Which idiosyncratic risk matters for business cycles?

Antoine Frech

Université Paris-Saclay

January 5, 2026

Introduction

Idiosyncratic risk and business cycles

- One of the main motivations of the heterogeneous-agent macroeconomics literature: showing that individual risk matters at the aggregate level.
- What is individual risk? Unemployment risk, climate hazard, sickness...
- How does it affect business cycles? When markets are incomplete, agents cannot fully insure themselves against this risk.
- This risk affects individuals differently, giving rise to heterogeneity among agents in macroeconomic models.
- Idiosyncratic risk + incomplete markets = precautionary savings, high MPCs and a greater role for redistribution.

Idiosyncratic risk in HANK models

HANK models are the new benchmark framework to study the effects of idiosyncratic risk and heterogeneity on business cycles. However, modeling the "micro-block" requires restrictive assumptions on the source of idiosyncratic risk. There are several options:

- In most HANK models, idiosyncratic shocks to individual labor productivities are at the root of heterogeneity, in the spirit of Aiyagari (1994).
- In HANK&SaM models, this is the risk of becoming unemployed.
- In Bilbiie (2025), this is the risk of becoming hand-to-mouth.

The goal

Measuring the relationship between individual risk and precautionary savings in a neutral way, but:

- In standard HANK models, it is hard to disentangle the effects of precautionary savings and high MPC agents.
- In HANK&SaM models, individual risk is tied to unemployment risk.
- In the THANK model of Bilbiie (2025), precautionary savings exist because of the presence of high-MPC agents.

Therefore, I need an agnostic framework without high-MPC agents.

Methodology

- I estimate a medium-scale DSGE model featuring idiosyncratic risk and incomplete markets.
- I take a minimum of assumptions regarding the actual source of individual risk.
- The modeling approach allows to isolate the effects of idiosyncratic risk on precautionary savings through a single wedge in the Euler equation.
- Estimating the model over U.S. time series, I am able to compute this wedge over the past decades.
- The model is aimed at being as agnostic as possible, in order to obtain a fair benchmark to compare the wedge in the Euler equation with empirical measures of individual risk.

Findings

- The results show that precautionary savings is an important driver of business cycles.
- The model delivers a realistic dynamics of individual risk (without targeting any empirical measures).
- Precautionary savings are strongly correlated with unemployment in normal times.
- Emphasis on the ambiguous effects of precautionary savings for supply shocks.

Related literature

This paper contributes to the growing literature that investigates the ability of HANK models to replicate macroeconomic time series while simultaneously matching data related to inequality, individual risk or MPCs.

- In standard HANK models: Auclert et al. (2020) and Bayer et al. (2024)
- In HANK&SaM models: Challe et al. (2017) and Cho (2023)
- In standard or ameliorated TANK models: Albonico et al. (2024) and Bilbiie et al. (2023)

This paper is also closely related to Berger et al. (2023), who estimate the effects of idiosyncratic risk on business cycles in a wedge accounting exercise.

Model, data and estimation procedure

Summary of the model

- Building on Acharya and Dogra (2020) and Acharya et al. (2023), I introduce a medium-scale HANK model, featuring: capital accumulation, investment adjustment costs, capital utilization and nominal rigidities on both prices and wages.
- Two assumptions are at the heart of this HANK economy:
  1. CARA instead of CRRA.
  2. Normally distributed idiosyncratic shocks.
- Together, these assumptions allow the derivation of closed-form solutions for the aggregate MPC and the Euler equation.

Idiosyncratic risk and incomplete markets

The variance of individual incomes σ_t^2 is assumed to take the form:

$$\sigma_t^2 = \tilde{\sigma}^2 e^{2\varphi(Y_t - Y)}$$

where φ determines whether the idiosyncratic risk is procyclical ($\varphi > 0$) or countercyclical ($\varphi < 0$). If σ is null, we recover the representative-agent version of the model.
The combination of a CARA utility function with normally distributed idiosyncratic shocks allows to derive a closed-form solution for the aggregate Euler equation in log-linear terms:

$$Cc_t = C\mathbb{E}_t c_{t+1} - \frac{1}{\gamma}\tilde{r}_t - \underbrace{\left(\gamma\mu^2\tilde{\sigma}^2\mathbb{E}_t\hat{\mu}_{t+1} + \varphi\gamma\mu^2\tilde{\sigma}^2 Y\mathbb{E}_t y_{t+1}\right)}_{\text{Wedge}}$$

Then, we have the following expression for the aggregate MPC in log-linear terms:

$$\hat{\mu}_t = \frac{1}{R}\left(\tilde{r}_t + \mathbb{E}_t\hat{\mu}_{t+1}\right)$$

Data and estimation procedure

- The data and the estimation procedure are common in the DSGE literature.
- The model is estimated over quarterly U.S. data for GDP, consumption, investment, hourly compensations, the FED funds rate, hours worked and the inflation rate stemming from the GDP deflator.
- The dataset spans from 1954 to 2019 (just before the Covid-19 outbreak). I use the same dataset that Bayer et al. (2024) used, so that the comparison with their results will be more straightforward.
- The model is estimated using Bayesian techniques, with seven aggregate shocks: TFP, price and wage mark-ups, investment technology, monetary policy, government expenditures and risk premium.

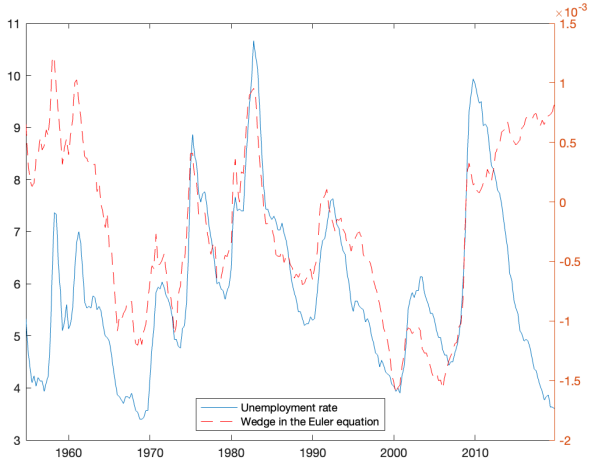
Estimation results

Estimation

- The results of the estimation point toward a very countercyclical idiosyncratic risk.
- While targeting no measure of individual risk, the estimated wedge exhibits a realistic dynamics over the past decades (see next slides).
- The heterogeneous-agent model outperforms its representative-agent counterpart by a sizable amount, suggesting that idiosyncratic risk is important at the aggregate level.
- Moreover, the model does a better job than the HANK model of Bayer et al. (2024) in terms of data fit.
- Precautionary savings play a crucial role for supply shocks, where the attenuation of investment responses is so important that it generates an attenuation of output responses (in comparison to the representative-agent counterpart).

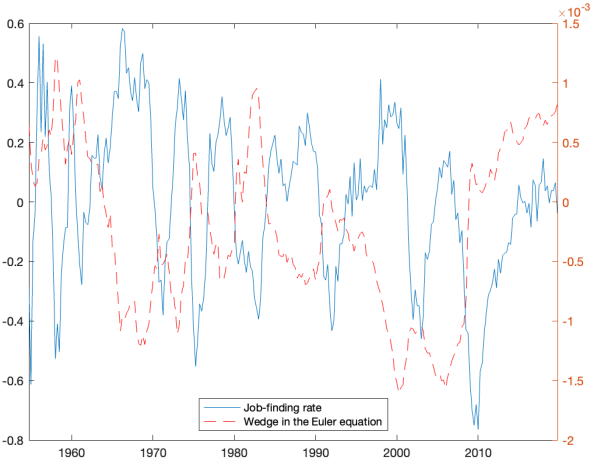
Which idiosyncratic risk matters?

The estimated wedge vs the unemployment rate



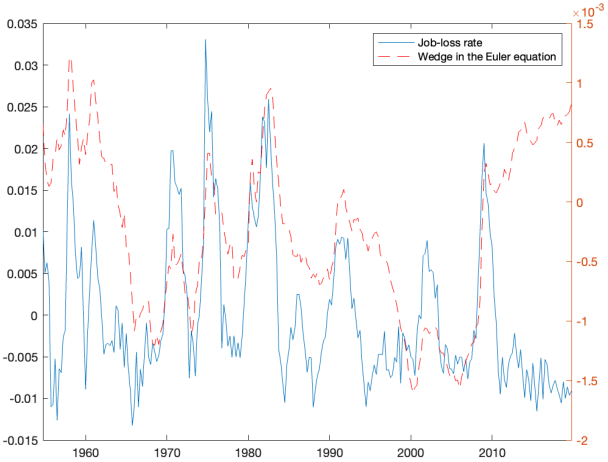
The correlation is 0.4. From 1968 to 2013, it is 0.86.

The estimated wedge vs the job-finding rate



The correlation is -0.39. From 1968 to 2013, it is -0.54.

The estimated wedge vs the job-loss rate



The correlation is 0.24. From 1968 to 2013, it is 0.51.

Why unemployment performs better?

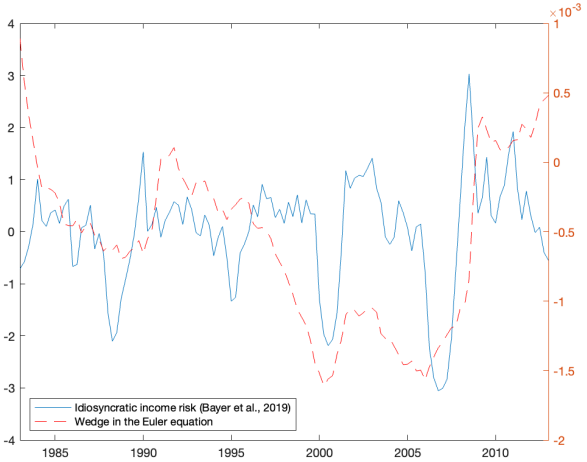
- The answer lies in its cyclicality.
- Computing the correlations of these empirical measures with output y_t:

Period considered	Wedge	Unemployment	Job-finding rate	Job-loss rate
Full sample	-0.9985	-0.4134	0.3956	-0.2290
From 1968Q1 to 2013Q1	-0.9977	-0.8778	0.5479	-0.4906

The Great Recession and structural shifts

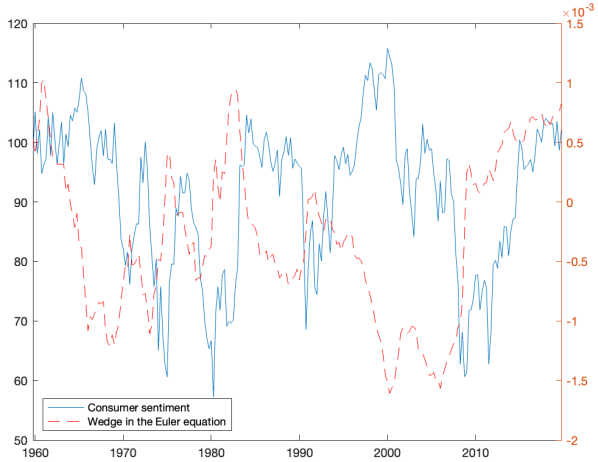
- The correlations between the wedge and labor market outcomes decreased sharply during the last decade.
- This reflects a broader disconnect between unemployment risk and output.
- Why precautionary savings are high but unemployment risk is low? Potential explanations:
  1. Durably depressed demand: rising wealth inequality, population aging, secular stagnation.
  2. Decrease of the the labor force participation: it mechanically reduces the unemployment rate but not necessarily idiosyncratic risk.

The estimated wedge vs income idiosyncratic risk



The dataset spans from 1983 to 2013. The correlation is 0.28.

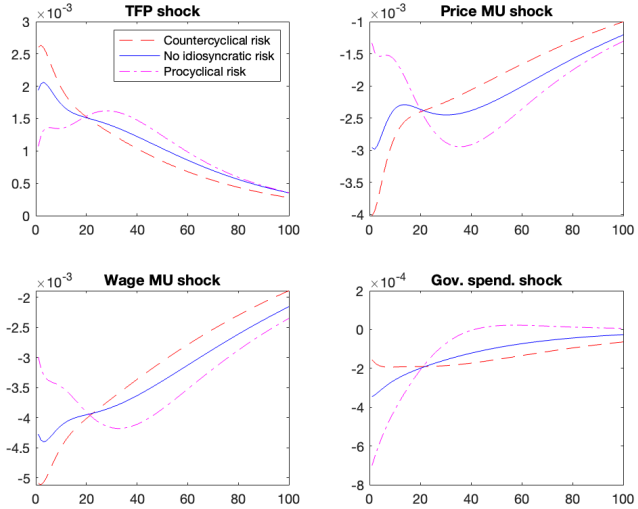
The estimated wedge vs consumer sentiment



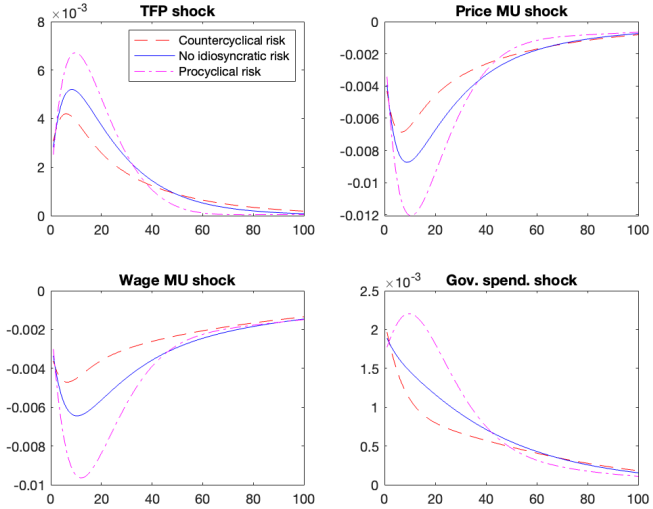
The dataset spans from 1959Q4 to 2019Q4. The correlation is -0.23.

The aggregate effects of idiosyncratic risk

IRFs of consumption



IRFs of output



Investment is the key

- The interplay between precautionary savings and investment explains the attenuation of supply shocks.
- As risk is countercyclical, precautionary savings increase during recessions and decrease during expansions.
- This puts additional pressure on the real rate, which ultimately transmits to investment through the price of capital. The following equation illustrates this mechanism:

$$\iota_t = \frac{1}{1+\tilde{\beta}}\iota_{t-1} + \frac{\tilde{\beta}}{1+\tilde{\beta}}\mathbb{E}_t\iota_{t+1} + \hat{\psi}_t + \frac{1}{\chi(1+\tilde{\beta})}\mathbb{E}_t\sum_{s=0}^{\infty}\tilde{\beta}^s(1-\delta)^s\tilde{\beta}R^K r^K_{t+1+s}$$

$$+ \frac{\gamma}{\chi(1+\tilde{\beta})}\mathbb{E}_t\sum_{s=0}^{\infty}\tilde{\beta}^s(1-\delta)^s\left[\underbrace{\gamma\mu^2\tilde{\sigma}^2\hat{\mu}_{t+1+s} + \varphi\gamma\mu^2\tilde{\sigma}^2 Yy_{t+1+s}}_{\text{Wedge in } t+s} - C(c_{t+1+s} - c_{t+s})\right]$$

Conclusion

Acharya, Sushant, Edouard Challe, and Keshav Dogra (2023) "Optimal Monetary Policy According to HANK," *American Economic Review*, 113 (7), 1741–1782.

Acharya, Sushant and Keshav Dogra (2020) "Understanding HANK: Insights From a PRANK," *Econometrica*, 88 (3), 1113–1158.

Aiyagari, S. Rao (1994) "Uninsured Idiosyncratic Risk and Aggregate Saving," *The Quarterly Journal of Economics*, 109 (3), 659–684.

Albonico, Alice, Guido Ascari, and Qazi Haque (2024) "The (Ir)Relevance of Rule-of-Thumb Consumers for U.S. Business Cycle Fluctuations," *Journal of Money, Credit and Banking*, 56 (4), 769–804.

Auclert, Adrien, Matthew Rognlie, and Ludwig Straub (2020) "Micro Jumps, Macro Humps: Monetary Policy and Business Cycles in an Estimated HANK Model," NBER Working Papers 26647, National National Bureau of Economic Research.

Bayer, Christian, Benjamin Born, and Ralph Luetticke (2024) "Shocks, Frictions, and Inequality in US Business Cycles," *American Economic Review*, 114 (5), 1211–47.

Berger, David, Luigi Bocola, and Alessandro Dovis (2023) "Imperfect Risk Sharing and the Business Cycle," *The Quarterly Journal of Economics*, 138 (3), 1765–1815.

Bilbiie, Florin O. (2025) "Monetary Policy and Heterogeneity: An Analytical Framework," *Review of Economic Studies*, 92 (4), 2398–2436.

Bilbiie, Florin O., Giorgio Primiceri, and Andrea Tambalotti (2023) "Inequality and Business Cycles," NBER Working Papers 31729, National Bureau of Economic Research.

Challe, Edouard, Julien Matheron, Xavier Ragot, and Juan F. Rubio-Ramirez (2017) "Precautionary Saving and Aggregate Demand," *Quantitative Economics*, 8 (2), 435–478.

Cho, Daeha (2023) "Unemployment risk, MPC heterogeneity, and business cycles," *Quantitative Economics*, 14 (2), 717–751.