Precautionary Savings with Risky Assets: When Cash Is Not Cash

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Motivation

- Traditional assumption in corporate finance models:

  Financial portfolios of industrial firms are only cash (or near-cash).

- But recent media coverage indicate that firms invest in a broader set of financial assets.

What do Duchin et al. do?

- Measure the financial portfolios of large U.S. industrial firms.
- Show how risky financial asset holdings change with firm characteristics.

Key Findings

- U.S. industrial firms invest heavily in risky financial assets
  - 40% of aggregate financial asset portfolio
  - 6% of aggregate book value
- Investments in risky financial assets are higher for less financially constrained firms.

Outline

Standard Approach to Measure Financial Portfolio

From the consolidated balance sheet,

- "Cash and cash equivalents" (*CH* in Compustat)
  - Financial assets with maturity of up to 90 days at issuance.
- "Short-term investments" (*IVST*)
  - Financial assets that the firm intends to liquidate within a year.
- The standard measure of financial assets is $CHE = CH + IVST$
- **Problem: Underestimate because *CHE* omits financial assets in "long-term investments" and "other assets".**

⏩ Apple 2007 10-K

Duchin et al. (2017) Approach

- In 2009, the SEC began requiring firms to disclose more information about their financial assets. ⏩ Apple 2011 10-K
- Duchin et al. (2017) hand-collect data from the footnotes to the balance sheet of all industrial firms in the S&P 500.
- They divide financial assets by riskiness and liquidity. ⏩ More

Aggregates by Riskiness

	Amount ($B)	% of Book Assets	% of *CHE*	% of Fin. Assets
Safe	983	9	77	62
Risky	611	6	48	38
Total	1,594	15	125	100

- Firms invest heavily in risky financial assets:
  - 40% of aggregate financial asset portfolio
  - 6% of aggregate book value
- *CHE* underestimates financial assets by 25%.

Aggregates by Liquidity

	% Liquid	% Illiquid
Safe	86	14
Risky	21	79
Total	63	37

- A substantial fraction of financial assets are illiquid contradicting traditional assumption in corporate finance model.
- Negative, but imperfect, correlation of riskiness and liquidity.

Outline

Main Question

- How does a firm's degree of financial constraint change the composition of its financial portfolio?
- Use the size of a firm's financial portfolio as proxy for the degree of financial constraint.
- Theoretical prediction is less financially constrained firms invest relatively more in risky and illiquid financial assets.

OLS Results

$$\textit{Risky financial assets}_{i,t} = \alpha_0 + \alpha_1 \textit{Financial assets}_{i,t} + \beta' X_{i,t} + \sum_s \textit{year}_s + \sum_j \textit{industry}_j + \varepsilon_{i,t}$$

Model	OLS
Dependent Variable	Risky Financial Assets/Financial Assets
Column	(1)
Financial assets	0.681*** [0.10
Market to book	0.00 [0.01
Size	0.044*** [0.009]
Cash flow	0.303* [0.165]
Net working capital	0.103 [0.088]
Capital expenditure	0.560** [0.226]
Leverage	0.039 [0.065]
Cash flow volatility	−0.377* [0.211]
Dividend dummy	−0.017 [0.020]
R&D expenditures	0.730*** [0.160]
Acquisition expenditures	0.089 [0.113]
Year fixed effects?	Yes
Industry fixed effects?	Yes
Adjusted R^2	0.330
N_obs	1,727

Endogeneity

- Firms likely jointly determine the size and composition of their financial portfolio.

  $\Longrightarrow$ A violation of the conditional mean independence assumption.

- Use two-stage least squares to exploit the variation in the portfolio size due to unexpected cash flow shocks. ▸▸ More

2SLS Results

$$\textit{Financial assets}_{i,t} = \alpha_0 + \alpha_1 \textit{Unexpected cash flow}_{i,t} + \beta' X_{i,t} + \sum_s \textit{year}_s + \sum_j \textit{industry}_j + \varepsilon^T_{i,t}$$

$$\textit{Risky financial assets}_{i,t} = \alpha_0 + \alpha_1 \textit{Financial assets}^*_{i,t} + \beta' X_{i,t} + \sum_s \textit{year}_s + \sum_j \textit{industry}_j + \varepsilon^R_{i,t}$$

		2SLS	
Model	OLS	First Stage	Second Stage
Dependent Variable	Risky Financial Assets/Financial Assets	Financial Assets/Book Assets	Risky Financial Assets/Financial Assets
Column	(1)	(2)	(3)
Financial assets	0.681***		
	[0.102]		
Unexpected cash flow		0.178***	
		[0.065]	
Financial assets*			0.296***
			[0.062]
Market to book	0.001	0.035***	0.022
	[0.010]	[0.008]	[0.021]
Size	0.044***	−0.016***	0.035***
	[0.009]	[0.006]	[0.013]
Cash flow	0.303*	0.159	0.416**
	[0.165]	[0.126]	[0.193]
Net working capital	0.103	−0.286***	−0.045
	[0.088]	[0.058]	[0.162]
Capital expenditure	0.560**	−0.590***	0.230
	[0.226]	[0.116]	[0.338]
Leverage	0.039	−0.162***	−0.036
	[0.065]	[0.036]	[0.106]
Cash flow volatility	−0.377*	0.433**	−0.120**
	[0.211]	[0.213]	[0.055]
Dividend dummy	−0.017	−0.024*	−0.031
	[0.020]	[0.013]	[0.025]
R&D expenditures	0.730***	0.821***	1.184**
	[0.160]	[0.151]	[0.460]
Acquisition expenditures	0.089	−0.374***	−0.119
	[0.113]	[0.068]	[0.218]
Year fixed effects?	Yes	Yes	Yes
Industry fixed effects?	Yes	Yes	Yes
Adjusted R^2	0.330	0.525	0.268
N_obs	1,727	1,727	1,727

Other Findings

- Duchin et al. (2017) also find that firms invest more in risky financial assets if they have
  - Worse corporate governance
  - A overconfident CEO
- They also find that industrial firms cannot generate a positive alpha through their risky financial asset holdings.
- They also develop a theory of industrial firms investing in risky and illiquid financial assets with predictions that are consistent with their empirical analysis.

Takeaways

- How we measure things is important. Make friends with accounts.
- Have RAs.

- Develop theory of industrial firms investing in risky and illiquid financial assets.

Apple 10-K (2007) Consolidated Balance Sheet

	September 29, 2007
ASSETS:	
Current assets:	
Cash and cash equivalents	$ 9,352
Short-term investments	6,034
Accounts receivable, less allowances of $47 and $52, respectively	1,637
Inventories	346
Deferred tax assets	782
Other current assets	3,805
Total current assets	21,956
Property, plant, and equipment, net	1,832
Goodwill	38
Acquired intangible assets, net	299
Other assets	1,222
Total assets	$ 25,347

Apple 10-K (2007) Note 2 Financial Instruments

Cash, Cash Equivalents and Short-Term Investments.

	September 29, 2007
Cash	$ 256
U.S. Treasury and Agency securities	670
U.S. Corporate securities	5,597
Foreign securities	2,829
Total cash equivalents	9,096
U.S. Treasury and Agency securities	358
U.S. Corporate securities	4,718
Foreign securities	958
Total short-term investments	6,034
Total cash, cash equivalents, and short-term investments	$ 15,386

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Apple 10-K (2011) Consolidated Balance Sheet

	September 24, 2011
ASSETS:	
Current assets:	
Cash and cash equivalents	$ 9,815
Short-term marketable securities	16,137
Accounts receivable, less allowances of $53 and $55, respectively	5,369
Inventories	776
Deferred tax assets	2,014
Vendor non-trade receivables	6,348
Other current assets	4,529
Total current assets	44,988
Long-term marketable securities	55,618
Property, plant and equipment, net	7,777
Goodwill	896
Acquired intangible assets, net	3,536
Other assets	3,556
Total assets	$ 116,371

Apple 10-K (2011) Note 2 Financial Instruments

Cash, Cash Equivalents and Marketable Securities.

	Adjusted Cost	Unrealized Gains	Unrealized Losses	Fair Value	Cash and Cash Equivalents	Short-Term Marketable Securities	Long-Term Marketable Securities
Cash	$ 2,903	$ 0	$ 0	$ 2,903	$ 2,903	$ 0	$ 0
Level 1:							
Money market funds	1,911	0	0	1,911	1,911	0	0
Mutual funds	1,227	0	(34)	1,193	0	1,193	0
Subtotal	3,138	0	(34)	3,104	1,911	1,193	0
Level 2:							
U.S. Treasury securities	10,717	39	(3)	10,753	1,250	2,149	7,354
U.S. agency securities	13,467	24	(3)	13,488	225	1,818	11,445
Non-U.S. government securities	5,559	11	(2)	5,568	551	1,548	3,469
Certificates of deposit and time deposits	4,175	2	(2)	4,175	728	977	2,470
Commercial paper	2,853	0	0	2,853	2,237	616	0
Corporate securities	35,241	132	(114)	35,259	10	7,241	28,008
Municipal securities	3,411	56	0	3,467	0	595	2,872
Subtotal	75,423	264	(124)	75,563	5,001	14,944	55,618
Total	$81,464	$ 264	$ (158)	$81,570	$ 9,815	$ 16,137	$ 55,618

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Classifying by Riskiness and Liquidity

- Riskiness is based on the Fed's money supply definitions:
  - *Safe* is money-like (M4 and L).
  - *Risky* is nonmoney-like (the rest).
- Liquidity is based on fair value levels:
  - *Liquid* is level 1 (market price available).
  - *Illiquid* is level 2 and 3 (no market price available).

- Example, equities are classified as risky and liquid.

More on Riskiness

Safe financial assets

- Cash
- Deposits
- Commercial paper
- Money market funds
- U.S. Treasuries

Risky financial assets

- Other government debt
  - Munis
  - Agency
  - Foreign
- Corporate
- ABS and MBS
- Equity
- Other

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Unexpected Cash Flows Shocks

- Unexpected cash flow shocks ($e_{i,t}$) are estimated with the pooled corss-sectional time-series model below:

$$\Delta CF_{i,t} = \alpha + \beta_1 \Delta CF_{i,t-1} + \beta_2 \Delta CF_{i,t-2} + \beta_3 \Delta CF_{i,t-3} + e_{i,t}$$

  where $\Delta CF_{i,t} \equiv CF_{i,t} - CF_{i,t-1}$ and $CF_{i,t}$ is the cash flow for firm i in year t.

- Identifying assumptions:
  - *Inclusion restriction:* Unexpected cash flow shocks affect the size of the firm's financial portfolio.
  - *Exclusion restriction:* Unexpected cash flow do not shocks affect the composition of the firm's financial portfolio.

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