobs	6048	6048	6048	6048	6048	6048

Note: *** $p < 0.001$; ** $p < 0.01$; * $p < 0.05$. Multiple imputations taken into account. 100 replicate weights. All specifications feature the savings rate in percent as the dependent variable. Income controls refer to *ihs*-transformed equivalent monthly household net income. Personal controls include a second-degree age polynomial, three education dummies and seven industry dummies. The first and fourth column control for the CDF of net wealth. The second and fifth column control for terciles of net wealth. Interaction terms in the third and sixth column are based on bias-dummies and tercile-dummies of net wealth.

Source: HFCS 2014, 2017 - ECB and OeNB.

3.3 An IV approach to biased perceptions

The main result points towards a strong association between savings and perceptions that individuals hold about their position in the wealth distribution. However, the result may be driven by endogeneity and therefore just delivers predictive effects. For example, reverse causality may arise if there was an additional causal mechanism by which the savings ability at a given wealth and income level makes individuals feel more or less optimistic about their relative economic position. In addition, there may be unobserved heterogeneity that correlates with misperceptions and savings behaviour. In a world with imperfect information, it can be costly to acquire information. As a result, some agents will have biased perceptions about inequality and their position in the distribution (Cruces, Perez-Truglia, and Tetaz 2013). If the individual cost of acquiring additional information correlates with both misperceptions and savings behaviour, our estimates are biased. Against the backdrop of these arguments, we propose a new instrumental variables approach designed to pinpoint the causal component within the association.

To generate random variation in misperceptions, we capitalise on a policy promoting wage transparency in Austria. Phased in between 2010 and 2014, the policy requires large firms to provide their employees with information on mean or median earnings within the firm. Since the full implementation in 2014, all firms with at least 150 employees have to break down pay information by gender and occupation. Originally, the policy was intended to promote pay transparency in order to reduce the gender pay gap.

While the policy did not affect male and female wages, separation rates fell in treated firms (Gulyas, Seitz, and Sinha 2023). As quits are strongly associated with employee perceptions about the fairness of pay schedules (Dube, Giuliano, and Leonard 2019), the fall in job separation is likely to result from employees facing a better relative pay situation than they anticipated (Gulyas, Seitz, and Sinha 2023). This is particularly the case since the within-firm perspective and the disaggregation of wages by occupations narrows down reference groups to include increasingly similar individuals. At the same time, the exemption of managerial positions from pay transparency requirements may add to more positive perceptions of treated individuals' relative economic position.

Our instrument is based on the idea that individuals treated individuals will tend to overestimate their relative wealth position. The argument requires agents to extrapolate from their ranking in the income distribution to their rank in the wealth distribution. Figure 4 in the Appendix shows that this is true, even though biased perceptions regarding the wealth distribution are larger in absolute terms.

Since the HFCS does not include data on the number of employees in a respondent's workplace, we match data on the prevalence of large firms at the district level to the survey. Prevalence is measured as the share of firms

with at least 100 employees relative to all firms with a positive number of employees in 113 different geographical units.⁴ Therefore, the instrument is relevant if respondents in regions with higher treatment intensity have more optimistic perceptions about their rank in the wealth distribution. At the same time, the instrument satisfies the exclusion restriction if firm size does not directly affect savings of individuals. As business owners in regions with a high share of large firms may also save more due to their ownership of larger firms, we limit the sample to individuals without business wealth. Moreover, we believe that this sample restriction is necessary since the self-employed were not subject to the pay transparency law by definition.

The IV specifications in our IV regressions are most similar to the second column of the baseline results in Table 3. However, we measure misperceptions on a continuous scale to capture the magnitude of bias rather than collapsing the variable into categories. At the same time, we add a regional dummy variable for each federal state.

Table 7 presents the results of the IV approach. It does not feature coefficients on control variables. The first column reports the coefficient where we instrument misperceptions. The coefficient implies that a one decile increase in the bias (where positive and negative values represent over- and underestimation respectively) leads to a 2.31 percentage point decrease in savings. Column 2 presents the first stage with the magnitude of bias as the regressand. The number of observations increases, since the second column includes data from the first wave of the HFCS. The interaction terms in Table 7 summarise the effect of firm size on the dependent variable for each survey wave separately. Crucially, there is no relationship between the share of large firms and biased perceptions in the first survey wave. The point estimate of the corresponding coefficient amounts to 1.54. In statistical terms, the point estimate is not significantly different from zero. However, in subsequent waves, a strong association between perceptions and the treatment intensity exists. Both interaction effects between wave dummies and the share of large firms are large and statistically significant at conventional levels. Both estimates suggest that a one percentage point increase in the share of large firms in a respondent's district is associated in an 0.2 to 0.3 decile increase in the magnitude of bias. The final column provides tentative evidence on the exclusion restriction. The dependent variable is the savings rate.⁵ The coefficient estimates refer to the relationship between

⁴The district level data on firm size comes with two limitations. Firstly, we cannot measure the share of firms which are exactly above the threshold of 150 employees. The measure of treated firms will therefore slightly overstate the true share of treated firms. Secondly, no data on firm size by district is available for the year 2010. Since we use the 2010 wave of the HFCS with the 2011 data on firms to demonstrate that the instrument has no direct effect on savings and misperceptions before the introduction of pay transparency, we discuss this limitation in detail in the Appendix.

⁵Providing estimates for 2010 requires reliance on the savings measure constructed from consumption data introduced in Subsection 3.2

Table 7: Perceptions and savings: Instrumental Variables

	IV	First stage	Exclusion
Bias	-2.31*** (0.38)		
Large firm share		1.54 (4.29)	-4.79 (24.59)
Large firm share X 2014		28.30*** (5.06)	-312.82*** (37.37)
Large firm share X 2017		21.74*** (4.17)	-226.29*** (34.71)
Wealth and income controls	Yes	Yes	Yes
Wealth X income	No	No	No
Personal controls	No	No	No
Wave fixed effects	Yes	Yes	Yes
Nobs	6048	8381	8381
R2		0.31	0.32

*Note: *** $p < 0.001$; ** $p < 0.01$; * $p < 0.05$. Multiple imputations taken into account. 100 replicate weights. IV refers to the coefficients from an instrumental variables regression, where perceptions are instrumented. The instrument is the share of firms with at least 100 employees by region (Large firm share). The corresponding first stage is labelled First stage. The dependent variable in the first column is the savings rate, while it is the magnitude of perception bias in the second. The final row has savings based on the consumption variables as a dependent variable. Households with business wealth excluded.*

Source: HFCS 2010, 2014, 2017 - ECB and OeNB and Arbeitsstättenzählung 2011, abgestimmte Erwerbsstatistik 2014, 2017 - Statistics Austria

the savings rate and the share of large firms. Again, there is no statistically significant effect of firm size at the district level and the savings rate in 2010. In contrast, the coefficients on firm size are significant both in statistical and economic terms in the 2014 and 2017 wave of the HFCS after the phasing-in of the pay transparency law. For example, in 2014, a one percentage point increase in the share of large firms in a given district is associated with a 3.13 percentage point decrease in the savings rate.

Overall, the results in Table 7 suggest that the introduction of pay transparency creates a relationship between the prevalence of large firms at the district level and both misperceptions and household savings behaviour. Therefore, the large firm share at the district level is a good indicator of treatment intensity. Using this variable as an instrument, the results suggest that the effect of biased perceptions on savings remains large and significant.

4 Summary remarks

The savings decision of the consumer is at the heart of macroeconomics. This paper sheds light on a vital yet often overlooked aspect of this decision, namely individuals' subjective perceptions.

Our findings illuminate a significant disparity between individuals' self-assessed wealth distribution ranks and objective reality, revealing a pervasive bias. More strikingly, this bias manifests substantial implications for economic behavior. Those underestimating their wealth rank exhibit a savings rate approximately 50% higher than their counterparts with accurate self-assessments. In the continuous case underestimating ones wealth rank by 1 wealth decile goes along with a 0.8 percentage point lower savings rate. These findings persist even after accounting for various household and individual characteristics and employing diverse functional forms. However, as the common support of underestimators and overestimators with regard to the wealth rank is sparse, our regression results to establish these predictive effects rest on strong extrapolation outside the common support.

To deal with the issue of common support and at the same time identify the causal part of this effect, we introduced a novel instrumental variable approach, capitalizing on the implementation of a wage transparency law. This approach is less sensitive to the limitations imposed by sparse common support, as it only rests on the differences in relative wealth perceptions explainable by the transparency policy. We establish a causal effect of similar magnitude, namely 2.3 percentage points lower savings rate for one decile of higher self-perception in the wealth distribution.

Our insights challenge existing macroeconomic models, advocating for the inclusion of perceived distributions alongside measured ones. We emphasize the need for macroeconomic models to recognize that individual decisions are rooted in subjective realities. Our predictive effects can be used to inform macroeconomic models and help them to incorporate wealth perceptions into their frameworks. Our causal estimates allow to quantify the effects on savings for any change in relative wealth rank perceptions which can be triggered by a large set of potential policies and other social- and economic phenomena.

At the microeconomic level, we contribute to our understanding of social comparisons. Additionally, our work aligns with theoretical models that incorporate (relative) wealth in utility functions, providing empirical support for the relevance of these models.

While perceptions of relative affluence are certainly driven by demographics and individual personal traits, they are likely to evolve looking forward. Trends in residential segregation are likely to amplify the bias towards the middle. At the same time, the rise of social media and AI may provide an even stronger amplifier of biased beliefs. Online echo chambers allow individuals to select into groups of like-minded people with potentially similar economic backgrounds, giving homogeneous groups the opportunity to exchange views and perceptions. This behaviour is facilitated by content algorithms matching individuals with information and other agents based on prior information about background, preferences and behaviour.

Our contributions have far-reaching implications for policymakers. The

existence of biased wealth perceptions opens avenues for targeted information treatments to influence macroeconomic trends and monetary policy transmission mechanisms. The determinants of savings rates and marginal propensities to consume are central to the transmission mechanism of monetary policy. Fiscal stimuli may also be more effective if paired with policies that aim at giving agents a better sense of their actual position in the wealth distribution.

Our analysis points out several avenues for future research. Most importantly, it would be interesting to study the implication of biased perceptions in view of other economic choices. This includes portfolio choice or labour market outcomes. In addition, our causal analysis could be supplemented by laboratory experiments to further explore heterogeneous treatment effects, for example. This would be particularly useful in view of designing policies that aim at alleviating bias in wealth rank perceptions.

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A Appendix

A.1 Descriptive statistics

The HFCS provides core and derived variables. The derived variables include a measure of net wealth, where debt is subtracted from total household assets. Table 8 offers descriptive statistics for both net wealth and total assets for the 2010, 2014 and 2017 waves of the HFCS. In addition to means, the table provides the Gini index, net wealth at different cutoff points of the distribution, where q50 refers to the median. Moreover, Table 8 summarises quantile ratios, as well as the mean-to-median ratio (mmratio).

The following tables illustrate the number of observations that fall into each decile of the income and wealth distribution for each type of perception bias, and therefore illustrate our problem with common support. Table 9 reports the number of individuals who underestimate their relative affluence by wealth (rows) and income (columns) decile in the 2017 wave of the HFCS, averaged across implicates. Tables 10 and 11 replicate this exercise for the group of individuals who assess their wealth rank correctly and overestimate it, respectively.

Next, Tables 12 to 14 report the weighted mean savings rate in each of these groups broken down by deciles of the income and wealth distribution.

Tables 15 to 17 replicate similar results, substituting mean values for the median in each group.

A.2 Additional Results

Table 18 presents OLS-regression results of the difference between perceived and computed rank in the wealth distribution. The dependent variable is the same in each model. The models differ simply in the regressors. The first specification "Resources" presents results for a combination of resource measures (wealth, income), leaving out some combinations that proved less relevant (such as higher order polynomials of income). It turns out that a third order polynomial of net wealth performs well in explaining differences in biased perceptions. All terms are statistically significant. In terms of the R^2 , the regression model in the first column can explain around 0.41 of the variation in biased perceptions.

Column 2 presents the estimates for a similar model, where we substitute the resource measures for control variables related to household and individual demographic characteristics and employment-related variables. A third-order age polynomial plays a key role as an explanatory factor. In addition, individuals born in Austria tend to be more prone to underestimate their relative position in the wealth distribution. Moreover, as household size increases, underestimation becomes a more prevalent phenomenon, while the opposite holds for an increasing number of dependent children. In view of employment characteristics, being employed in the first

Table 8: Wealth descriptive statistics

Indicators	Net wealth	Assets
	2010	
Mean	265032.6	281778.2
p90	542163	572580.8
p75	250469.8	275038.6
Median	76445	92792.4
p25	10314.8	12271.4
p10	977.4	2452.2
gini	76.2	73.4
Ratio p90/p10	554.7	233.5
Ratio p75/p25	24.3	22.4
Ratio p90/p50	7.1	6.2
Mean to median ratio	3.5	3
	2014	
Mean	258413.7	275656.5
p90	518072.4	545515.8
p75	304572.5	334182.4
Median	85914.2	100431.6
p25	10642.4	12361
p10	994.2	2167.4
gini	73.1	70.9
Ratio p90/p10	521.1	251.7
Ratio p75/p25	28.6	27
Ratio p90/p50	6	5.4
Mean to median ratio	3	2.7
	2017	
Mean	250272.5	269038.2
p90	524783.2	550209.6
p75	274657.4	311977.8
Median	82680.6	97185.2
p25	12735.4	14393.8
p10	2004	3200
gini	73	70.9
Ratio p90/p10	261.9	171.9
Ratio p75/p25	21.6	21.7
Ratio p90/p50	6.3	5.7
Mean to median ratio	3	2.8

Note: This table provides summary statistics for net wealth and assets.

Source: HFCS 2010, 2014, 2017 - ECB and OeNB.

Table 9: Number of underestimators by wealth and income deciles

Wealth decile ↓ / Income decile →	1	2	3	4	5	6	7	8	9	10
1	0	0	0	0	0	0	0	0	0	0
2	16	13	14	6	8	1	3	4	1	0
3	11	12	14	12	10	9	6	10	4	0
4	16	14	23	23	24	20	32	20	16	5
5	19	23	17	14	17	18	25	27	33	18
6	25	19	17	29	27	21	20	23	25	25
7	13	19	18	22	23	33	31	31	20	22
8	7	10	20	22	34	23	35	31	31	29
9	10	16	11	22	22	23	32	33	38	46
10	10	7	10	17	20	19	17	31	44	84

Note: This table provides the number of observations belonging to the group of individuals who underestimate their wealth rank in each decile of the household net wealth (rows) distribution by deciles of household net equivalised income (columns). The table refers to rounded averages across implicates for the 2017 wave.

Source: HFCS 2017 - ECB and OeNB.

Table 10: Number of individuals with accurate self-perceptions by wealth and income deciles

Wealth decile ↓ / Income decile →	1	2	3	4	5	6	7	8	9	10
1	67	21	17	11	8	6	1	2	2	1
2	20	19	23	7	11	4	4	1	1	1
3	6	10	17	19	18	19	24	10	7	5
4	4	8	12	8	7	9	17	9	6	1
5	3	2	5	8	6	4	8	8	13	14
6	0	1	1	2	5	1	3	5	7	6
7	0	1	0	2	3	1	5	4	5	6
8	0	0	0	0	1	1	1	0	1	3
9	0	0	0	0	0	0	0	0	1	1
10	0	0	0	0	0	0	0	0	1	2

Note: This table provides the number of observations belonging to the group of individuals who correctly assess their wealth rank in each decile of the household net wealth (rows) distribution by deciles of household net equivalised income (columns). The table refers to rounded averages across implicates for the 2017 wave.

Source: HFCS 2017 - ECB and OeNB.

Table 11: Number of overestimators by wealth and income deciles

Wealth decile ↓ / Income decile →	1	2	3	4	5	6	7	8	9	10
1	56	45	32	22	9	12	10	9	12	3
2	23	32	32	29	25	24	12	10	5	3
3	10	13	8	18	20	24	16	13	5	6
4	2	4	4	10	6	14	14	16	15	4
5	0	2	1	5	3	11	5	7	16	9
6	0	3	0	1	1	2	1	2	5	10
7	0	0	0	0	0	1	1	0	2	3
8	0	0	0	1	0	0	0	0	0	0
9	0	0	0	0	0	0	0	0	1	0
10	0	0	0	0	0	0	0	0	0	0

Note: This table provides the number of observations belonging to the group of individuals who overestimate their wealth rank in each decile of the household net wealth (rows) distribution by deciles of household net equivalised income (columns). The table refers to rounded averages across implicates for the 2017 wave.

Source: HFCS 2017 - ECB and OeNB.

Table 12: Mean savings rate of underestimators by wealth and income deciles

Wealth decile ↓ / Income decile →	1	2	3	4	5	6	7	8	9	10
1	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2	3.1	3.4	4.3	0	5.4	2.5	7.7	7.1	0	NA
3	7.9	6.9	6.4	3.4	11.9	5	8.1	4.2	15.6	NA
4	3.8	6	5.7	7.1	6.1	10.7	9.9	11.9	13.5	7.1
5	7.5	14.6	11.8	8.3	11.6	15.3	11.5	12.8	13.6	17.7
6	12.9	16.8	7.3	15	14.1	17.4	15.7	14.9	14.3	11.3
7	13.8	11	12.9	20.9	14.2	19	16	16.6	12.7	17.2
8	11	18.6	21	16.6	19.7	18.7	17.3	18.7	19.7	21.2
9	14	15.1	14.4	13	17.5	19.5	17.3	19.3	18.7	20
10	20.4	19.7	14.7	18.3	15.1	14.1	18.3	20.2	25	24.8

Note: This table provides the mean savings rate of individuals who underestimate their wealth rank in each decile of the household net wealth (rows) distribution by deciles of household net equivalised income (columns). The table refers to rounded averages across implicates for the 2017 wave. Survey weights taken into account.

Source: HFCS 2017 - ECB and OeNB.

Table 13: Mean savings rate of individuals with accurate self-perceptions by wealth and income deciles

Wealth decile ↓ / Income decile →	1	2	3	4	5	6	7	8	9	10
1	2.5	4.3	6	6.6	5.4	6.5	7.4	4.5	12.6	0
2	3.9	9.7	3.9	6.9	3.9	3.7	6.8	10.8	7.4	0.9
3	14.3	5.7	7.9	8.4	8.6	8.5	7.9	7.6	3	6.5
4	10.1	7.9	7.4	8.3	7.5	8.3	13.5	12.3	7.2	8.3
5	15.7	13.7	4.4	12.1	15.3	9.4	13	10.4	13.2	15
6	NA	29.7	28.9	2.9	15.4	46.5	10.3	14.7	10	10.9
7	NA	16.4	NA	1.4	15.4	12	12	15.7	20	23.2
8	NA	NA	16.7	NA	0	0	12.1	NA	26.2	21.4
9	NA	NA	NA	NA	NA	NA	NA	33.3	12.8	18.2
10	NA	NA	NA	NA	NA	NA	NA	NA	30	40.2

Note: This table provides the mean savings rate of individuals who correctly assess their wealth rank in each decile of the household net wealth (rows) distribution by deciles of household net equivalised income (columns). The table refers to rounded averages across implicates for the 2017 wave. Survey weights taken into account.

Source: HFCS 2017 - ECB and OeNB.

Table 14: Mean savings rate of overestimators by wealth and income deciles

Wealth decile ↓ / Income decile →	1	2	3	4	5	6	7	8	9	10
1	4.8	6.2	6	4	8.5	11.2	12	12.3	10.7	14
2	2.4	8.9	4.2	4.9	4.2	5.4	4.9	6.6	9.3	4.4
3	8.7	7.2	6.6	11.3	11.9	12	9.9	4.9	14.3	10.5
4	12.4	31.6	8.4	12	9.7	13.2	8.9	6.4	14.6	7.3
5	NA	4.4	7.7	22	10.2	14	8.5	14.3	13.3	9.8
6	NA	19.2	NA	6.8	10	23.8	12.4	25.7	9.2	9.2
7	NA	NA	NA	NA	0	7.7	18.2	NA	15.6	28.6
8	NA	NA	NA	55.9	NA	NA	NA	NA	NA	NA
9	NA	NA	NA	NA	NA	NA	NA	NA	35	NA
10	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Note: This table provides the mean savings rate of individuals who overestimate their wealth rank in each decile of the household net wealth (rows) distribution by deciles of household net equivalised income (columns). The table refers to rounded averages across implicates for the 2017 wave. Survey weights taken into account.

Source: HFCS 2017 - ECB and OeNB.

Table 15: Median savings rate of underestimators by wealth and income deciles

Wealth decile ↓ / Income decile →	1	2	3	4	5	6	7	8	9	10
1	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2	0	0	0.4	0	0	2.9	7.2	7.2	0	NA
3	1.1	7.6	7.3	3	8.4	0	3.8	0	8.9	NA
4	0	6.4	3.9	5.5	5.1	11.6	8.1	8.1	5.5	7.1
5	0	8.8	9.9	7.3	8.6	13.5	9.5	12.6	12.8	14.6
6	9.1	16.4	1.5	11.7	10.9	11.9	14.1	13.5	12.5	10.6
7	9	3.7	11.4	12.4	10.5	13.6	14.7	16.6	11.9	15
8	11.9	17.1	16.7	14.3	17.2	16.9	16	14.1	18.8	21.4
9	17.2	14	12.4	10.5	16.1	16.8	15.6	11.5	16.5	17.4
10	24	15.9	14.3	15.4	10.6	11.5	11.3	16.9	20	21.4

Note: This table provides the median savings rate of individuals who underestimate their wealth rank in each decile of the household net wealth (rows) distribution by deciles of household net equivalised income (columns). The table refers to rounded averages across implicates for the 2017 wave. Survey weights taken into account.

Source: HFCS 2017 - ECB and OeNB.

Table 16: Median savings rate of individuals with accurate self-perceptions by wealth and income deciles

Wealth decile ↓ / Income decile →	1	2	3	4	5	6	7	8	9	10
1	0	0	0	0	0	0	7.4	2.3	24	0
2	0	3.4	3.9	4.7	0	2.9	5.1	8.5	7.4	0.9
3	15.5	4.6	0.8	7.1	6.9	5.9	8	8	1.8	5.7
4	5.6	8.4	7.6	6.9	6.9	7	11.1	11.9	5.6	6.7
5	13.4	10.5	5	10.8	12.7	8.7	13.9	8	10.1	11.3
6	NA	29.6	28.9	2.1	12.8	50	10.7	12.8	8.1	8.8
7	NA	18.2	NA	0	8.7	8	9.4	10	18.6	21.7
8	NA	NA	16.7	NA	0	0	12.1	NA	26.2	23.7
9	NA	NA	NA	NA	NA	NA	NA	33.3	12.8	18.2
10	NA	NA	NA	NA	NA	NA	NA	NA	30	57.1

Note: This table provides the median savings rate of individuals who correctly assess their wealth rank in each decile of the household net wealth (rows) distribution by deciles of household net equivalised income (columns). The table refers to rounded averages across implicates for the 2017 wave. Survey weights taken into account.

Source: HFCS 2017 - ECB and OeNB.

Table 17: Median savings rate of overestimators by wealth and income deciles

Wealth decile ↓ / Income decile →	1	2	3	4	5	6	7	8	9	10
1	0	0	0	0.8	7.6	6.3	7	12.2	10.8	11.8
2	0	6.7	0.4	4.3	0	0.6	5.3	1.9	12	3
3	8.5	7.1	7.1	10.3	8.9	10.8	9.9	3.4	13.4	9.4
4	14.5	36.4	10.6	8	11.8	6.2	7.4	6.7	11.6	8.4
5	NA	5	7.7	11.3	6.5	11.6	7.5	9	10.4	9.4
6	NA	16.3	NA	5.1	10	26.3	12.1	24.4	9	8.8
7	NA	NA	NA	NA	0	7.7	18.2	NA	12.8	27.2
8	NA	NA	NA	55.9	NA	NA	NA	NA	NA	NA
9	NA	NA	NA	NA	NA	NA	NA	NA	35	NA
10	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Note: This table provides the median savings rate of individuals who overestimate their wealth rank in each decile of the household net wealth (rows) distribution by deciles of household net equivalised income (columns). The table refers to rounded averages across implicates for the 2017 wave. Survey weights taken into account.

Source: HFCS 2017 - ECB and OeNB.

place is associated with an overestimation of one's household in the wealth distribution, a relationship which is significantly weaker for individuals in temporary contracts. All ISCO-dummies are statistically significant at conventional levels. The association between working in an ISCO 4 occupation and negative bias in perceptions is equivalent to increasing household size by one member. In addition to occupational characteristics, industry-level indicators also systematically vary with the bias in perceptions.

The third column documents the explanatory purchase of subjective variables, including expectations. As trust increases by one unit on a Likert-scale from 1 to 10, positive bias by 0.06. The opposite is true for time preferences. People who care more about the future are those more prone to underestimation. Compared to the absolute magnitude of risk aversion, though, these effects are more limited. A one-point decrease in risk aversion on a 1 to 10 scale (1 being high risk aversion) is associated with an increase in the bias, as underestimation becomes more prevalent. Regarding income expectations, more optimistic individuals are more likely to underestimate their relative wealth position. Individuals who believe that they can rely on their family to help them out financially are more likely to overestimate their rank in the wealth distribution.

The fourth column combines all regressors from the previous three columns. By definition, R^2 is at its maximum in this column, reaching a level of 0.46. However, compared to the model in column 1, the additional variation explained by demographics, employment characteristics and behavioural traits is limited. In terms of statistical significance, demographic and behavioural variables maintain their relevance in large parts. At the same time, many of the occupational and industry dummies lose some of their explanatory power.

The variable selection in the last column is based on a best subsets regression for the 15 most powerful predictors among all predictors employed in experimenting with the other models in Table 18. Therefore, some additional variables not represented in the previous columns feature here. In the spirit of the results in the fourth column, the best subsets regression suggests that resources, along with some demographic variables and behavioural traits are most important in explaining biased perceptions of one's rank in the distribution of wealth.

Overall, the results point towards a strong relationship between resources (income and wealth) and biased perceptions. However, this may partly result from reverse causality: Underestimating one's own wealth rank is associated with higher savings, which contribute to wealth accumulation in turn. Beyond income and wealth, demographic characteristics play a major role in shaping misperceptions - including household composition. The finding that individuals in larger households feel less wealthy squares well with recent research on economies of scale for household wealth (Rapp 2023). Finally, behavioural variables such as trust have strong predictive

power regarding perceptions of distributional ranking.

A.3 Biased perceptions of wealth and income ranks

Data from the first wave of the HFCS (2010) allows comparing perceptions of relative wealth with respondents' assessments of their position in the income distribution. Figure 4 explores the relationship between income and wealth rank perceptions. We grouped observations by the magnitude of bias in both income and wealth rank perceptions (ranging from -9 to +9). The colour and size of the bubbles refers to the weighted number of households in each group. The graph implies that a correlations exists between both types of bias. At the same time, biased perceptions of households' relative ranks in the distribution of wealth are more pronounced.

Figure 4: Missperceptions income versus wealth



Note: This graph illustrates the correlation of biased distributional rank perceptions in terms of income and wealth. Respondents are grouped by the magnitude of their bias in terms of net wealth and net monthly income rank. The size and color of the bubbles indicate the number of households in each group. Multiple imputations and survey weights are taken into account.

Source: HFCS 2010 - ECB and OeNB.

A.4 Results with continuous bias

Here, we present the results of the main specifications, drawing on a different operationalisation of biased perceptions. Rather than grouping individuals

Table 18: Determinants of biased perceptions

	Resources	Demographic	Traits	All	Optimal
(Intercept)	-3.40** (0.88)	0.29 (0.18)	-2.17*** (0.12)	-5.28*** (0.85)	-3.07** (0.85)
poly(wlth_net, 3)1	-23.85* (11.77)			-22.22* (11.06)	-22.65* (11.10)
poly(wlth_net, 3)2	45.48*** (12.03)			41.04*** (10.79)	41.67*** (10.91)
poly(wlth_net, 3)3	-37.72* (15.48)			-34.24* (14.68)	-35.00* (14.70)
ihs(wlth_net)	0.21 (0.12)			0.18 (0.12)	0.20 (0.12)
ihs(ahi0710)	0.51** (0.12)			0.80*** (0.11)	0.83*** (0.11)
syear2017	0.19*** (0.04)	0.11* (0.05)		0.12** (0.04)	
ihs(wlth_net):ihs(ahi0710)	-0.05* (0.02)			-0.05* (0.02)	-0.05* (0.02)
poly(dhageh1, 3)1		-57.54*** (1.20)		-20.27*** (1.87)	
poly(dhageh1, 3)2		21.69*** (1.03)		16.76*** (1.27)	
poly(dhageh1, 3)3		5.13*** (1.21)		-2.78** (0.93)	
dhgenderh1		0.11* (0.04)		0.12*** (0.02)	
dem_birthAT		-0.82*** (0.06)		-0.30** (0.07)	-0.31** (0.07)
dem_hhsize		-0.76*** (0.03)		-0.44*** (0.04)	-0.45*** (0.03)
dem_kidsdep		0.53*** (0.03)		0.31*** (0.04)	0.31*** (0.03)
dem_partnered1		-0.27*** (0.04)		-0.01 (0.04)	
dem_single1		-0.37*** (0.04)		-0.18*** (0.03)	
emp_isco.2		-0.30*** (0.07)		0.21*** (0.05)	
emp_isco.3		-0.32** (0.08)		0.20* (0.08)	
emp_isco.4		-0.76*** (0.08)		0.07 (0.09)	
emp_isco.0		0.59*** (0.12)		0.22 (0.11)	
emp_nace.Agriculture..Forestry		-1.41** (0.40)		-0.64* (0.25)	
emp_nace.Mining..Manufacturing		-0.14* (0.05)		-0.10* (0.04)	
emp_nace.Construction		0.09 (0.10)		0.05 (0.06)	
emp_nace.Wholesale..Retail..Ac		0.21*** (0.04)		0.18*** (0.04)	
emp_nace.Transportation..Infor		0.46*** (0.08)		0.19* (0.08)	
emp_nace.Financial.and.Insuran		-0.58*** (0.08)		-0.16 (0.09)	
emp_nace.Real.Estate..Renting.		0.39*** (0.06)		0.40*** (0.06)	
emp_employ1		0.76*** (0.08)		0.14 (0.10)	0.13* (0.05)
emp_temp		-0.32** (0.11)		-0.35* (0.13)	
beh_trust			0.06*** (0.01)	0.05*** (0.01)	0.05*** (0.01)
beh_incxp			0.21*** (0.02)	0.18*** (0.02)	0.17*** (0.02)
beh_risklove			-0.21*** (0.02)	-0.20*** (0.01)	-0.17*** (0.02)
beh_timeP			-0.03*** (0.01)	0.01* (0.01)	
p_familysupport			0.69*** (0.04)	0.05 (0.03)	
dhageh1					-0.05*** (0.00)
dhageh1.3					0.00*** (0.00)
R2	0.41	0.20	0.02	0.46	0.45
Nobs	6048	6048	6048	6048	6048

Note: *** $p < 0.001$; ** $p < 0.01$; * $p < 0.05$. Multiple imputations taken into account. 100 replicate weights. The dependent variable is the magnitude of bias in real numbers

Source: HFCS 2014, 2017 - ECB and OeNB.

Table 19: Perceptions and savings: Main results with continuous bias

	Uncond diff	OLS I	OLS II
Perception bias	-1.09*** (0.03)	-0.77*** (0.04)	-0.80*** (0.04)
Net wealth (ihs)		0.13*** (0.02)	0.15*** (0.02)
Net eq. income (ihs)		6.27*** (0.28)	5.51*** (0.32)
Wealth and income controls	No	Yes	Yes
Personal controls	No	No	Yes
Wave fixed effects	Yes	Yes	Yes
R2	0.05	0.09	0.10
Nobs	6048	6048	6048

*Note: *** $p < 0.001$; ** $p < 0.01$; * $p < 0.05$. Multiple imputations taken into account. 100 replicate weights. All specifications feature the savings rate in percent as the dependent variable. Positive bias means overestimation, while negative bias is underestimation. Income and wealth controls refer to ihs-transformed household net wealth and monthly equivalent household net income. Personal controls include a second-degree age polynomial, three education dummies and seven industry dummies.*

Source: HFCS 2014, 2017 - ECB and OeNB.

by the direction of bias into those who underestimate their position, as opposed to overestimators and respondents with accurate perceptions, we measure bias on a continuous scale in in Tables 19 and 20.

A.5 Instrumental variables with leading values

Statistics Austria only provides data on enterprise demography from 2011 onward. To show that our instrument has no direct impact on savings and missperceptions prior to the reform, we merge the 2011 district-level data to the 2010 data from the HFCS. Due to the high persistence of the share of large firms in each district across time, we are confident that the 2011 data is a sufficiently good proxy for the missing 2010 information. Table 21 provides evidence for this argument. It replicates the results from Table 7, substituting not only the 2010 data for its leading values, but also using 2018 and 2015 data with the 2017 and 2014 HFCS waves respectively. The IV estimate in the first column does not change substantially (increasing from -2.31 to -2.17 compared to the estimates of Table 7). The same holds for the other two specifications, appraising the effect of firm size on savings and missperceptions before and after the reform. The coefficients maintain their signs, order of magnitude and statistical significance when compared to the results presented in Section 3.3.

Table 20: Perceptions and savings: Interaction effects

	Uncond diff	OLS I	OLS II
Perception bias	1.56*** (0.17)	1.00*** (0.15)	0.92*** (0.16)
Perception bias X net wealth	-0.18*** (0.01)	-0.14*** (0.01)	-0.14*** (0.01)
Net wealth (ihs)	0.53*** (0.03)	0.33*** (0.03)	0.35*** (0.03)
Net eq. income (ihs)		5.56*** (0.23)	4.90*** (0.27)
Income controls	No	Yes	Yes
Personal controls	No	No	Yes
Wave fixed effects	Yes	Yes	Yes
R2	0.08	0.11	0.11
Nobs	6048	6048	6048

Note: *** $p < 0.001$; ** $p < 0.01$; * $p < 0.05$. Multiple imputations taken into account. 100 replicate weights. All specifications feature the savings rate in percent as the dependent variable. Positive bias means overestimation, while negative bias is underestimation. Interaction terms are based on bias-dummies and ihs-transformed net wealth. Income controls refer to ihs-transformed monthly equivalent household net income. Personal controls include a second-degree age polynomial, three education dummies and seven industry dummies.

Source: HFCS 2014, 2017 - ECB and OeNB.

Table 21: Perceptions and savings: Instrumental Variables

	IV	First stage	Exclusion
Bias	-2.17*** (0.37)		
Large firm share		1.56 (4.30)	-3.62 (24.59)
Large firm share X 2014		29.38*** (4.83)	-292.49*** (37.91)
Large firm share X 2017		20.59*** (4.16)	-226.60*** (35.33)
Wealth and income controls	Yes	Yes	Yes
Wealth X income	No	No	No
Personal controls	No	No	No
Wave fixed effects	Yes	Yes	Yes
Nobs	6048	8381	8381
R2		0.31	0.32

Note: *** $p < 0.001$; ** $p < 0.01$; * $p < 0.05$. Multiple imputations taken into account. 100 replicate weights. IV refers to the coefficients from an instrumental variables regression, where perceptions are instrumented. The instrument is the share of firms with at least 100 employees by region (Large firm share). The corresponding first stage is labelled First stage. The dependent variable in the first column is the savings rate, while it is the magnitude of perception bias in the second. The final row has savings based on the consumption variables as a dependent variable. Households with business wealth excluded.

Source: HFCS 2010, 2014, 2017 - ECB and OeNB and Arbeitsstättenzählung 2011, abgestimmte Erwerbsstatistik 2015, 2018 - Statistics Austria

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