

Perceived Income Risks

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Outline

- 1 Motivation
- 2 Stylized facts
 - Cross-sectional patterns
 - Perceived risks and decisions
 - Correlation with the stock market
 - Permanent/transitory decomposition (work in progress)
- 3 Model (work in progress)
- 4 Conclusion

Motivation

- Not just expectation of income but also **high moments** such as income risks matter for consumption/portfolio decisions, i.e. precautionary motives, stock market investment, etc.
- **Uninsurance** of idiosyncratic risks make it matter in macroeconomics working assumption by the HANK literature
- It is people's perceptions that directly drive that decisions
- Are the perceptions in line with econometricians' estimates of income risks based on cross-sectional inequality and the size of income income risks used in heterogeneous macro?

This paper's agenda

- ① Using density survey of labor income to directly shed light on perceived risk profile
 - Perceived income risks differ systematically across age, generations, genders and education.
 - Evidence of non-normality, i.e half of the sample have non-zero skewness
 - Perceived risks and skewness negatively correlate with stock market returns.
- ② Characterize the potential differences between perceptions, econometrician's estimates used in structural model so far.
 - Do people understand the permanent and transitory risks perfectly?
- ③ Incorporating **imperfect understanding** of income process into an otherwise standard heterogenous-agent model featuring uninsured idiosyncratic risks

Literature

- “insurance or information”: Pistaferri (2001), Kaufmann and Pistaferri (2009), Meghir and Pistaferri (2011), Flavin (1988), New York Fed Blog (2019)
- consumption/saving and portfolio choice incorporating imperfect perception/understanding. Rozsypal and Schlafmann (2017), Carroll et al. (2018), Lian (2019).
- expectation formation, mostly on macroeconomic variables, Coibion and Gorodnichenko (2012), Fuhrer (2018), etc.
- subjective survey, especially on probabiblist surveys. Manski (2004), Delavande et al. (2011), Manski (2018),
- Bertrand and Mullainathan (2001), Armantier et al. (2017)
- Heterogeneous agent macro (HANK): uninsured idiosyncratic risks leads to ex post heterogeneity. ?
- Long-run risk ?

Data

Table: Survey of Consumer Expectations

Time period	2013M6-2019M6
Frequency	monthly
Sample size	1,300
Density variable	1-yr-ahead earning growth (same position/hours)
Pannel structure	stay up to 12 months
Demographics	educ, income, age

- density estimation following (Engelberg et al. (2009))
- exclude top and bottom 5% values for forecast errors and uncertainty

Definitions

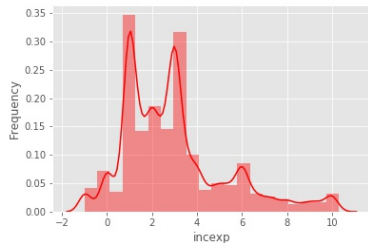
- Moments to look at
 - expected growth, $E_i(\Delta y_i)$
 - variance: $\overline{var}_i(\Delta y_i)$
 - skewness: $skew_i(\Delta y_i)$
- Both perceived nominal and real income growth
 - $E_i(\Delta y_i^r) = E_i(\Delta y_i^n) - E_i(\pi)$
 - $\overline{var}_i(\Delta y_i^r) = \overline{var}_i(\Delta y_i^n) + \overline{var}_i(\pi)$
- Conditional on employment.
 - Can be adjusted to unconditional risk using perceived unemployment risk. So the perceived risk of same job/hour is just a lower bound for income risk.

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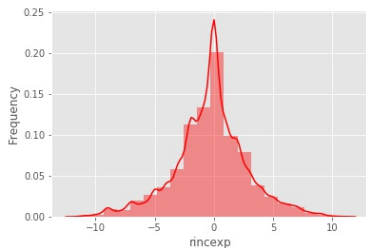
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Cross-sectional distribution of expected income growth

(a) nominal income expectation



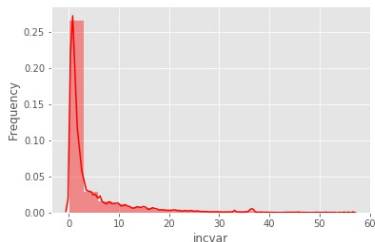
(b) real income expectation



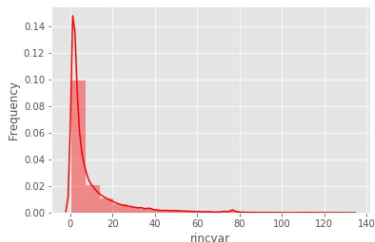
- Nominal rigidity can be seen from the expected nominal earning growth, while real expected growth become symmetric

Cross-sectional distribution of income dispersion

(a) nominal income risk



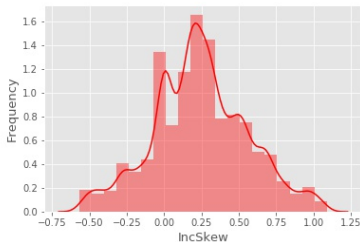
(b) real income risk



- average perceived income risks: 3% standard deviation for nominal and 4% standard deviation for real income
- just a lower bound: before adjustment of unemployment risk

Cross-sectional distribution of tail risks

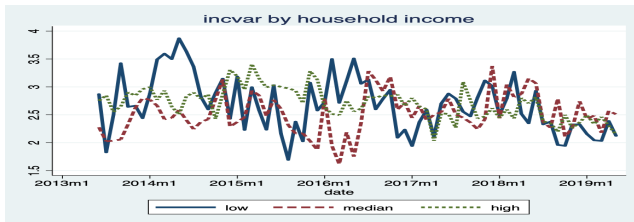
(a) nominal income skewness



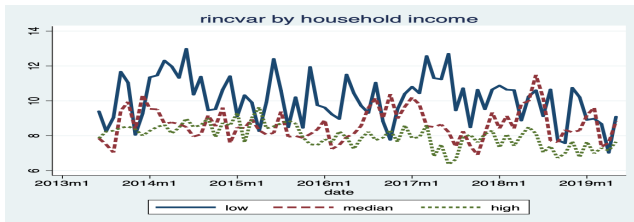
- sizable dispersion in skewness, i.e. about half of the people have non-zero skewness in perceived income distribution.

Perceived income risks by household income

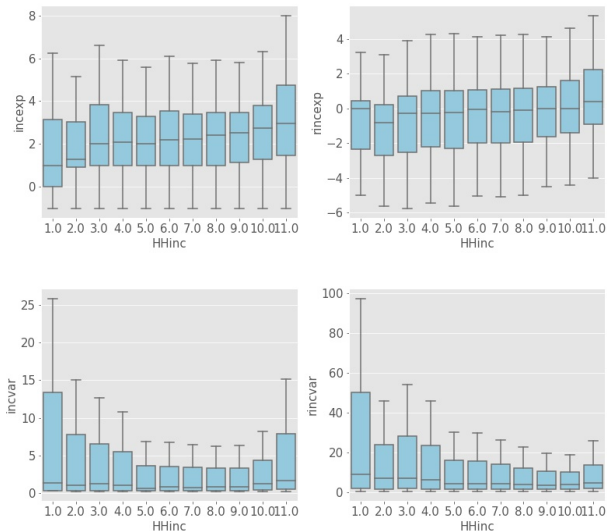
(a) nominal income risks



(b) real income risks

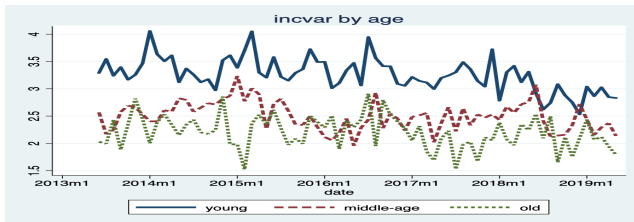


Perceived income risks by household income

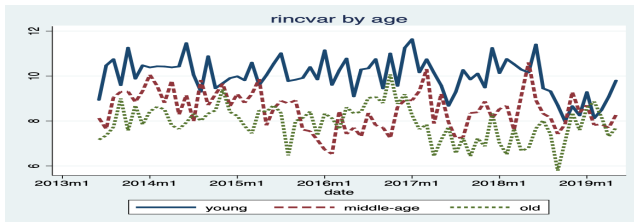


Perceived income risks by age

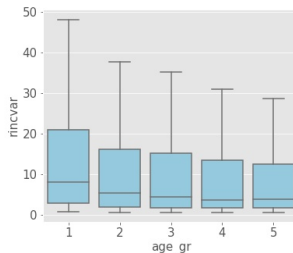
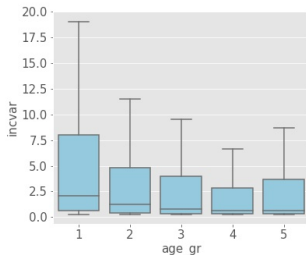
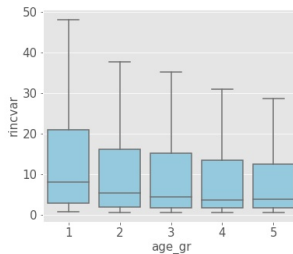
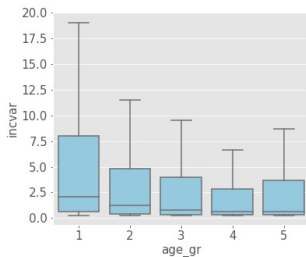
(a) nominal income risks



(b) real income risks

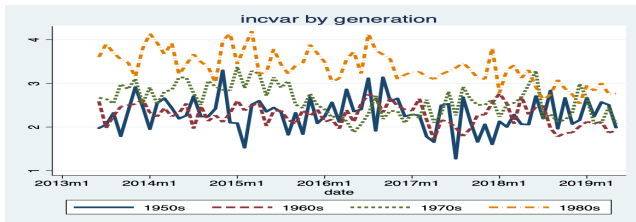


Perceived income risks by age

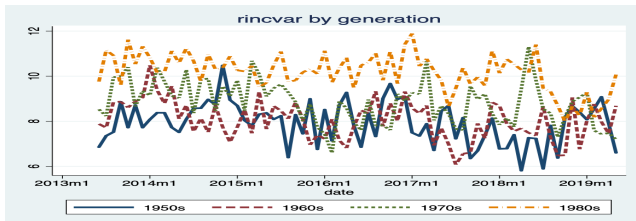


Perceived income risks by generation

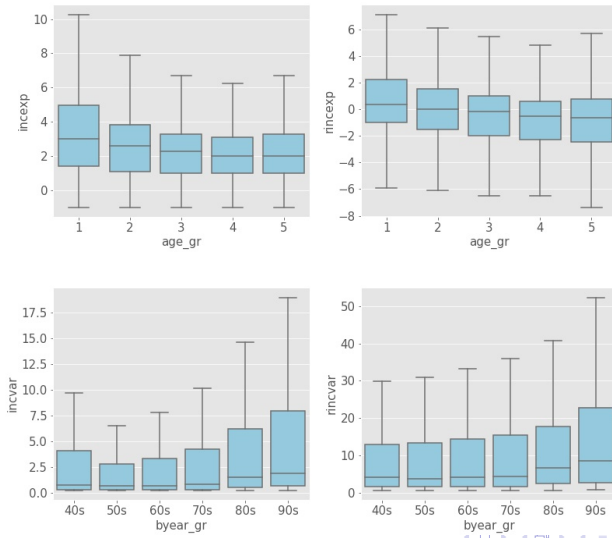
(a) nominal income risks



(b) real income risks



Perceived income risks by generation



Covariants of expected income growth

Table: Expected income growth and individual characteristics

	incexp I	incexp II	incexp III	incexp IIII	rincexp I	rincexp II	rincexp III	rincexp IIII
HHinc_gr=low inc			-0.03 (0.02)				-0.39*** (0.03)	
educ_gr=low educ				-0.25*** (0.02)				-0.63*** (0.03)
gender=male				-0.32*** (0.02)				-0.78*** (0.03)
parttime=yes	-0.47*** (0.03)	-0.36*** (0.03)	-0.35*** (0.03)		-0.63*** (0.04)	-0.53*** (0.04)	-0.44*** (0.04)	
selfemp=yes	0.86*** (0.03)	-0.00*** (0.00)	0.00*** (0.00)		0.84*** (0.05)	-0.00*** (0.00)	-0.00*** (0.00)	
Stkprob		0.01*** (0.00)	0.01*** (0.00)			0.02*** (0.00)	0.02*** (0.00)	
UEprobInd		-0.01*** (0.00)	-0.01*** (0.00)			-0.02*** (0.00)	-0.02*** (0.00)	
Intercept	2.82*** (0.01)	2.57*** (0.02)	2.58*** (0.02)	3.05*** (0.02)	-0.29*** (0.02)	-0.92*** (0.03)	-0.80*** (0.03)	0.20*** (0.02)
N	54275	48606	48606	47712	49702	44446	44446	43694
R2	0.01	0.02	0.02	0.01	0.01	0.04	0.04	0.02

Covariants of perceived income risks

Table: Perceived income risks and individual characteristics

	incvar I	incvar II	incvar III	incvar IIII	rincvar I	rincvar II	rincvar III	rincvar IIII
HHinc_gr=low inc			1.56*** (0.10)				7.01*** (0.19)	
educ_gr=low educ				0.40*** (0.11)				3.82*** (0.21)
gender=male				-0.80*** (0.10)				2.76*** (0.19)
parttime=yes	0.05 (0.12)	0.24* (0.13)	-0.12 (0.13)		1.41*** (0.23)	1.81*** (0.26)	0.19 (0.26)	
selfemp=yes	7.21*** (0.15)	-0.00*** (0.00)	-0.00*** (0.00)		6.27*** (0.27)	-0.00*** (0.00)	0.00*** (0.00)	
Stkprob		0.01*** (0.00)	0.01*** (0.00)			-0.05*** (0.00)	-0.05*** (0.00)	
UEprobAgg		0.01** (0.00)	0.00* (0.00)			0.05*** (0.00)	0.04*** (0.00)	
UEprobInd		0.03*** (0.00)	0.02*** (0.00)			0.05*** (0.00)	0.04*** (0.00)	
Intercept	4.64*** (0.05)	3.75*** (0.12)	3.28*** (0.12)	5.72*** (0.07)	12.42*** (0.10)	12.21*** (0.24)	10.16*** (0.25)	11.16*** (0.14)
N	54029	47331	47331	47457	50730	44382	44382	44517
R2	0.05	0.00	0.01	0.00	0.01	0.01	0.04	0.01

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Perceived income risks and household spending

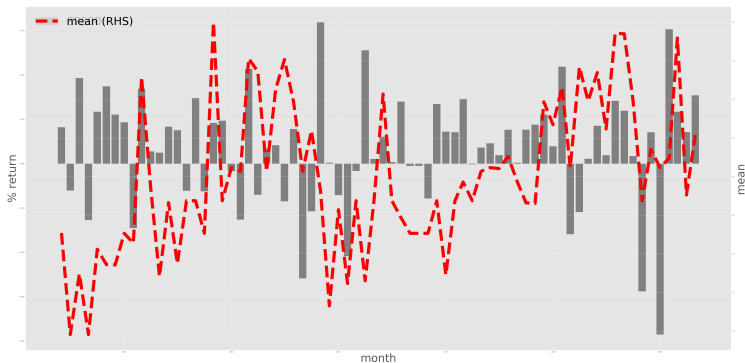
Table: Perceived income risks and household spending

	spending I	spending II	spending III	spending IIII	spending IIIII	spending IIIIII	spending IIIIII
incexp	0.39*** (0.08)						
rincexp		-0.04* (0.02)					
inevar			0.07*** (0.02)				
rincvar				0.07*** (0.01)			
UEprobAgg						0.04*** (0.01)	
UEprobInd					-0.01 (0.01)		
incskew							0.21 (0.43)
N	55673	50997	55465	52099	54315	85468	55029
R2	0.00	0.00	0.00	0.00	0.00	0.00	0.00

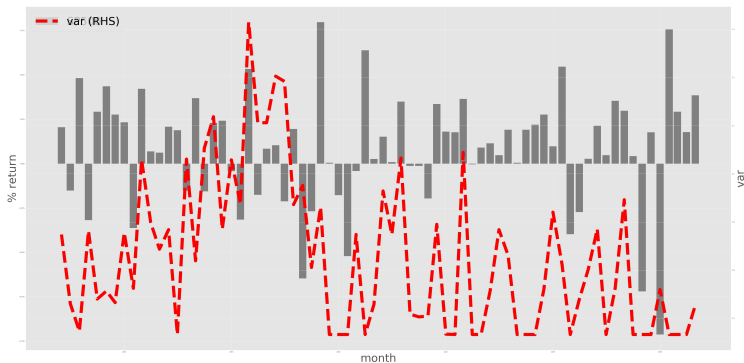
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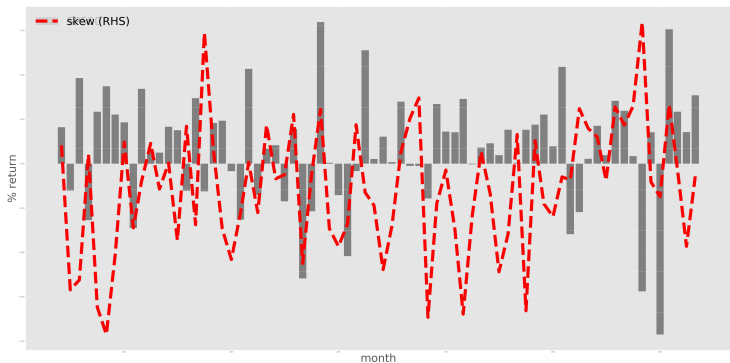
Expected income growth and stock market performance



Dispersion risks and stock market performance



Tail risks and stock market performance



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Underlying income process

- Income of individual i , cohort c at time t

$$y_{i,c,t} = p_{i,c,t} + \epsilon_{i,c,t}, \quad \text{where } \epsilon_{i,c,t} \sim N(0, \sigma_{c,\epsilon}^2)$$

$$p_{i,c,t} = p_{i,c,t-1} + \theta_{i,c,t}, \quad \text{where } \theta_{i,c,t} \sim N(0, \sigma_{\theta,c,t}^2)$$

$$\log \sigma_{\theta,c,t}^2 = \rho_c \log \sigma_{\theta,c,t-1}^2 + \mu_{\theta,c,t}$$

$$\mu_{\theta,c,t} \sim N(0, \gamma_c^2)$$

- Parameters for cohort c

- ρ_c : how persistent is the innovation to the size of the permanent risk
- γ_c : how large is the innovation to the size of permanent risk
- $\sigma_{c,\epsilon}$: the time-invariant size of the transitory risk

Perceived risk for 1-year-ahead growth

- Under a perfect understanding of the income process
- Perceived risks about next-month growth $\Delta y_{i,t}$

$$\begin{aligned}\overline{var}_{i,t}(\Delta y_{i,t+1}) &= E_{i,t}(\sigma_{\theta,t+1}^2) + \sigma_{\epsilon}^2 \\ &= \rho e^{-0.5\gamma} \sigma_{\theta,t}^2 + \sigma_{\epsilon}^2 + \underbrace{\omega_{i,t}}_{\text{perception shock}}\end{aligned}$$

- Perceived risks about next-year growth $\Delta Y_{i,t}$

$$\begin{aligned}\overline{var}_{i,t}(\Delta Y_{i,t+12}) &= \sum_{k=1}^{12} (12 - k + 1)^2 E_{i,t}(\sigma_{\theta,t+k}^2) + 12\sigma_{\epsilon}^2 \\ &= \sum_{k=1}^{12} (12 - k + 1)^2 \rho^k e^{-0.5k\gamma} \sigma_{\theta,t}^2 + 12\sigma_{\epsilon}^2\end{aligned}$$

Perceived permanent and transitory decomposition

- ① Do GMM estimation using observed perceived risks from the data
 - Using average perceived risks, variance, autocovariance across the whole population or within specified cohort
- ② With the estimated parameters, we will have a breakdown of the permanent and transitory risks. We can redo the exercises in previous sections separately.

Model ingredients

- ① imperfect understanding of the income process, a deviation from rational expectation benchmark.
 - experience-based learning capturing the cross-generation and age-dependence income perceptions
- ② a finite life cycle with a constant probability of death
- ③ uninsured idiosyncratic risks and aggregate risks (the workhorse assumption of the HANK literature)
- ④ single asset, i.e. no distinction between liquid and illiquid assets

Intuitions behind the model mechanisms

- an imperfect understanding → heterogeneous perception of risks
AND uninsurance of risks → difference in precautionary motives and MPCs across populations → potential amplification of aggregate MPC

Conclusion

- ddddd

Density estimation and robustness of my results

- ddd

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