Financial Intermediaries and Demand for Duration

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Outline

- Intro
- Motivation
- Data & Methodology
- Empirical Results
- Conclusion

This paper in a nutshell

Research Question

- Who seeks long-term cash flows in the stock market?

  e.g., we often assume "*pension funds are long-term investors*"
  Are they *always* so in the equity market?

- Moreover:
  Does demand for long-term cash flows change over time?
  If yes, what drives its time variation?

What we do

- Study demand for long-term cash flows of financial intermediaries

What we find

- Significant *time variation* in demand for long-term cash flows
- Financial constraints affect demand

  more binding constraints $\Longrightarrow$ long-duration demand $\downarrow$

Motivation

Positioning

- Increasing interest on institutional investors' portfolio choice:
  - demand system asset pricing

  e.g., Koijen-Yogo (2019), Koijen-Richmond-Yogo (2023),
  Huebner-Haddad-Loualiche (2022)

- Financial Intermediaries do matter for asset prices:
  - their balance sheet affect market prices

  e.g., Adrian-Etula-Muir (2014), He-Kelly-Manela (2017), Haddad-Muir (2022)
  - typically regarded as *long-term investors* (unconditionally)

This paper:

→ Do financial intermediaries demand long-term cash flows in equity?

→ How balance sheet constraints impact investors' demand?

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Data & Methodology

Data

1980:Q1 - 2022:Q2 sample

- CRSP/Compustat
- 13F (Thomson Reuters)
  - **NY Fed Primary Dealers**
  - **Banks**
  - **Insurances**
  - **Pension Funds**

Summary Stats

Summary Holdings: Full Sample						
			AUM ($MM)		N. stocks	
	N. investors	% market	median	p90	median	p90
Primary Dealers	63	10.13	14,169	133,220	1,503	2,722
Banks	594	15.50	412	9,176	198	1,051
Insurances	158	5.13	816	16,511	157	1,175
Pension Funds	114	5.51	3,023	24,281	438	1,468
Total	929	36.26	711	21,990	227	1,541

Methodology (I)

Goal : study demand for long-term cash flows in equity

$\rightarrow$ need a proxy for **stock-specific** *"cash flow maturity"*

- Equity Duration following Goncalves (2021) ▸ Validation

$$Dur_{j,t} = \sum_{h=1}^{\infty} h \cdot \frac{e^{-dr_{j,t} \cdot h}\, \mathbb{E}_t[PO_{j,t+h}]}{ME_{j,t}}$$

- where:
  - $\mathbb{E}[CF_{t+h}]$ as VAR(1) on accounting variables ▸ State vector
  - Finds $dr_{j,t}$ who matches market prices ▸ $dr_{j,t}$
  - Get $Dur_{j,t}$ ▸ More

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Methodology (II)

- Intertemporal-CAPM (e.g., Merton, 1973; Goncalves, 2021)

  Portfolio choice of an agent with H-period horizon (and $H \to \infty$):

  $$\to \quad w_{i,t}(n) = A_{i,t} \cdot \mathbb{E}[r_{mkt,t+1}] + B_{i,t} \cdot \underbrace{\mathbb{E}[r_{t+1 \to t+H}]}_{\text{hedging}}$$

  Long-term investors demand:

  1. "market portfolio"
  2. hedge *reinvestment risk*[1]

[1] i.e., unfavorable shifts in future investment opportunities.

Methodology (III)

- Demand System (Koijen-Yogo, 2019):

$$\rightarrow \frac{w_{i,t}(n)}{w_{i,t}(0)} = \exp\left\{\alpha_{i,t} + \theta_{0,i,t}\,\mathrm{me}_t(n) + \theta_{mkt,i,t}\,\beta_t^{mkt}(n) + \boldsymbol{\theta_{dur,i,t}}\,dur_t(n)\right\}\epsilon_{i,t}(n)$$

where: me_t (dur_t) is log market equity (duration)

- Validation check: ▸ Latent Demand

Gormsen-Lazarus (2022) : *a single duration factor subsumes traditional characteristics*

- Estimation follows Koijen-Richmond-Yogo (2022):
  - IV for me_t excluding Household sector
  - GMM across four quarters
    (Shrinkage estimation if $\leq 2,000$ holdings within four quarters)

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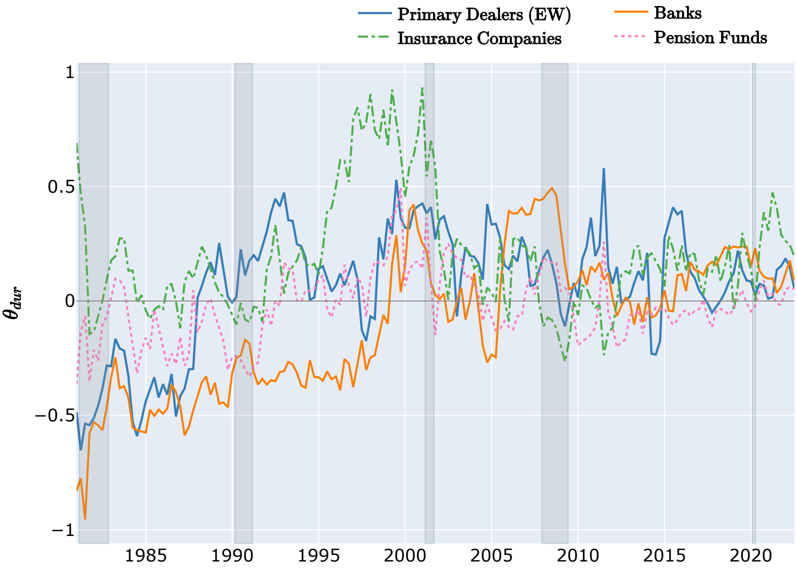
Empirical Results

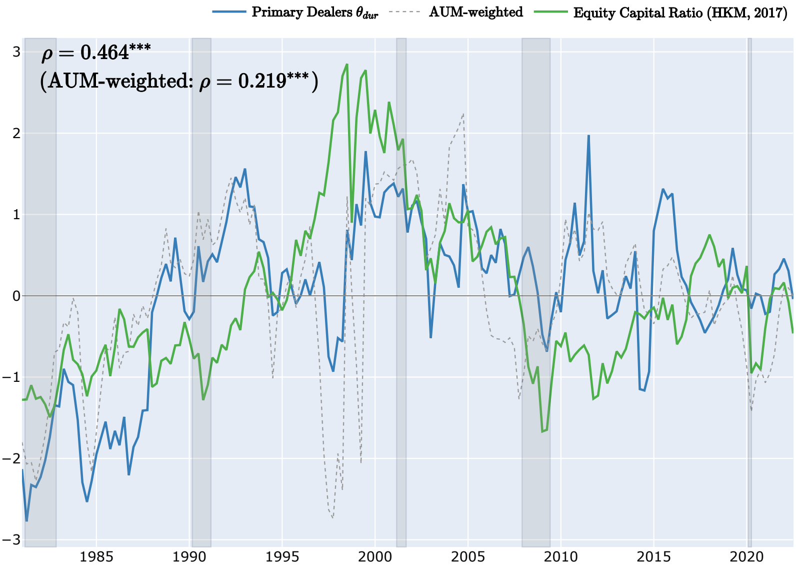
Empirical Results - Validation Exercise

Demand for equity duration by **Target-Date Funds** w/ different “time-to-maturity”

Fact 1: Time-Series Variation



Time Series Variation: Primary Dealers



Time Series Variation and Intermediaries' Capital

$$\theta_{dur,t} = \alpha + \delta\,\eta_{t-1} + \gamma\,\sigma(dur)_{t-1} + u_t\ ,$$ for each intermediary type

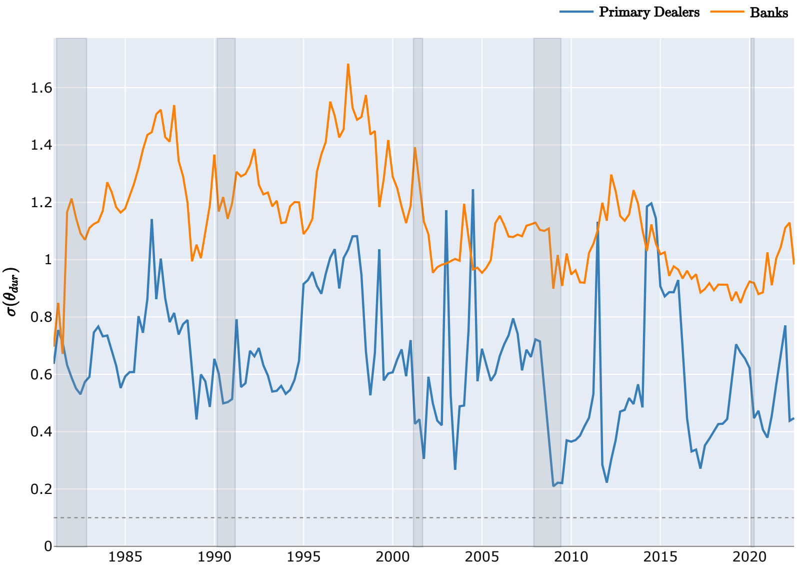
Avg. Duration Demand and Intermediary Constraints				
	Primary Dealers	Banks	Insurances	Pension Funds
η_{t-1}	0.086***	0.092***	0.128***	0.048***
	(0.024)	(0.033)	(0.041)	(0.015)
$\sigma(dur)_{t-1}$	1.103***	1.586***	-0.247	0.408***
	(0.304)	(0.352)	(0.470)	(0.151)
N	166	166	166	166
R^2	0.360	0.486	0.207	0.257

Time Series Variation and Intermediaries' Capital

$$\theta_{dur,i,t} = \alpha_i + \delta\,\eta_{t-1} + \gamma\,\sigma(dur)_{t-1} + u_{i,t}\,,$$ for each intermediary type

Duration Demand: Panel Regression				
$\theta_{dur,t}$	Primary Dealers	Banks	Insurances	Pension Funds
η_{t-1}	0.052	0.058*	0.169***	0.041
	(0.033)	(0.031)	(0.048)	(0.035)
$\sigma(dur)_{t-1}$	0.542	1.071***	-0.060	0.317
	(0.389)	(0.331)	(0.404)	(0.292)
Manager FE	✓	✓	✓	✓
N	2,605	16,457	5,625	4,901
$Adj\ R^2$	0.297	0.425	0.275	0.142

Fact 2: Cross-Sectional Variation



Cross-Sectional Variation

For 1992Q1-2020Q4 manually match: Thomson Reuters (*mgrno*) to Compustat (*cusip*)

$$\theta_{dur,i,t} = \alpha_i + \delta\, \mathbb{1}_{\{High\ \eta_{t-1}\}i,t} + \gamma\, \sigma(dur)_{t-1} + u_{i,t}$$

	Demand for Duration	
	(1)	(2)
High η_{t-1}	$\boxed{0.157^{**}}$	$\boxed{0.130^{**}}$
	(0.063)	(0.061)
$\sigma(dur)_{t-1}$		0.907***
		(0.239)
Manager FE	✓	✓
N	29,658	29,658
Adj R^2	0.389	0.393

Conclusion

- We study a demand-system with equity duration (I-CAPM)

  $\rightarrow$ θ_{dur} : demand for long-term cash flows in the stock market

- Time variation in θ_{dur}

- Explore the link between:

  demand for long-term cash flows *and* **intermediaries' constraints**

$$\underline{\text{when constraints are binding} \;\Rightarrow\; \theta_{dur} \downarrow}$$

(pro-cyclical demand for long-term cash flows)

- Channel: gambling for resurrection? More to do on this...

Heterogeneity in Demand

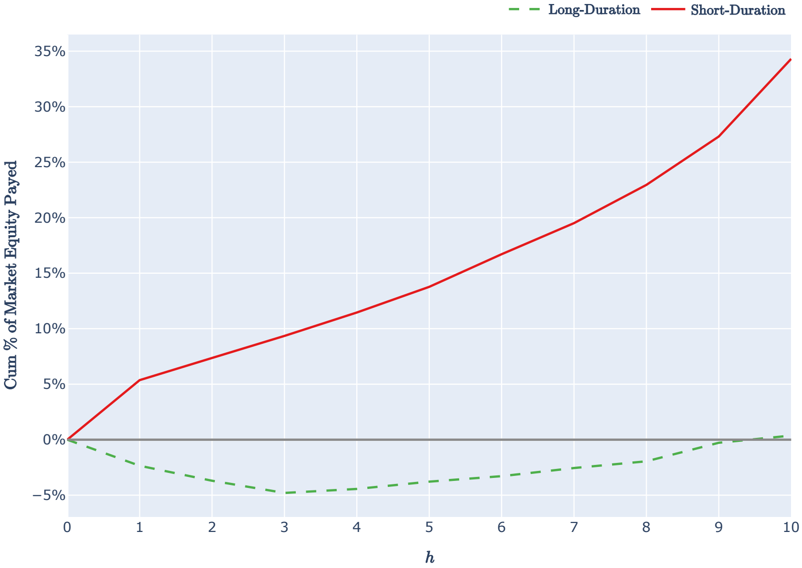
Model investors preference as function of equity capital ratio:

$$ln\frac{w_{i,t}(n)}{w_{i,t}(0)} = \alpha_{i,t} + \theta_{me}\,\mathrm{me}_t(n) + \left(\theta^{(0)}_{mkt,g} + \theta^{(1)}_{mkt,g}\eta_{t-1,g}\right)\beta_{mkt,t}(n) + \left(\theta^{(0)}_{dur,g} + \theta^{(1)}_{dur,g}\eta_{t-1,g}\right) dur_t(n) + u_{i,t}(n)$$

	Heterogeneity in Demand Coefficients			
	Primary Dealers	Banks	Insurances	Pension Funds
$\theta_{dur} \times \eta_{t-1}$	0.091**	0.177***	0.036	0.004
	(0.041)	(0.024)	(0.038)	(0.028)
$\theta_{mkt} \times \eta_{t-1}$	-0.082***	-0.055***	-0.072***	-0.055***
	(0.020)	(0.012)	(0.016)	(0.015)
Manager-Time FE	✓	✓	✓	✓
N	2,785,546	6,198,498	1,997,622	2,864,040
$Adj\ R^2$	0.441	0.234	0.225	0.462

Equity Duration Validity

▸ Back

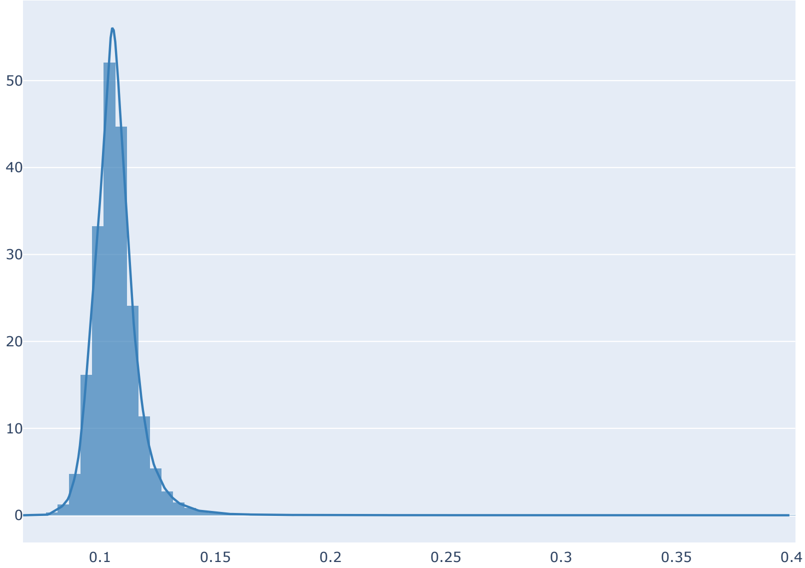


State-Vector for Equity Duration

Back

- 12 CPI-deflated accounting variables + 1 constant
  - clean surplus profitability,
  - book equity growth,
  - book to market,
  - payout yield,
  - sales yield,
  - asset growth,
  - sales growth,
  - ROE,
  - gross profitability,
  - market leverage,
  - book leverage,
  - cash holdings.
- Variable construction follows standard choice in the literature

Distribution of $dr_{j,t}$ ▸ Back



Equity Duration Time Series

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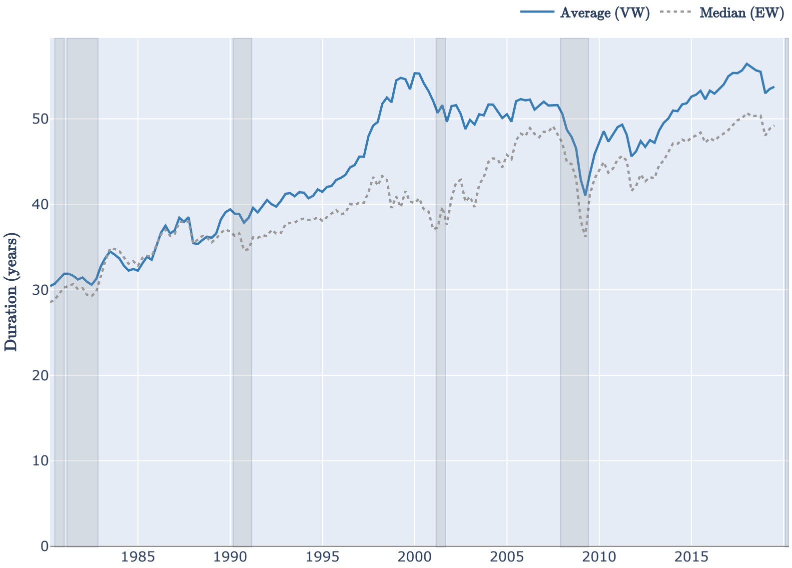


Equity Duration (Goncalves, 2021) ▸ Back

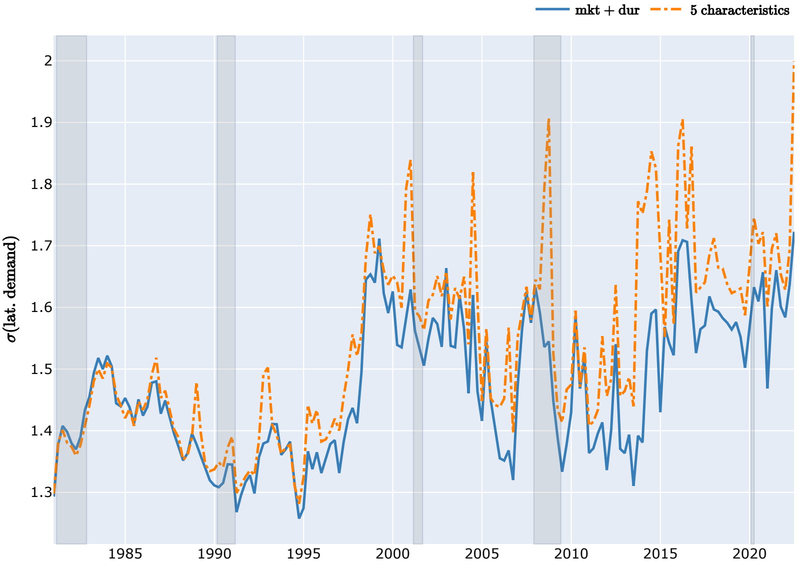
- Stocks' j payouts in t: $PO_{j,t}$ = dividends + repurchases − issuances
- $ME_{j,t} = \sum_{h=1}^{\infty} \mathbb{E}_t[PO_{j,t+h}] \cdot e^{-h \cdot dr_{j,t}}$
- Where $\mathbb{E}_t[PO_{j,t+h}]$ depends on state-vector $s_{j,t+h}$ (assumed to follow a VAR(1))

$$s_{j,t} = \Gamma\, s_{j,t-1} + u_{j,t}, \quad \text{where: } u_{j,t} \sim \mathcal{N}(0, \Sigma)$$

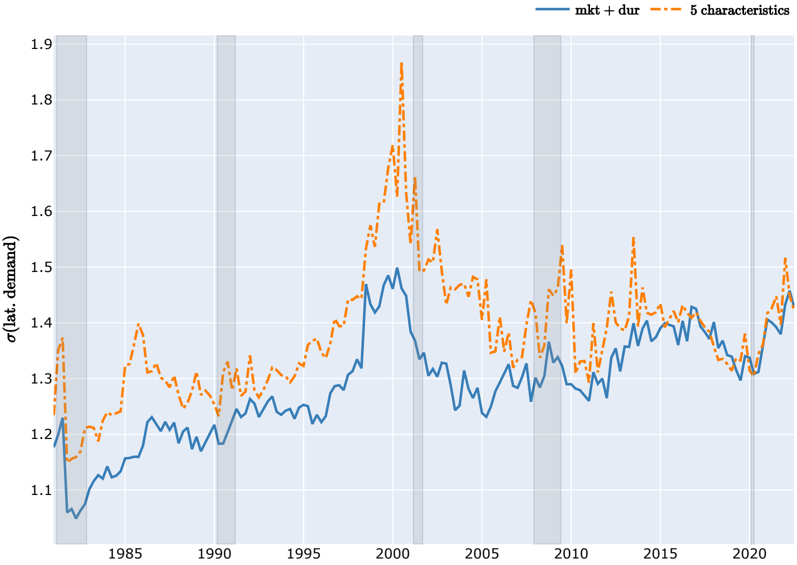
- Estimating VAR(1) parameters $\rightarrow\ \mathbb{E}_t[PO_{j,t+h}]\ \forall h = 1, \ldots$
- Finds $dr_{j,t}$ who makes hold: $ME_{j,t} = \sum \mathbb{E}_t[PO_{j,t+h}] \cdot e^{-h \cdot dr_{j,t}}$

$\rightarrow$ $Dur_{j,t} = \sum_{h=1}^{\infty} h \cdot \frac{e^{-dr_{j,t} \cdot h}\, \mathbb{E}_t[PO_{j,t+h}]}{ME_{j,t}}$

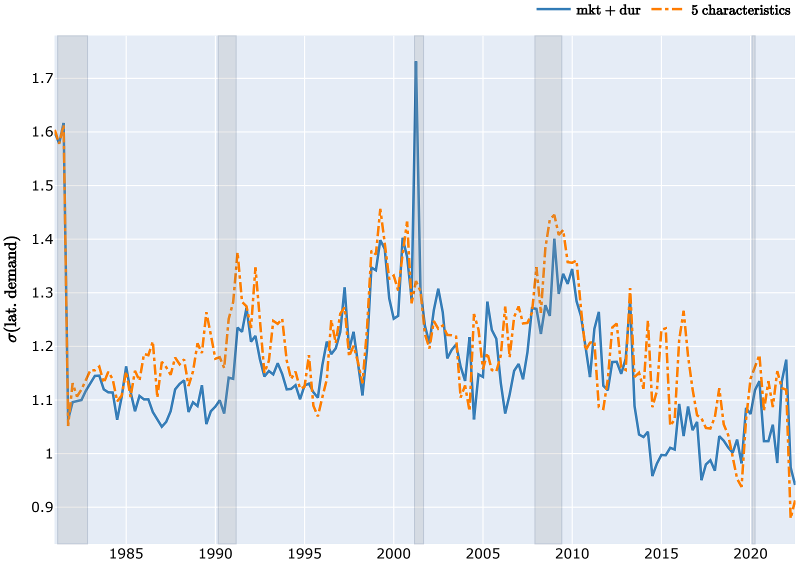
σ (*latent demand*) - Primary Dealers ▸ Back



σ (*latent demand*) - Banks ‣ Back



σ (*latent demand*) - Insurance Companies ▸ Back



σ (*latent demand*) - Pension Funds ▸ Back