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Interest rate uncertainty and savings: evidence from microdata

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Abstract
This paper studies the effect of interest rate uncertainty on savings using microdata from the Survey of Consumer Finances 1989-2016. We find that, moving across the distribution of labor income, average wealth increases while interest rate uncertainty tends to fall. Strikingly, average wealth of top 10% labor income earners is on average twenty-fold larger than that of individuals belonging to the bottom 10% of the labor income distribution. Finally, savings reduce when interest rate is more uncertain. This suggests that an insurance policy against interest rate uncertainty would lead to an increase in aggregate capital stock.

Keywords: interest rate uncertainty, precautionary savings, Survey of Consumer Finances, quantile regression
JEL Classification Codes: C23, D31, E21

1. Introduction

Rising wealth inequality greatly concerns policymakers, and taxes are shown to be a promising policy to halt this trend (Benhabib et al., 2011; Aoki and Nirei, 2016; Kaymak and Poschke, 2016; Nguyen and Khieu, 2020; Khieu and Nguyen, 2020; Khieu, 2024). Furthermore, idiosyncratic interest rate risk is shown to be the main driver of the fat right tail of the wealth distribution (Benhabib et al. (2011)). This suggests that insurance against interest rate uncertainty would also be a promising wealth-inequality-reducing policy.
However, since this insurance policy reduces interest rate uncertainty, it would have an impact on saving behavior of households. Using a neoclassical growth model featuring uninsured idiosyncratic investment risk, Angeletos (2007) shows that idiosyncratic investment risk can have significant negative effects on aggregate savings. Eeckhoudt and Schlesinger (2008) however argue that the impact of interest rate uncertainty on savings depends on the interaction between a precautionary effect and a substitution effect. When the substitution effect is stronger,

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lower (higher) interest rate uncertainty would lead to higher (lower) savings. Using microdata from the Survey of Consumer Finances 1989-2016, our paper aims to test the theoretical prediction by Angeletos (2007) and to provide empirical evidence for the prediction by Eeckhoudt and Schlesinger (2008) on the dominant channel of the effect of interest rate uncertainty on savings. The result is useful for quantitative analysis of the Pareto-improving redistribution of wealth through an insurance policy against interest rate uncertainty.

The rest of this paper is organized as follows. Section 2 describes the data and presents the estimation strategy. Section 4 discusses the main results, and Section 5 concludes.

2. Methods

We estimate the following fixed effects model

$$\ln(AVGWEALTH_{it}) = \alpha + \beta_1 \ln(AVGINT_{it}) + \beta_2 \ln(INTU_{it}) + \gamma WAGEGINI_t + q_i + f_t + \varepsilon_{it}, \quad (1)$$

where $AVGWEALTH_{it}$, $AVGINT_{it}$ and $INTU_{it}$ are the average wealth, mean interest rate, and interest rate uncertainty, respectively, of a sub-sample between the $(i-1)$th percentile and the ith percentile of the distribution of labor income in year t. As we work with the logarithm of wealth, wealth is normalized such that it is strictly positive.[1] We use the standard deviation (STD), the coefficient of variation (CV), and the dispersion index (DISP) to measure interest rate uncertainty faced by individuals whose labor income is between the $(i-1)$th percentile and the ith percentile of the distribution. We use q_i and f_t to capture the fixed percentile and time effects, respectively. The control variable $WAGEGINI_t$ represents the Gini coefficient capturing inequality over the entire distribution of labor income in year t. As we consider the average wealth and interest rate uncertainty at each percentile of the distribution of labor income, labor income uncertainty is controlled.[2]

The moments used in the regression equation (1) are derived from corresponding distributions, which can be obtained from a microdata survey. Let us first define *wealth* as the difference between total asset and total debt. When wealth is negative, the household is in (net) debt. Stock of savings and wealth are of analogy in our analysis. *Labor income* represents total wage and salary income. *Interest rate* (the rate of return on wealth) of individual j in year t is given b

y

$$r_{jt} = \frac{Y_{jt}}{A_{jt}} \quad (2)$$

where Y_{jt} represents capital income and A_{jt} stands for total assets (or gross wealth). Following Fagereng et al. (2020), we express the dollar yield on wealth as a share of total assets to guarantee that the sign of the rate of return depends on that of the yield only (and not on that of wealth). Doing so also avoids infinite interest rate associated with zero wealth or positive

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[1] We add a constant positive amount to the wealth level of each household.

[2] We remove individuals with zero labor income. Iacono and Ranaldi (2020) employ a similar model to control the wealth effect when they estimate the effect of the unemployment rate on wages.

interest rate associated with negative capital income and negative wealth.[3] Capital income is given by

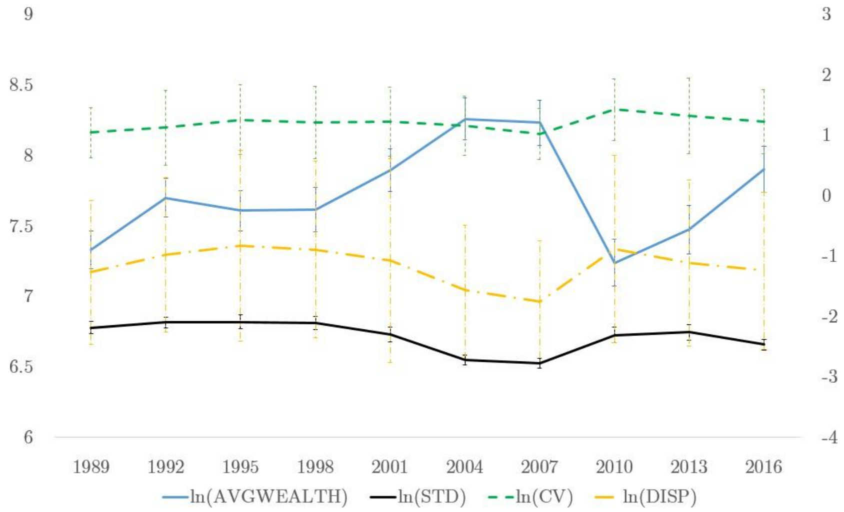
$$Y_{jt} = y^{b}_{jt} + R_{jt} + D_{jt} + G_{jt} - B_{jt}, \tag{3}$$

where y^b, R_{jt}, D_{jt}, G_{jt}, and B_{jt} represent *income* from business, sole proprietorship, and farm, *interest* (taxable and nontaxable), *dividend income*, *capital gain (or loss)*, and *debt payments*, respectively.

3. Data

We use microdata from the Survey of Consumer Finances (SCF) 1989-2016 to extract the variables described above.[4] The SCF is a triennial cross-sectional survey of U.S. families, which includes information on families' balance sheets, pensions, income, savings, and demographic characteristics.

Figure 1. The evolution of the first and second moments of average wealth and interest rate uncertainty in log scale



Notes: Left and right vertical axes display units of average wealth and interest rate uncertainty in log scale, respectively. Error bars represent the standard deviation of the two aforementioned variables
Source: own elaboration

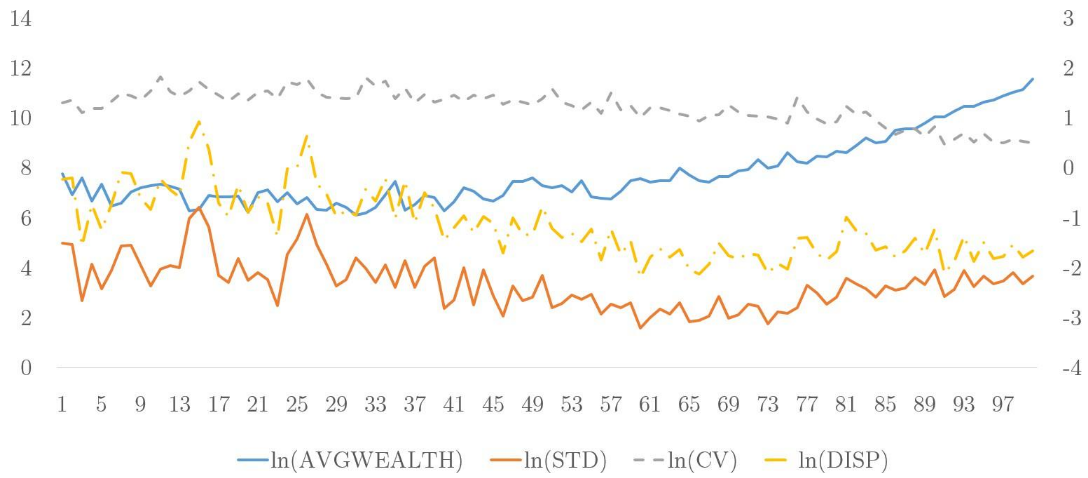
It is worth discussing the measures of uncertainty used in our empirical model. Uncertainty arises when people are unable to forecast the likelihood of events happening while risk refers to events following a known probability distribution (Knight, 1921). We indeed use a broad

[3] We find that the distribution of the interest rate in the SCF is right-skewed with a fat tail. This property is also applied to returns on US and Pacific Basin equities (Dennis, 2001).
[4] Wealth, asset, and labor and capital income are expressed in 1000 USD in prices of 2016.

definition of uncertainty and therefore a number of proxies for uncertainty. In particular, uncertainty is proxied by dispersion at the household level, and these proxies are computed based on realized real data (Bloom, 2014).[5]

Figure 1 shows the evolution of the mean values and the standard deviations of average wealth and interest rate uncertainty over time. We first observe that average wealth and its standard deviation tend to increase over the period 1989-2007. There was a significant drop in 2010, followed by a rising trend afterwards. The dynamics of three measures of interest rate uncertainty are relatively consistent. Accordingly, interest rate uncertainty tends to fall over the period 1989-2007. There was a considerable increase in 2010 as opposed to the sharp decline in average wealth. Interest rate uncertainty reduces again over the period 2010-2016. Variations of interest rate uncertainty across the distribution of labor income in each year are represented by the error bars. While interest rate uncertainty measured by the dispersion index displays the widest variations, quite modest variations are observed when using the standard deviation. The coefficient of variation exhibits moderate variations as well as a relatively stable time path of the mean value.[6]

Figure 2. Average wealth and interest rate uncertainty across the distribution of labour income



Notes: Left and right vertical axes display units of average wealth and interest rate uncertainty in log scale, respectively
Source: own elaboration

Moving across the distribution of labor income, we find that interest rate uncertainty measured by the standard deviation and the dispersion index tends to decrease between the 1st

[5] Strobel (2015) shows that uncertainty measures based on realized variables fluctuate more than the measures based on forecasts.
[6] The coefficient of variation of interest rate is greater than its standard deviation since mean interest rate is less than one.

percentile and the 60th percentile and then slightly increases over the top of the distribution (Figure 2). Compared with these two measures of interest rate uncertainty, the coefficient of variation decreases across the distribution of labor income with less noise. Average wealth tends to increase across the distribution of labor income. Particularly, it slightly rises between the 1st percentile and the 60th percentile and the surges across the rest of the distribution of labor income (Figure 2). This suggests that individuals are exposed to lower interest rate uncertainty and save more when they earn higher labor income. In particular, average wealth of individuals belonging to the top 10% of the labor income distribution is on average twenty-fold larger than that belonging to the bottom 10% (Figure 3). The ratio of average wealth of the former to that of the latter (represented by the dashed line) tends to increase over the period 2001-2016. Though average wealth of these two groups tends to rise over time, top labor income earners accumulate wealth much faster.

4. Results

All variables pass the stationarity test.[7] The main results are reported in Table 1. We use standard deviation, the coefficient of variation, and the dispersion index to measure interest rate uncertainty in models 1, 2, and 3, respectively. Interest rate uncertainty has a negative impact on average wealth. As can be seen from the table, all specifications are statistically significant and display negative coefficients. Interestingly, models 1 and 2 report an identical coefficient of in- terest rate uncertainty. Specifically, a one percent increase (decrease) in the standard deviation or the coefficient of variation of the interest rate leads to a 0.24% percent decrease (increase) in average wealth. When interest rate uncertainty is measured by the dispersion index, model 3 shows that a one percent increase (decrease) in the dispersion index of the interest rate leads to a 0.12% percent decrease (increase) in average wealth. Our finding therefore supports the quantitative theories of Angeletos (2007). In particular, our finding implies that the substitution effect of interest rate uncertainty in the tradition of Eeckhoudt and Schlesinger (2008) is em- pirically stronger than the precautionary effect. This finding has two important implications. First, it helps justify the fact that average wealth of individuals belonging to the top 10% of the labor income distribution is on average twenty-fold larger than that belonging to the bottom 10%. As can be seen from Figure 2, interest rate uncertainty at the top 10% of the labor income distribution is lower than that at the bottom 10%. Second, this finding has an important policy implication. Precisely, a policy that reduces interest rate uncertainty would have a positive ef- fect on aggregate capital stock. For example, an insurance policy against idiosyncratic returns would induce individuals to save and therefore would generate higher aggregate savings. This insurance policy would therefore generate a Pareto improvement if it helped reduce wealth inequality.[8]

[7] See Table A.2 in the appendix for more details.

[8] Khieu (2021) quantifies the effect of insurance against idiosyncratic returns on the evolution of wealth inequality and finds that a modest insurance fee of 2% of high returns implemented in year t would reduce the Gini coefficient in year $t + 10$ by 20%.

Our estimation result supports speculative saving hypothesis, i.e. higher expected rate of return induces higher saving. Specifically, all models display positive coefficients of mean interest rate though some of them are statistically insignificant. Labor income inequality has a positive effect on average wealth since all specifications are statistically significant and report positive coefficients. This result supports the theory of precautionary savings. When labor income is more unequally distributed, this implies higher income uncertainty. Individuals save more to self-insure against the income uncertainty.

Figure 3. Dynamics of average wealth of top 10% and bottom 10% labour income earners

Notes: The left vertical axis expresses the unit of average wealth in 1000 USD. The right vertical axis displays the value of the ratio of average wealth of top 10% labour income earners to that of individuals belonging to the bottom 10%
Source: own elaboration

Thus, interest rate uncertainty, in addition to speculative and precautionary saving channels, explains wealth differentials across the distribution of labor income. To check the robustness of our results, we run different panel-data mean group estimations. We find the results consistent with those of our baseline estimation.9

Our analysis works on an assumption that needs to be discussed here. While individuals anticipate interest rate changes and make saving (investment) decisions before returns are realized, the moments of interest rate used in our analysis are computed based on the realizations. This approach of deriving uncertainty based on realized real data has been used widely in the literature (Dorofeenko et al., 2014; Chugh, 2016; Bloom et al., 2018). Compared to the approach based on forecast data, Strobel (2015) shows that the real data based approach generates higher uncertainty. We use the real data based approach since the other approach heavily relies on the quality of forecasting methods.

Table 1. Estimation results

		Model (1)	Model (2)	Model (3)
	ln(STD)	-0.240***		
		[-3.56]		
ln(INTRISK)	ln(CV)		-0.240***	
			[-3.56]	
	ln(DISP)			-0.120***
				[-3.56]
ln(AVGINT)		0.287***	0.047	0.167
		[3.52]	[1.20]	[3.06]
WAGEGINI		8.599***	8.599***	8.599***
		[4.58]	[4.58]	[4.58]
Year effect		Yes	Yes	Yes
Percentile effect		Yes	Yes	Yes
R-squared (%)		78.91	78.91	78.91
F-statistics		14.13***	14.13***	14.13**

Notes: The symbols *, **, and *** indicate 10%, 5%, and 1% significance level, respectively. The t-statistics based on heteroskedasticity are reported in square brackets.
Source: own elaboration

5. Concluding remarks

We provide empirical evidence supporting the quantitative theories of the effect of interest rate uncertainty on aggregate savings (Angeletos (2007) and Eeckhoudt and Schlesinger (2008)). Using microdata from the Survey of Consumer Finances 1989-2016, we find that a one percent decrease in interest rate uncertainty measured by either the standard deviation, the coefficient of variation, or the dispersion index would increase average wealth by at least 0.12%. This suggests that reducing interest rate uncertainty would have a positive impact on aggregate capital stock. While idiosyncratic interest rate risk is the main driver of the fat right tail of the wealth distribution, an insurance policy against interest rate uncertainty is expected to generate Pareto-improving redistribution of wealth. This is a fruitful area for future research.

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References

Angeletos, G. M. (2007) Uninsured idiosyncratic investment risk and aggregate saving, *Review of Economic Dynamics*, 10(1), 1–30.

Aoki, S. and Nirei, M. (2016) Pareto distribution of income in neoclassical growth models, *Review of Economic Dynamics*, 20, 25–42.

Benhabib, J., Bisin, A. and Zhu, S. (2011) The distribution of wealth and fiscal policy in

economies with finitely lived agents, *Econometrica*, 79(1), 123–157.
Bloom, N. (2014) Fluctuations in uncertainty, *Journal of Economic Perspectives*, 28(2), 153–176.
Bloom, N., Floetotto, M., Jaimovich, N., Saporta-Eksten, I. and Terry, S. J. (2018) Really uncertain business cycles, *Econometrica*, 86(3), 1031–1065.
Chugh, S. K. (2016) Firm risk and leverage-based business cycles, *Review of Economic Dynamics*, 20, 111–131.
Dennis, W. J. (2001) Limited downside risk in portfolio selection among US and Pacific Basin equities, *International Economic Journal*, 15(4), 1–39.
Dorofeenko, V., Lee, G. S. and Salyer, K. D. (2014) Risk shocks and housing supply: a quantitative analysis, *Journal of Economic Dynamics and Control*, 45, 194–219.
Eeckhoudt, L. and Schlesinger, H. (2008) Changes in risk and the demand for saving, *Journal of Monetary Economics*, 55, 1329–1336.
Fagereng, A., Guiso, L., Malacrino, D. and Pistaferri, L. (2020) Heterogeneity and persistence in returns to wealth, *Econometrica*, 88(1), 115-170.
Iacono, R. and Ranaldi, M. (2020) The wage curve across the wealth distribution, *Economics Letters*, 196, 1–5.
Kaymak, B. and Poschke, M. (2016) The evolution of wealth inequality over half a century: the role of taxes, transfers and technology, *Journal of Monetary Economics*, 77, 1–25.
Khieu, H. (2021) Investment insurance: is there pareto-improving redistribution of wealth? *mimeo*.
Khieu, H. (2024) On the distribution of lifetime wealth accumulation, *Journal of Economics*, 143, 87–100.
Khieu, H. and Nguyen, T. V. (2020) Progressive consumption tax, minimum consumption, and inequality, *Economics Letters*, 197, 109653.
Knight, F. (1921) *Risk, uncertainty, and profit,* Houghton Mifflin.
Nguyen, T. V. and Khieu, H. (2020) Does a global wealth tax reduce inequality? When Piketty meets Mankiw, *Research in Economics*, 74, 119–130.
Strobel, J. (2015) On the different approaches of measuring uncertainty shocks, *Economics Letters*, 134, 69–72.

Appendix: Stationarity test and robustness check

Table A.1. Robustness check: The different Panel Mean Group estimations

Variables	PMG	SMG	SRMG
Panel A: Long run coefficients			
ln(INTRISK)	-0.173***	-0.370***	-0.349***
	[-8.20]	[-4.07]	[-3.41]
ln(AVGINT)	1.952***	13.907***	9.190***
	[8.49]	[3.68]	[3.23]
WAGEGINI	4.989	6.144***	5.727***
	[7.35]	[4.97]	[4.19]
TREND			0.002
			[0.58]
ECC	-0.961***		
	[-18.31]		
Panel B: Short-run coefficients			
D.ln(INTRISK)	-0.139		
	[-1.47]		
ln(AVGINT)	8.706**		
	[2.06]		
D.WAGEGINI	1.641		
	[1.25]		
Constant	3.343***	1.818*	1.868*
	[16.74]	[1.85]	[1.71]

Notes: The symbols *, **, and *** indicate 10%, 5%, and 1% significance level
Source: own elaboration

Table A.2. Panel stationarity and co-integration tests

	Variables			
	ln(AVGWEALTH)	**ln(INTRISK)**	**ln(AVGINT)**	**WAGEGINI**
Panel A: Cross-sectional dependence				
Pesaran's test of cross sectional independence	T-statistics = 24.682***			
Frees' test of cross sectional independence	Frees' Q distribution = 11.214***			
Panel B: Stationary test				
Levin-Lin-Chu (No trend)	-17.317***	-13.695***	-64.133***	-27.976***
Levin-Lin-Chu (Trend)	-18.883***	-17.791***	-41.134***	-4.384***
Im-Pesaran-Shin (No trend)	-10.206***	-10.822***	-10.902***	-10.990***
Im-Pesaran-Shin (Trend)	-10.873***	-12.089***	-12.522***	-9.099***
Pesaran with cross-sectional dependence (No trend)	-2.991***	-3.379***	-2.791***	2.610
Pesaran with cross-sectional dependence (Trend)	-3.388***	-3.766***	-3.063***	1.700
Fisher Test using Phillips-Perron	714.157***	854.016***	1036.616***	585.040***
Panel C: Panel co-integration test				
Kao test without mean	Unadjusted Dickey-Fuller t-statistics = -19.545***			
Kao test without demean option	Unadjusted Dickey-Fuller t-statistics = -20.265***			
Pedroni test without trend	Augmented Dickey-Fuller t-statistics = -14.570***			
Pedroni test with trend	Augmented Dickey-Fuller t-statistics = -16.861***			

Notes: The symbols *, **, and *** indicate 10%, 5%, and 1% significance level
Source: own elaboration