How Important is Precautionary Labor Supply?

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Research Question

- Prudent individuals have an incentive to save when facing wage risk.
- Extra savings either by consuming less or by working more (Carroll and Kimball, 2008).

- Theory predicts that labor supply reacts to changes in wage risk (Low, 2005; Flodén, 2006; Pijoan-Mas, 2006).
- Scarce and mixed empirical evidence (Pistaferri, 2003; Parker et al., 2005)

- **How important is precautionary labor supply?**

In a Nutshell

- Labor supply equation augmented with wage risk
- Married men
- German SOEP data (2000-2012)

- 2.5% of hours worked due to precautionary labor supply
- 26% of precautionary savings are due to labor supply
- If self-employed faced wage risk of civil servants, work hours would reduce by 4%.

A Dynamic Labor Supply Equation

- Dynamic labor supply model (MaCurdy, 1981; Altonji, 1986; Domeij and Flodén, 2006)
- Partial adjustment mechanism (Robins and West, 1980)

$$\Delta \ln h_{it} = \alpha \Delta \ln h_{it-1} + \beta_1 \Delta \ln w_{it} + \beta_2 \Delta \sigma_{w,it} + \delta \Delta X_{it} + \varepsilon_{it}$$

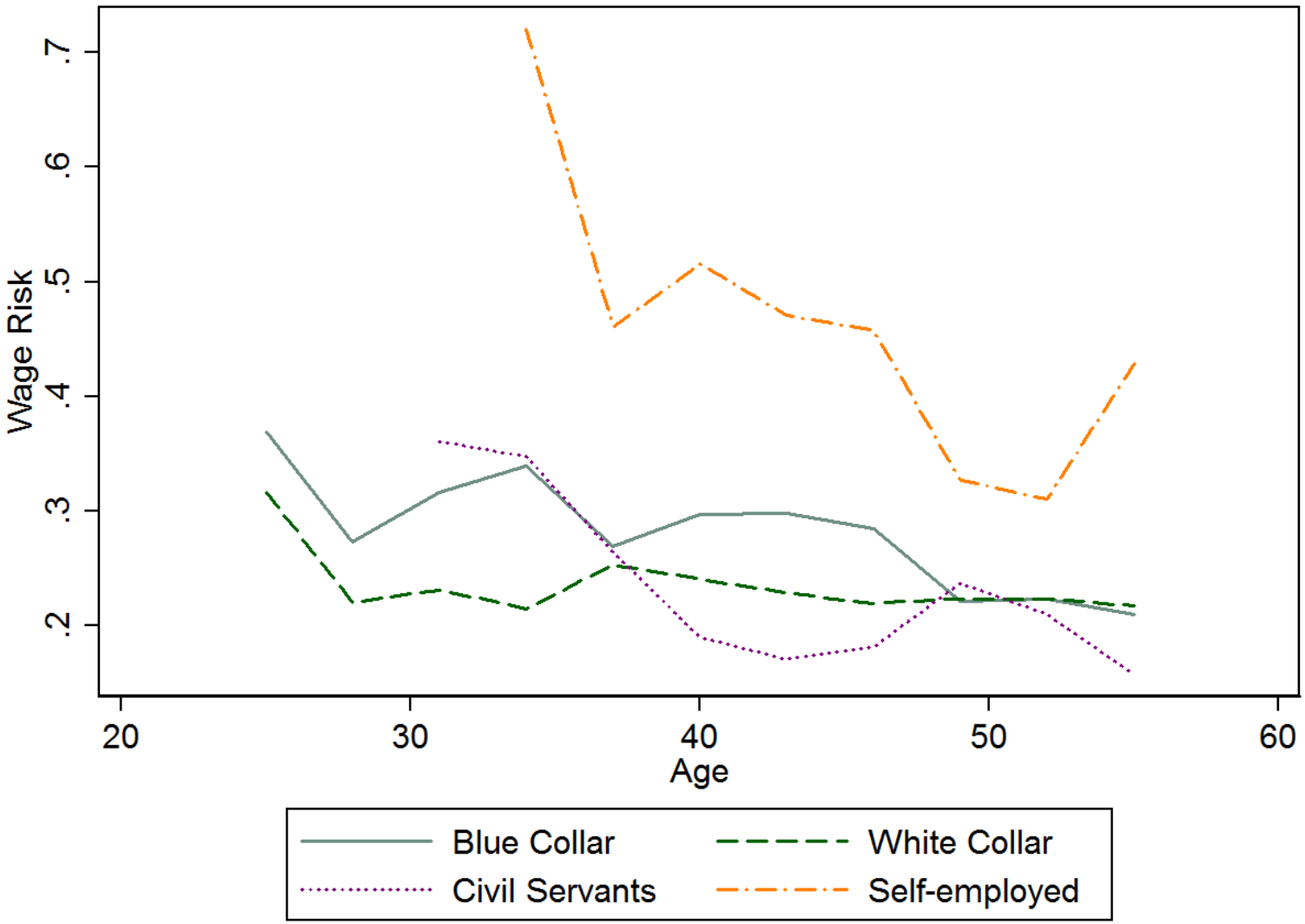
- h weekly hours of work
- w marginal hourly net wage (STSM; Steiner et al., 2012)
- σ_w net wage risk
- X controls (year dummies, household structure, demographics, predicted unemployment probability)
- Partial adjustment
  - Short-run effect of wage risk: β_2
  - Long-run effect of wage risk: $\frac{\beta_2}{(1-\alpha)}$

Net Wage Risk: Uncertainty about the Wage Rate

- Looking back forms expectation about future wage variability
- Variation of past individual wages similar to Parker et al. (2005)
- Standard deviation of detrended log wages $\ln \tilde{w}_{it}$

$$\sigma_{w,it} = \frac{1}{4} \sum_{j=t-6}^{t-1} \sqrt{(ln\tilde{w}_j - ln\bar{\tilde{w}}_j)^2}$$

Average Net Wage Risk over the life cycle



Estimation Methods

- Dynamic Panel Data Estimation
- Instrumentation of wages
  - Hourly wages constructed using income and hours information
  - Measurement error in hours leads to a downward (denominator) bias of the wage coefficient (cf. Borjas, 1980; Altonji, 1986).
  - Instrument wages with lags of monthly labor income
  - IV valid even if measurement error correlated over time

Results

	(1) AH	(2) DGMM	(3) SGMM
L.Log of Paid Hours	0.160***	0.153***	0.123***
	(0.042)	(0.041)	(0.037)
Wage	-0.058	-0.058	0.175***
	(0.042)	(0.038)	(0.019)
Wage Risk	0.009*	0.009*	0.023***
(1SD)	(0.005)	(0.005)	(0.003)
Unempl. Prob.	0.011**	0.011**	0.012***
(1SD)	(0.006)	(0.005)	(0.003)
Controls	✓	✓	✓
Instruments	$\ln h_{it-2}$, $\Delta\text{labinc}_{it-1}$	$\ln h_{it-2}, \ldots, \ln h_{it-13}$, collapsed, $\Delta\text{labinc}_{it-1}$	$\ln h_{it-2}, \ldots, \ln h_{it-13}$, $\Delta \ln h_{it-2}, \ldots, \Delta \ln h_{it-13}$, collapsed, $\Delta\text{labinc}_{it-1}$
Observations	7989	8112	10755
AR1inFD		0.000	0.000
AR2inFD		0.883	0.212
Hansen		0.289	0.186

Robust standard errors clustered at the individual level in parentheses.
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Importance of Precautionary Labor Supply

Table: Percentage Reduction for Different Occupations

	Short-Run		Long-Run	
	Perfect Foresight	Civil Servants	Perfect Foresight	Civil Servants
Self-Employed	4.88	3.57	5.53	4.04
Blue Collar	2.09	0.74	2.38	0.84
White Collar	1.98	0.64	2.26	0.72
Civil Servants	1.92	0.58	2.19	0.65
All	2.19	0.85	2.49	0.96

Notes: Simulated percentage reduction in hours of work when reducing wage risk to the sample minimum (perfect foresight) or the median risk faced by civil servants.

- Average precautionary savings due to precautionary labor supply are 59 Euro per month[1]
- Average monthly savings: 450 Euro
- If 50 percent of savings are precautionary, 26% of precautionary savings are due to precautionary labor supply.

[1] 13 Euro (average marginal net wage) · 42 (average weekly hours of work) · 0.0249 · 52 weeks /12 months

Simulated Reduction in Hours of Work

A Calibration Exercise

- Are the estimated results in line with theoretical predictions?
- We calibrate a simple two period model with CRRA utility similar to Flodén (2006).
- Flexible labor supply and savings
- 1st period wage: 13 Euro
- 2nd period wage: 8 or 18 Euro with equal probability
- $U_t = \frac{C_t^{1+\eta}}{1+\eta} - \Psi \frac{H_t^{1+\gamma}}{1+\gamma}$
  - γ intratemporal substitution parameter ($\frac{1}{\gamma}$ = Frisch elasticty = 0.2)
  - Ψ scaling factor
  - η risk aversion = -1.67
- Precautionary savings: 58 Euro; Precautionary labor supply: 1.19 h

$\Rightarrow$ A quarter of precautionary savings due to precautionary labor supply

Precautionary Labor Supply is Important

- 2.5% of annual hours or one week worked because of wage risk
- If self-employed faced wage risk of civil servants,
  work hours would reduce by 4%.
- A quarter of precautionary savings are due to precautionary labor supply.
- That is, about 700 Euro per year on average.
- This is in line with a reasonably parameterized two-period-model.

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Summary Statistics

	Unit	Mean	Std. Dev.	Min	Max	N
Labor Supply						
Weekly Hours Worked	(h)	41.78	6.85	20	80	10,987
Wages and Incomes						
Hourly Gross Wage	(Euro)	22.62	10.15	2.27	98.06	10,987
Hourly Marginal Net Wage	(Euro)	13.07	6.33	1.04	57.67	10,987
Monthly Gross Labor Income	(Euro)	3,896.83	1,972.09	319	27,000	10,987
Monthly Net Labor Income	(Euro)	2,554.75	1,202.22	150	12,072	10,987
Wage and Unemployment Probability						
Gross Wage Risk	(ln Euro)	0.192	0.195	0	3.539	10,987
Marginal Net Wage Risk	(ln Euro)	0.249	0.224	0	3.354	10,987
Unemployment Probability	(%)	1.1	1.7	0	21.7	10,987

Static Results

	(1) OLS_net	(2) OLSIV_net	(3) IVFD_net
Wage Risk	0.021***	0.028***	0.009*
	(0.004)	(0.005)	(0.005)
Unempl. Prob.	0.002	0.016***	0.012**
	(0.004)	(0.005)	(0.005)
Wage	-0.058***	0.148***	-0.071*
	(0.011)	(0.021)	(0.039)
Observations	10987	10821	8031

Standard errors in parentheses
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$