

Households in Demand System Asset Pricing

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Demand System Asset Pricing

- Kojien and Yogo (2019), “A Demand System Approach to Asset Pricing,” *Journal of Political Economy*.
1. A demand system for financial assets.
 - Traditional portfolio choice with
 - Heterogenous beliefs.
 - Factor structure in returns.
 - Asset demand is a logit function of characteristics.
 - Matches institutional and household holdings.
 2. IV estimator to address the endogeneity of demand and asset prices.
 3. Asset pricing applications.
 - Liquidity estimation (price impact of demand shocks).
 - Which investors explain volatility? A new variance decomposition of asset returns.
 - Which investors explain predictability? Due to predictable variation in demand.

Data on institutional portfolios

1. SEC Form 13F: Quarterly U.S. stock holdings of institutions managing over \$100m since 1980.
2. Thomson Reuters Ownership and FactSet Ownership: International stock holdings.
3. Thomson Reuters eMAXX: Quarterly bond holdings of institutions (mutual funds and insurance companies) since 2002.
 - Insurance companies: Schedule D since 1991.
 - Fed: System Open Market Accounts since 2003.
4. Securities Holdings Statistics: Comprehensive holdings for the euro area since 2014.
 - Household holdings are shares outstanding minus aggregate institutional holdings.

Data on household portfolios

1. Statistics Sweden: Household holdings for 1983–2007 (Calvet et al. 2007).
2. Norwegian Central Securities Depository: Stock holdings and transactions for 1996–2017 (Betermier et al. 2022).
3. U.S. brokerage data for 1991–1996 (Barber and Odean 2000).

Summary of 13F institutions

- SEC Form 13F: Quarterly stock holdings of institutions managing over \$100m.
 - Types: Banks, insurance companies, investment advisors, mutual funds, pension funds, other.
 - Household sector.

Period	Number of institutions	% of market held	Assets under management (\$ million)		Number of stocks held		Number of stocks in investment universe	
			Median	90th percentile	Median	90th percentile	Median	90th percentile
1980–1984	544	35	337	2,666	118	386	183	523
1985–1989	780	41	400	3,604	116	451	208	692
1990–1994	979	46	405	4,566	106	512	192	813
1995–1999	1,319	51	465	6,579	102	556	176	943
2000–2004	1,800	57	371	6,095	88	521	165	983
2005–2009	2,442	65	333	5,427	73	460	145	923
2010–2014	2,879	65	315	5,441	68	447	122	800
2015–2017	3,655	68	302	5,204	67	454	112	748

Demand system asset pricing

- Investor i 's allocates wealth A_i , subject to budget constraint $\sum_{n=0}^N w_i(n) = 1$.
- Demand for asset n :

$$\frac{w_i(n)}{w_i(0)} = \exp \left\{ \beta_{0,i} \text{me}(n) + \sum_{k=1}^K \beta_{k,i} x_k(n) \right\} \epsilon_i(n)$$

- Market clearing:

$$\text{ME}(n) = \sum_{i=1}^I A_i w_i(n)$$

Demand estimation

- For each 13F institution and the household sector, estimate demand from the cross section of portfolio holdings.
- IV for log market equity.
- Characteristics:
 1. Log book equity.
 2. Profitability.
 3. Investment.
 4. Dividends to book equity.
 5. Market beta.

Summary of findings

- Demand elasticity is low (less than one) for all institutions and the household sector.
 - Large-sample confirmation of the earlier literature on index effects (Chang et al. 2015).
- Compared with institutions, the household sector has
 - Higher demand elasticities.
 - Tilt toward small cap, profitable, and high dividend firms.
 - Higher variance of latent demand, especially during the global financial crisis. That is, more trading across stocks.

Variance decomposition of stock returns in 2008

AUM ranking	Institution	AUM (\$ billion)	Change in AUM (%)	% of variance	
	Supply: Shares outstanding, stock characteristics & dividend yield			8.1	(1.0)
1	Barclays Bank	699	-41	0.3	(0.1)
2	Fidelity Management & Research	577	-63	0.9	(0.2)
3	State Street Corporation	547	-37	0.3	(0.0)
4	Vanguard Group	486	-41	0.4	(0.0)
5	AXA Financial	309	-70	0.3	(0.1)
6	Capital World Investors	309	-44	0.1	(0.1)
7	Wellington Management Company	272	-51	0.4	(0.1)
8	Capital Research Global Investors	270	-53	0.1	(0.1)
9	T. Rowe Price Associates	233	-44	-0.2	(0.1)
10	Goldman Sachs & Company	182	-59	0.1	(0.1)
	<i>Subtotal: 30 largest institutions</i>	6,050	-48	4.4	
	Smaller institutions	6,127	-53	40.7	(2.3)
	Households	6,322	-47	46.9	(2.6)
	<i>Total</i>	18,499	-49	100.0	

Research agenda

- Some early evidence based on DSAP are consistent with the household finance literature.
- However, we can only learn so much from aggregated data.
- More granular data from Sweden, Norway, or even incomplete U.S. data could help us unlock the household sector.
- A complete asset pricing model requires
 1. Outer nest: Households allocate wealth to different institutions including 401(k) plans, mutual funds outside retirement accounts, insurance companies, direct holdings, etc.
 2. Inner nest: Each institution allocates AUM across securities.