

Idiosyncratic Asset Return and Wage Risk of US Households

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Stephen Snudden

Wilfrid Laurier University

Introduction

Question:

What is the degree of idiosyncratic asset return risk, serial correlation, and correlation with wage risk for US households?

Method:

- Proposes panel-data measures for returns on U.S. household assets
- System estimation of a permanent-transitory wage process with an asset return process
- Tests for risk, serial correlation, and correlation with wage risk

Findings:

- Sizeable idiosyncratic return risk exists for all asset classes
 - exist concurrently with permanent heterogeneity in household-specific returns
 - exhibits negative serial correlation
- Idiosyncratic permanent risk to wages and transitory risk to total asset returns are correlated
 - primarily due to primary housing capital gains
 - the correlation depends on age: larger for older and less wealthy households
- These estimates inform the covariance structure of idiosyncratic asset returns and wage risk.

U.S. Data

Panel Study of Income Dynamics (PSID) from 1999—2019

Returns to assets are observed for total household assets, and:

- primary housing, secondary housing, private businesses, public equities, and risk-free assets

$$r_{a,it} = \frac{\sum_{j \in J} \{y_{j,it} + \Delta a_{j,it} - nx_{j,it}\}}{\sum_{j \in J} a_{j,it-1}}$$

for asset j of household i at time t , $y_{j,it}$ is flow dividends, $a_{j,it}$ is the value for, $nx_{j,it}$ is net investment

Data advantages:

- Includes net investment in the measure of capital gains
- Encompassing: total household assets including non-taxable assets and secondary housing
- No observations are top-coded

Summary Statistics for Asset Returns and Wage Growth

	Obs	Indiv.	Mean	Standard Deviation		Skewness	Kurtosis	
				Total	Within			
Wage Growth	29716	4941	3.0	39.7	15.0	37.9	-0.2	6.2
Total Assets	19233	3153	3.2	10.8	4.7	9.9	1.9	13.3
Private Business	1432	314	48.8	137.8	92.5	117.9	4.1	25.4
Primary Housing	24172	3690	5.7	12.3	4.5	11.6	0.9	8.2
Secondary Hous.	2470	522	13.5	44.3	23.5	39.3	3.1	17.4
Risk Free	29531	5046	-1.8	0.8	0.4	0.7	0.2	3.0
Public Equities	11798	2268	7.3	34.8	18.0	30.9	3.8	23.9

Note: Real wage growth and return on assets in percentage points, 1999-2019. Conditional on the minimum of four consecutive return observations, three for the return to private businesses and secondary housing, and the presence of both wage and return observations. 25p and 75p refer to the corresponding percentiles.

Idiosyncratic Returns and Wages

- Idiosyncratic heterogeneity in before-tax real returns, $\tilde{r}_{a,it}$

$$r_{a,it} = f(Z_{it}, P_{it}) + S_{it}\beta + \tilde{r}_{a,it}$$

- where Z_{it} are observable household characteristics, P_{it} is year fixed effects interacted with portfolio shares, S_{it} are indicators for if assets were sold.
- Idiosyncratic before-tax real wages are calculated in the same way but exclude portfolio shares and the sale indicator.

Structural System Estimation

Model:

- Idiosyncratic permanent-transitory wage and return processes (Lillard and Weiss, 1979; Baker, 1997, among others):

$$\Delta r_{j,it} = \Delta u_{j,it}^r + \alpha_j^r \Delta u_{j,it-1}^r$$

$$\Delta w_{k,it} = v_{k,it}^w + \Delta u_{k,it}^w + \alpha_k^w \Delta u_{k,it-1}^w$$

- permanent idiosyncratic innovation $v_{k,it}^w$ for wages
- transitory idiosyncratic innovations $u_{j,it}^r$ and $u_{j,it}^w$
- moving average of transitory innovations α_k^w and α_j^r
- correlations of innovations ρ_{vur} , ρ_{uu^r}

Identification:

- to identify: σ_{v^w} , σ_{u^w} , σ_{u^r} , ρ_{vur} , ρ_{uu^r} , α_k^w and α_j^r
- over-identified using eleven moment conditions
- estimated in system via an iterated GMM
- heteroskedastic and serial correlation robust standard errors

Transitory idiosyncratic risk to returns is observed for all assets and exists concurrently with the household-specific returns observed by Fagereng et al. (2020) and Snudden (2021)

Estimates

Transitory Idiosyncratic Return Risk is Sizeable and Correlated with Head-of-Household's Permanent Wage Innovations

Asset Return	Total	Business	Prim. Hous.	Sec. Hous.	P. Equities
σ_u	22.74	31.80	24.19	24.19	19.68
(Temporary wage shock)	(6.70)	(13.71)	(6.68)	(10.85)	(8.16)
σ_v	18.03	31.64	20.16	31.73	19.04
(Permanent wage shock)	(7.22)	(17.41)	(6.81)	(14.18)	(9.15)
σ_{ur}	8.96	108.90	10.95	36.16	24.71
(Temporary return shock)	(2.33)	(43.97)	(2.46)	(11.17)	(10.21)
α^w	0.10	-	0.09	-	0.17
(Wage moving average)	(0.042)	-	(0.035)	-	(0.066)
α^r	-0.14	-	-0.14	-	-0.21
(Return moving average)	(0.045)	-	(0.036)	-	(0.122)
ρ_{vur}	0.07	0.30	0.07	-	-
(Corr. v wage u returns)	(0.032)	(0.102)	(0.026)	-	-
Observations	6,586	564	8,803	985	2,294
Persons	1,791	159	2,013	270	705
J-test p-value H_0 : Valid	0.664	0.301	0.708	0.502	0.086

Note: Estimates are from system estimation using iterative GMM. Idiosyncratic returns are in percentage points; idiosyncratic head's wages are in percent change. Prim. and Sec. refer to primary and secondary housing (hous.), respectively. P. refers to public and corr. refers to correlation. Heteroskedastic and serial correlation robust standard errors are in parentheses.

Correlated Wage and Return Risk Associated with Primary Home Ownership

Ownership Sample	Pr. Home	x Pr. Home	Business	x Business
σ_u	22.18	23.09	32.32	19.46
(Temporary wage shock)	(7.10)	(8.11)	(15.29)	(5.14)
σ_v	18.38	20.63	28.32	19.36
(Permanent wage shock)	(8.02)	(9.95)	(20.49)	(6.70)
σ_{ur}	9.98	2.24	13.90	8.68
(Temporary return shock)	(2.70)	(1.42)	(4.80)	(2.39)
α^w	0.10	-	-	-
(Wage moving average)	(0.048)	-	-	-
α^r	-0.16	-	-	-0.15
(Return moving average)	(0.053)	-	-	(0.052)
ρ_{vur}	0.08	-	-	0.08
(Corr. v wage u returns)	(0.037)	-	-	(0.030)
Observations	4,674	1,339	416	5,821
Persons	1,281	395	147	1,595
J-test p-value H_0 : Valid	0.408	0.607	0.171	0.610

Note: Estimates are from system estimation using iterative GMM. Idiosyncratic rates of return are in percentage points, idiosyncratic head's wages are in percent change. Pr. Home and x Pr. Home refers to households that do and do not own primary housing assets, respectively, whereas x Business and x Sec. Hous. refers to households that own neither private businesses nor secondary (Sec.) housing assets, respectively. Heteroskedastic and serial correlation robust standard errors are in parentheses.

Permanent idiosyncratic shocks to head's wages are correlated with the transitory shock to asset returns due to capital gains to housing

Correlated Wage and Return Risk is Dependant on Age

Sample	Younger	Older	Low Wealth	High Wealth
σ_u	20.66	23.95	21.59	22.76
(Temporary wage shock)	(6.16)	(8.32)	(6.38)	(7.90)
σ_v	16.45	20.67	16.75	20.09
(Permanent wage shock)	(7.15)	(9.52)	(7.67)	(9.08)
σ_{ur}	8.88	9.26	8.28	9.43
(Temporary return shock)	(2.36)	(2.98)	(2.75)	(2.76)
α^w	-	0.12	-	0.14
(Wage moving average)	-	(0.056)	-	(0.056)
α^r	-	-0.19	-0.16	-0.14
(Return moving average)	-	(0.076)	(0.071)	(0.061)
ρ_{vur}	0.07	-0.09	-	-
(Corr. temporary shocks)	(0.028)	(0.052)	-	-
ρ_{vur}	-	0.17	0.13	-
(Corr. v wage u returns)	-	(0.084)	(0.048)	-
Observations	3,634	2,952	3,348	3,238
Persons	1,016	775	904	887
J-test p-value H_0 : Valid	0.365	0.548	0.650	0.815

Note: Estimates are from system estimation using iterative GMM. Idiosyncratic rates of return are in percentage points; idiosyncratic head's wages are in percent change. Wealth and age refers to above and below the median. Heteroskedastic and serial correlation robust standard errors are in parentheses.

Correlated permanent wage and transitory return risk is highest for older and less wealthy households.

Robustness:

- The results are robust to most assumptions of the data treatment, calculation of idiosyncratic return, and moments.
- The most sensitive results are the positive serial correlation in wages due to sample characteristics and the correlation between wages and returns for private business assets.
- Idiosyncratic asset returns correlation only observed for risk-free assets and public equity.
- Tests reject the use of an AR process for wages or returns.

Married Households Exhibit Within-Household Wage-Return Correlation Insurance

Wage Sample	Head	Spouse	Individual	Household
σ_u	22.74	21.47	21.13	18.88
(Temporary wage shock)	(6.70)	(5.86)	(4.72)	(4.48)
σ_v	18.03	17.59	19.14	18.69
(Permanent wage shock)	(7.22)	(7.55)	(5.87)	(5.62)
σ_{ur}	8.96	8.65	9.10	8.99
(Temporary return shock)	(2.33)	(2.78)	(2.26)	(2.33)
α^w	0.10	-	-	-
(Wage moving average)	(0.042)	-	-	-
α^r	-0.14	-0.20	-0.19	-0.15
(Return moving average)	(0.045)	(0.074)	(0.042)	(0.047)
ρ_{vur}	0.07	-	0.05	-
(Corr. v wage u returns)	(0.032)	-	(0.025)	-
Observations	6,586	3,609	10,244	7,082
Persons	1,791	1,017	2,824	1,903
J-test p-value H_0 : Valid	0.664	0.568	0.287	0.116

Note: Estimates are from system estimation using iterative GMM. Idiosyncratic rates of return are in percentage points, idiosyncratic wages are in percent change. Heteroskedastic and serial correlation robust standard errors are in parentheses.

Implications

- The substantial idiosyncratic risks that exist within all asset classes suggests that background risks may arise from all asset classes.
- Transitory idiosyncratic risk to returns is observed exists concurrently with the household-specific returns observed by Fagereng et al. (2020) and Snudden (2021)
- Quantitative models of return heterogeneity need to include both household-specific and transitory idiosyncratic components.
- Studies that have include idiosyncratic risks for both returns and wages should include the correlation across these shocks
- Both the degree of return risk and correlation with wages places is primarily driven by primary housing, consistent with Cocco (2005).

References

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