Intermediary Asset Pricing: New Evidence from Many Asset Classes

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Motivation

- **Intermeidary Asset Pricing** highlights SDF of intermediary
- Intermediaries are more likely to be marginal investors
  - Intermediaries are active in almost all asset classes (but households might be only active in some)
  - Especially sophisticated asset classes say Options or CDS
- Theory proposes some proxies for pricing kernels (marginal value of wealth) of intermediaries
  - He-Krishnamurthy, Brunnermeier-Sannikov: intermediary net worth, which is directly linked to **capital ratio**=Equity/Asset
  - Capital ratio measures financial distress: the lower the capital ratio, the higher the marginal value of wealth
- **Primary Dealers**; constructing capital ratio

$$\frac{\Sigma_i MarketEquity_{it}}{\Sigma_i \left(MarketEquity_{it} + BookDebt_{it}\right)}$$

Results

- Apply the standard cross-sectional asset pricing tests for each asset class **separately**
  - Fama-French 25 portfolios (equity), US Bonds (Government and Corporate), Sovereign Bonds, Options, CDS, Commodities, and FX markets
- Positive prices of "intermediary capital risk" for all asset classes
  - Positive price: intermediaries value one dollar more in the state of low capital
  - Robust result on Options and CDS in alternative specifications
- Each market identifies a price of intermediary capital risk...theory says they should be equal
  - We do find quantitatively similar implied prices of risk (9% per quarter) in all asset classes
  - Not saying these markets are without segmentation.....

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Intermediary's Pricing Kernel and Capital Ratio

- We propose two-factor pricing kernel of intermediaries

$$\Lambda_t \propto (\eta_t W_t)^{-\gamma}, \text{ where } \gamma > 0$$

  - W_t is the aggregate wealth of the economy; CAPM intuition
  - η_t is the intermediary equity capital ratio
- Underlying two-dimensional states/shocks
  - **Fundamental shock**: Persistent technology shock driving the economic growth in general; mainly affect W_t
  - **Financial shock**: affecting soundness of the intermediary sector (e.g., agency/contracting considerations; or housing shocks affects bank's net worth mainly)

Why Equity Capital Ratio?

- Intermediaries value a dollar more when equity is low

$$\frac{\partial \Lambda_t}{\partial \eta_t} < 0$$

- A direct implication of macro-finance literature about balance sheet channel (Bernanke-Gertler, Holmstrom-Tirole)
  - Past losses eat the agent's net worth, more constrained as harder to obtain external financing, lower investment, etc
  - He-Krishnamurthy: risk-averse intermediary gets more distressed given smaller equity base (see paper for the model)
  - Other mechanisms: regulatory capital requirement; equity based on compensation; potential layoff; etc
- All we need is
  - Intermediaries are marginal
  - Their pricing kernel linked to capital ratio which proxies for distress—low capital, high marginal value of wealth

Constructing Intermediary Capital Ratio

- Intermediaries: **Primary Dealers**
  - Compustat/CRSP/Datastream data for publicly-traded holding companies of NY Fed-designated primary dealers (foreign too)
  - Why these? Large, active in effectively all markets
- **Capital ratio** at t is defined as

$$\eta_t = \frac{\Sigma_i MarketEquity_{it}}{\Sigma_i \left(MarketEquity_{it} + BookDebt_{it}\right)}$$

  - Market equity is shares outstanding times stock price
  - Book debt is total asset minus common equity: $AT - CEQ$
- **Intermediary capital risk factor**: construct AR(1) innovation of η_t, then scaled by lagged η_t

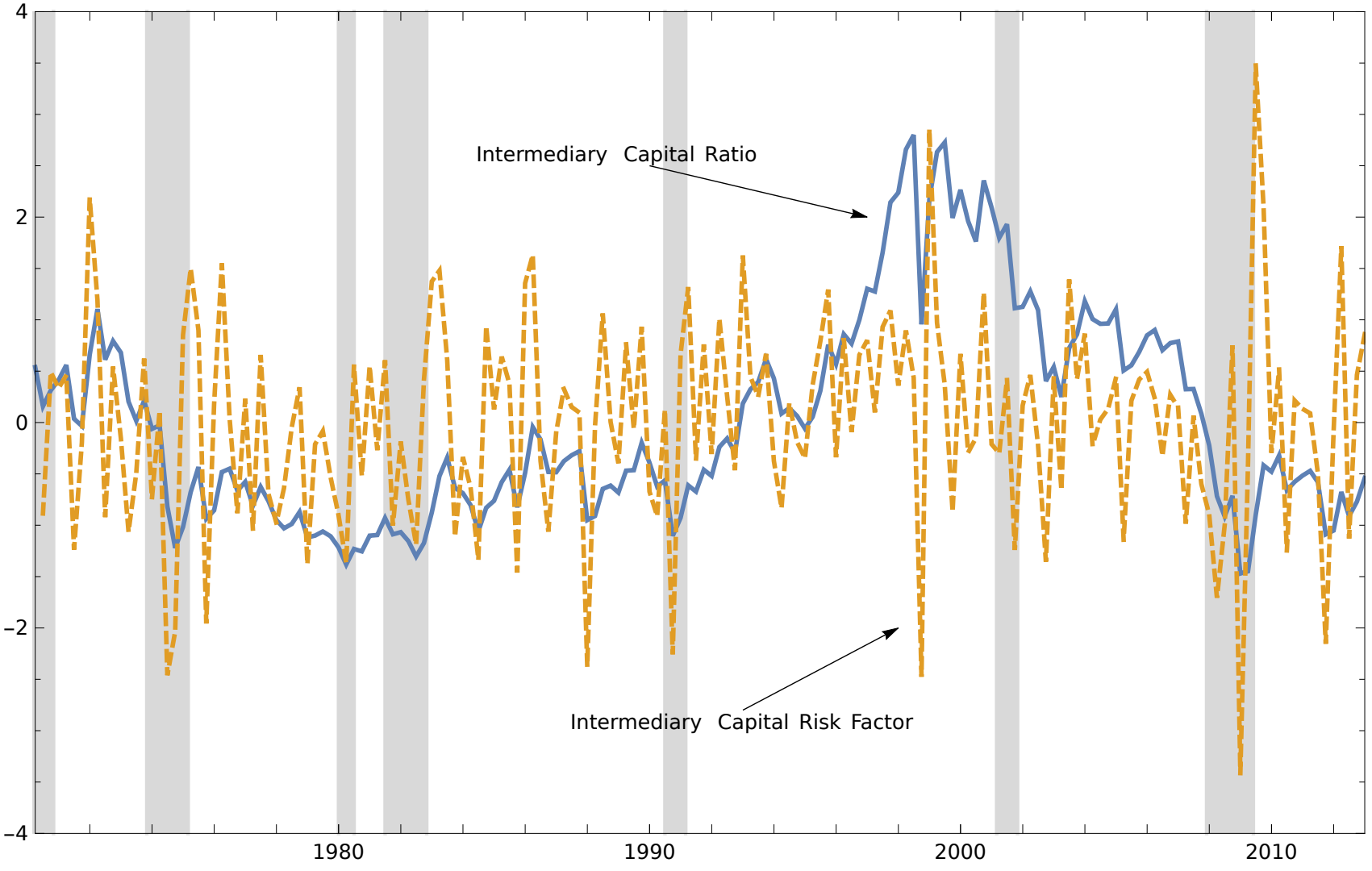
Primary Dealers as of February 11, 2014

Primary Dealer	Holding Company	Since
Goldman, Sachs & Co.	Goldman Sachs Group, Inc.	1974
Barclays Capital Inc.	Barclays PLC	1998
HSBC Securities (USA) Inc.	HSBC Holdings PLC	1999
BNP Paribas Securities Corp.	BNP Paribas	2000
Deutsche Bank Securities Inc.	Deutsche Bank AG	2002
Mizuho Securities USA Inc.	Mizuho Financial Group, Inc.	2002
Citigroup Global Markets Inc.	Citigroup Inc.	2003
UBS Securities LLC	UBS AG	2003
Credit Suisse Securities (USA) LLC	Credit Suisse Group AG	2006
Cantor Fitzgerald & Co.	Cantor Fitzgerald & Co	2006
RBS Securities Inc.	Royal Bank of Scotland Group	2009
Nomura Securities International,Inc	Nomura Holdings, Inc.	2009
Daiwa Capital Markets America Inc.	Daiwa Securities Group Inc.	2010
J.P. Morgan Securities LLC	JPMorgan Chase & Co.	2010
Merrill Lynch, Pierce, Fenner & Smith	Bank of America Corporation	2010
RBC Capital Markets, LLC	Royal Bank Holding Inc.	2010
SG Americas Securities, LLC	Societe Generale	2011
Morgan Stanley & Co. LLC	Morgan Stanley	2011
Bank of Nova Scotia, NY Agency	Bank of Nova Scotia	2011
BMO Capital Markets Corp.	Bank of Montreal	2011
Jefferies LLC	Jefferies LLC	2013
TD Securities (USA) LLC	Toronto-dominion Bank	2014

Representativeness of Primary Dealers

	Total Assets			Book Debt			Market Equity		
	BD	Banks	Cmpust.	BD	Banks	Cmpust.	BD	Banks	Cmpust.
1960-2012	0.959	0.596	0.240	0.960	0.602	0.280	0.911	0.435	0.026
1960-1990	0.997	0.635	0.266	0.998	0.639	0.305	0.961	0.447	0.015
1990-2012	0.914	0.543	0.202	0.916	0.550	0.240	0.848	0.419	0.039

Capital Ratio (State Variable and Factor)



Correlations with Other Macro Variables

	Market Capital Ratio corr(state variable,level)	Market Capital Ratio corr(factor,growth)
Book Capital Ratio	0.50	0.30
Market Excess Return		0.78
E/P	-0.83	-0.75
Unemployment	-0.63	-0.05
GDP	0.18	0.20
Financial Conditions	-0.48	-0.38
Market Volatility	-0.06	-0.49

- Equity capital ratio is procyclical

Test Portfolios

- **Equity**: Fama-French 25 size/value portfolios
- **US Bonds**:
  - Government: Fama 10 maturity sorted portfolios from CRSP
  - Corporate: 10 spread sorted portfolios of Nozawa (2014) who combines TRACE, Lehman, etc
- **Sovereign Bonds:** 6 portfolios of Borri and Verdelhan (2012)
- **Options**: 18 portfolios of S&P 500 index options sorted on moneyness and maturity from Constantinides et al. (2013)
- **CDS**: 20 portfolios sorted on spread using individual name 5-year CDS from Markit beginning in 2001
- **Commodities**: Commodities Research Bureau, Yang (2013)
- **FX**:
  - 6 portfolios sorted on yield differential (Lettau et al., 2014)
  - 6 portfolios sorted on momentum (Menkhoff et al., 2012)
- **All Ptfs.**: Combines all classes into single large cross section

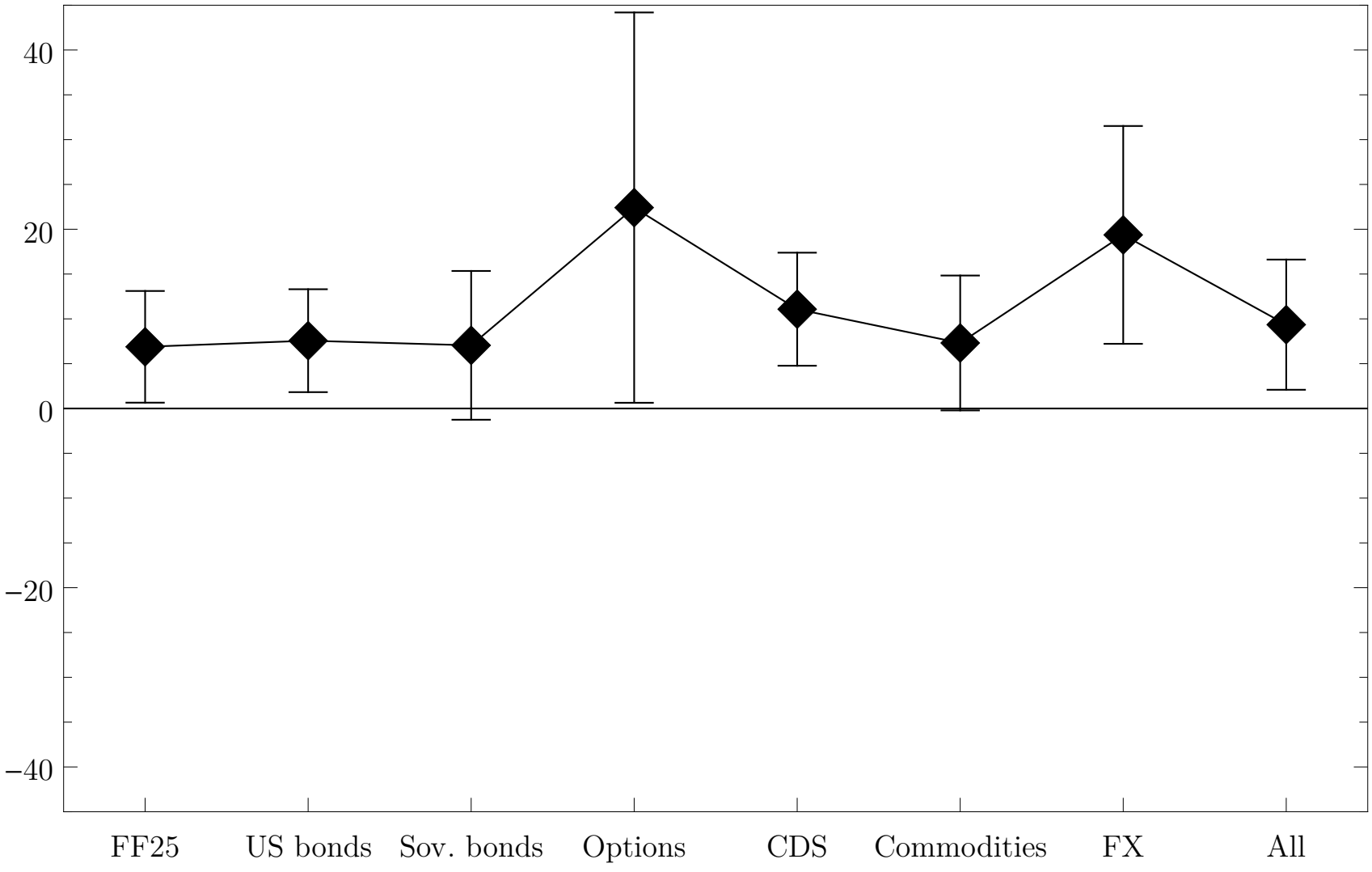
Empirical Design

- Portfolio i in asset class k
- Cross-section: first-order condition (pricing kernel equation $\mathbb{E}\left[mR_k^i\right] = 1$)

$$\mathbb{E}\left[R_k^i\right] - R_f = \lambda_k^\eta \beta_k^{i,\eta} + \lambda_k^W \beta_k^{i,W} + \nu_k^i$$

  - Risk loadings β_k^i from a first-stage time-series regression
  - Fama-Macbeth to estimate λ_k^η for asset class k
- Separately estimate risk price within each asset class, then do this once for all portfolios
  - Theory says $\lambda_k^\eta = \lambda^\eta$ for the same factor (only depends on the pricing kernel m)

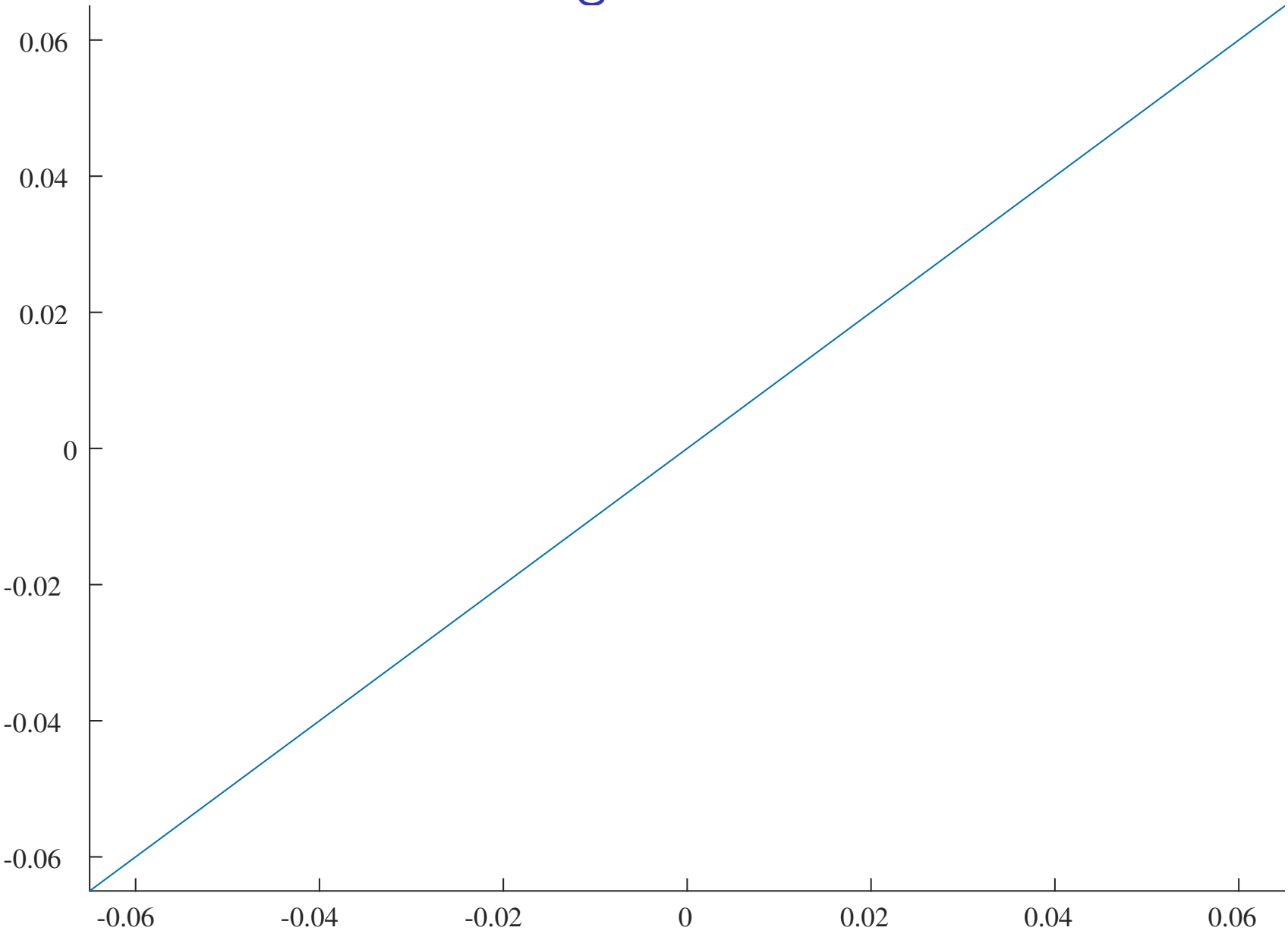
Intermediary Capital Risk Price $\hat{\lambda}^{\eta}$ by Asset Class



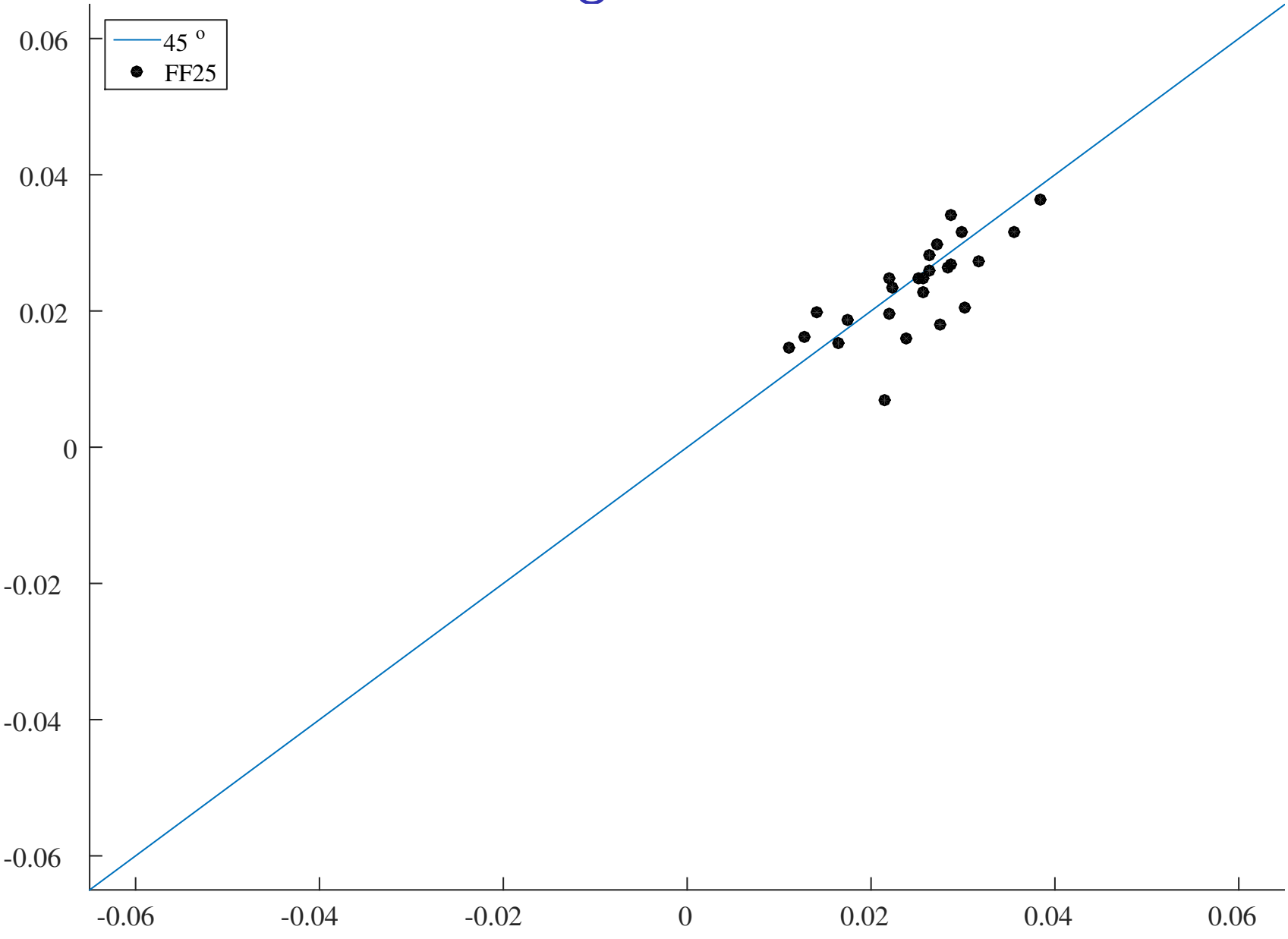
Cross-sectional Results by Asset Class 1970Q1–2012Q4

	FF25	US bonds	Sov. bonds	Options	CDS	Commod.	FX	All
Capital	6.88	7.56	7.04	22.41	11.08	7.31	19.37	9.35
	(2.16)	(2.58)	(1.66)	(2.02)	(3.44)	(1.90)	(3.12)	(2.52)
Market	1.19	1.42	1.24	2.82	1.11	-0.55	10.14	1.49
	(0.78)	(0.82)	(0.32)	(0.67)	(0.41)	(-0.25)	(2.17)	(0.80)
Intercept	0.48	0.41	0.34	-1.11	-0.39	1.15	-0.94	-0.00
	(0.36)	(1.44)	(0.33)	(-0.31)	(-2.77)	(0.83)	(-0.83)	(-0.00)
R^2	0.53	0.84	0.81	0.99	0.67	0.25	0.53	0.71
MAPE, %	0.34	0.13	0.32	0.14	0.18	1.15	0.44	0.63
MAPE-R, %	0.40	0.26	0.45	0.68	0.39	1.40	0.62	0.63
RRA	2.71	3.09	2.52	8.90	3.61	2.88	8.26	3.69
Sharpe ratio	1.08	1.20	1.04	3.50	1.56	1.13	3.13	1.46
Assets	25	20	6	18	20	23	12	124
Quarters	172	148	65	103	47	105	135	172

Actual vs. Predicted Average Excess Returns



Actual vs. Predicted Average Excess Returns



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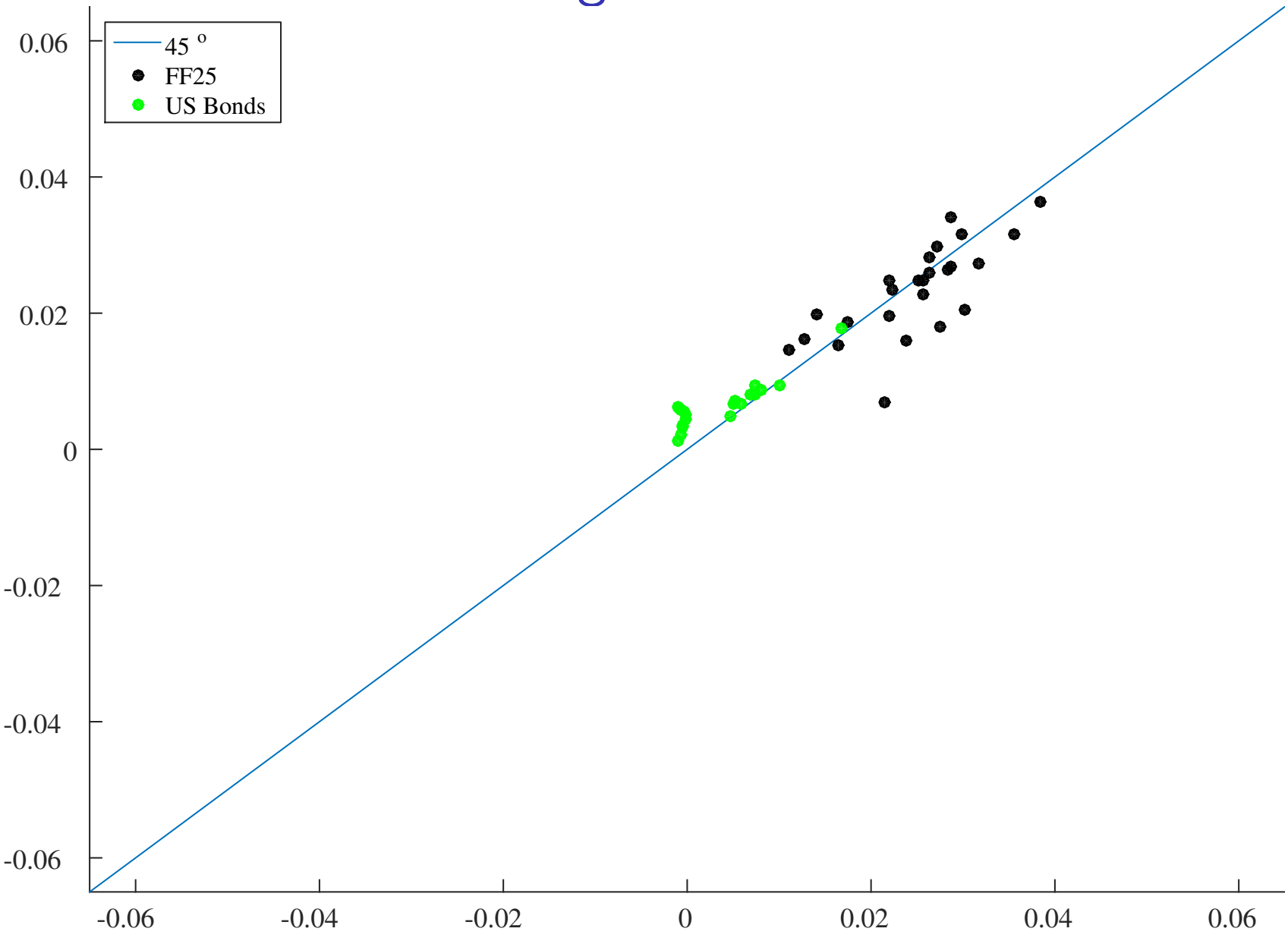

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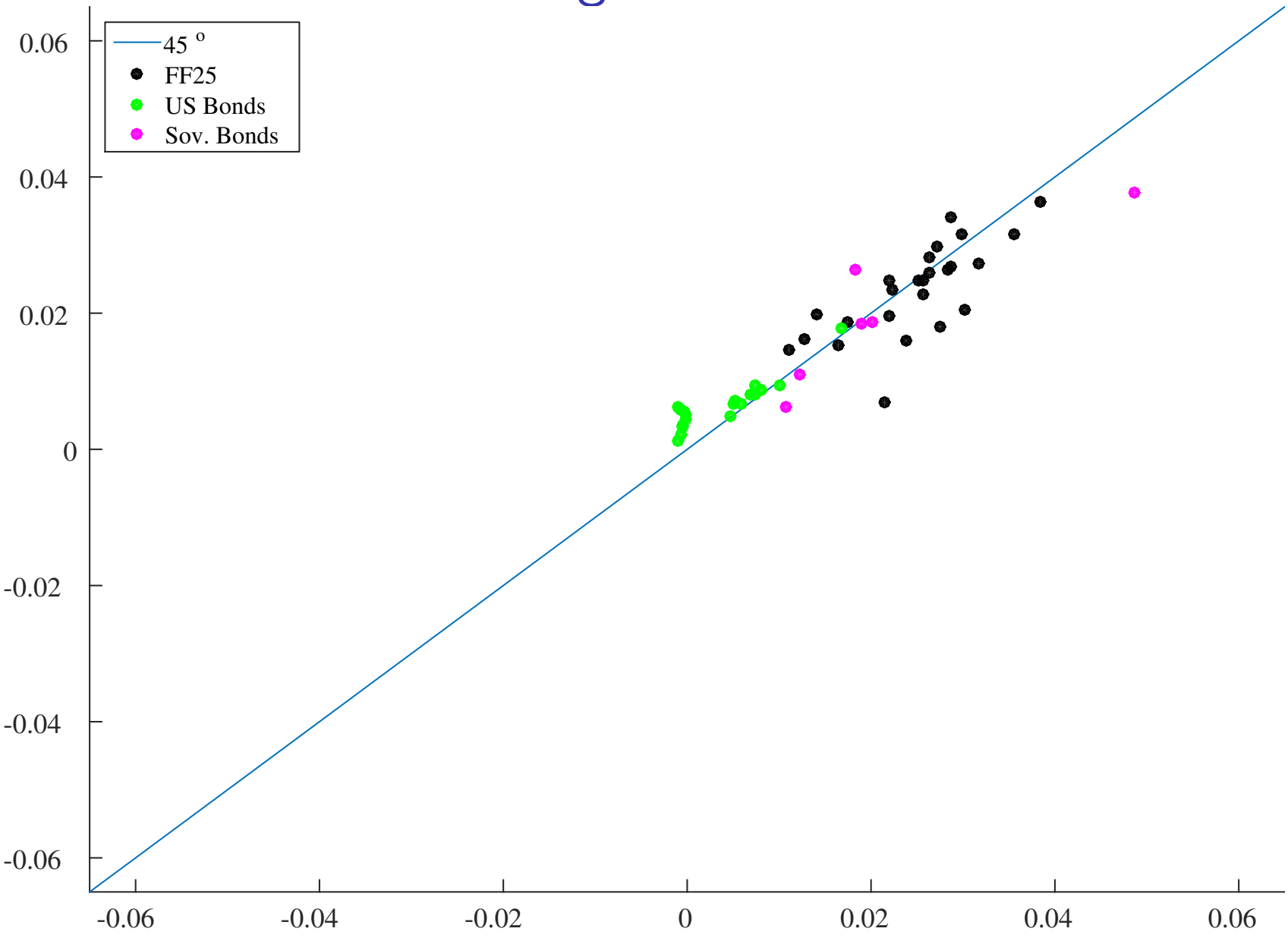

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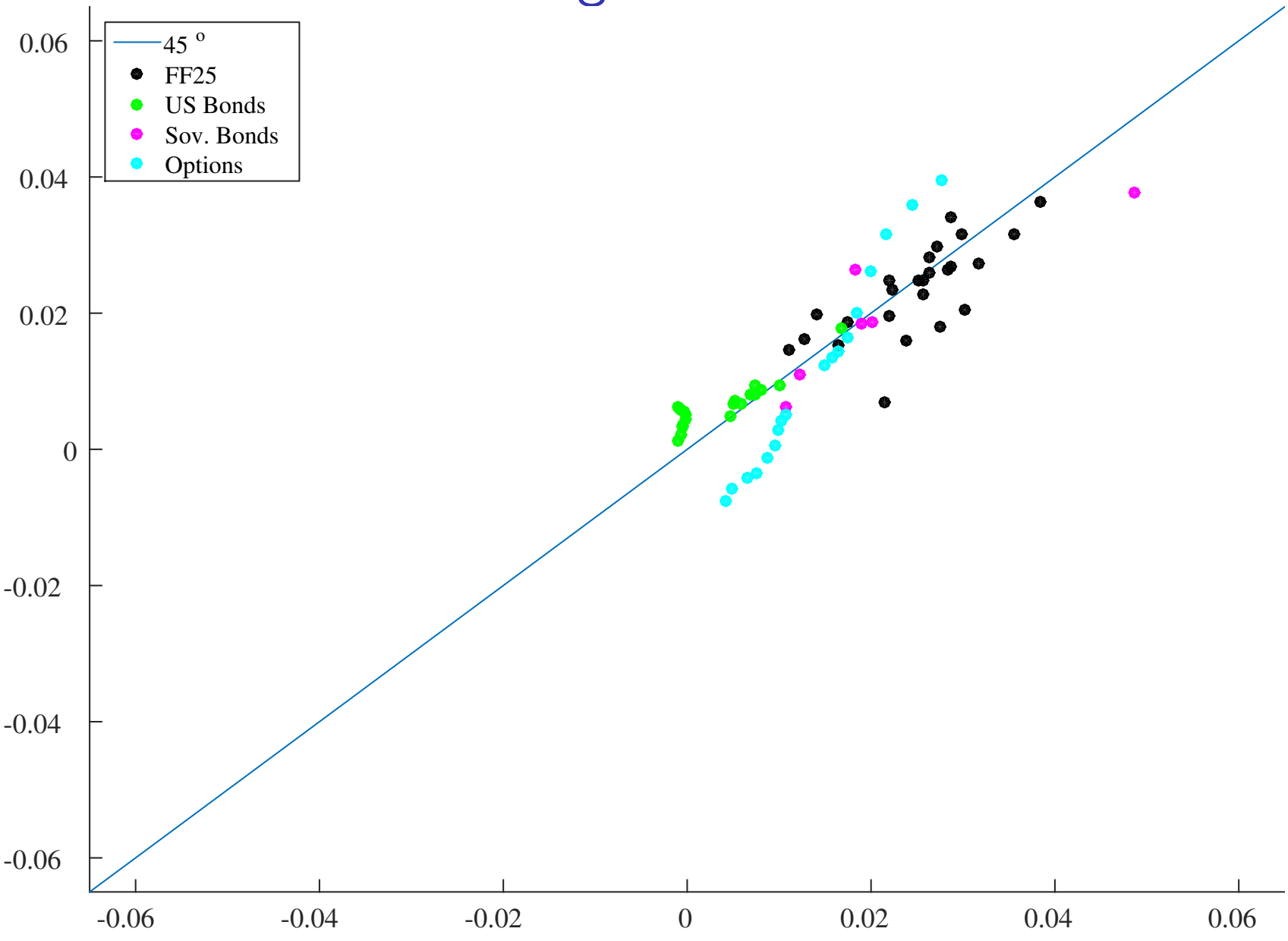

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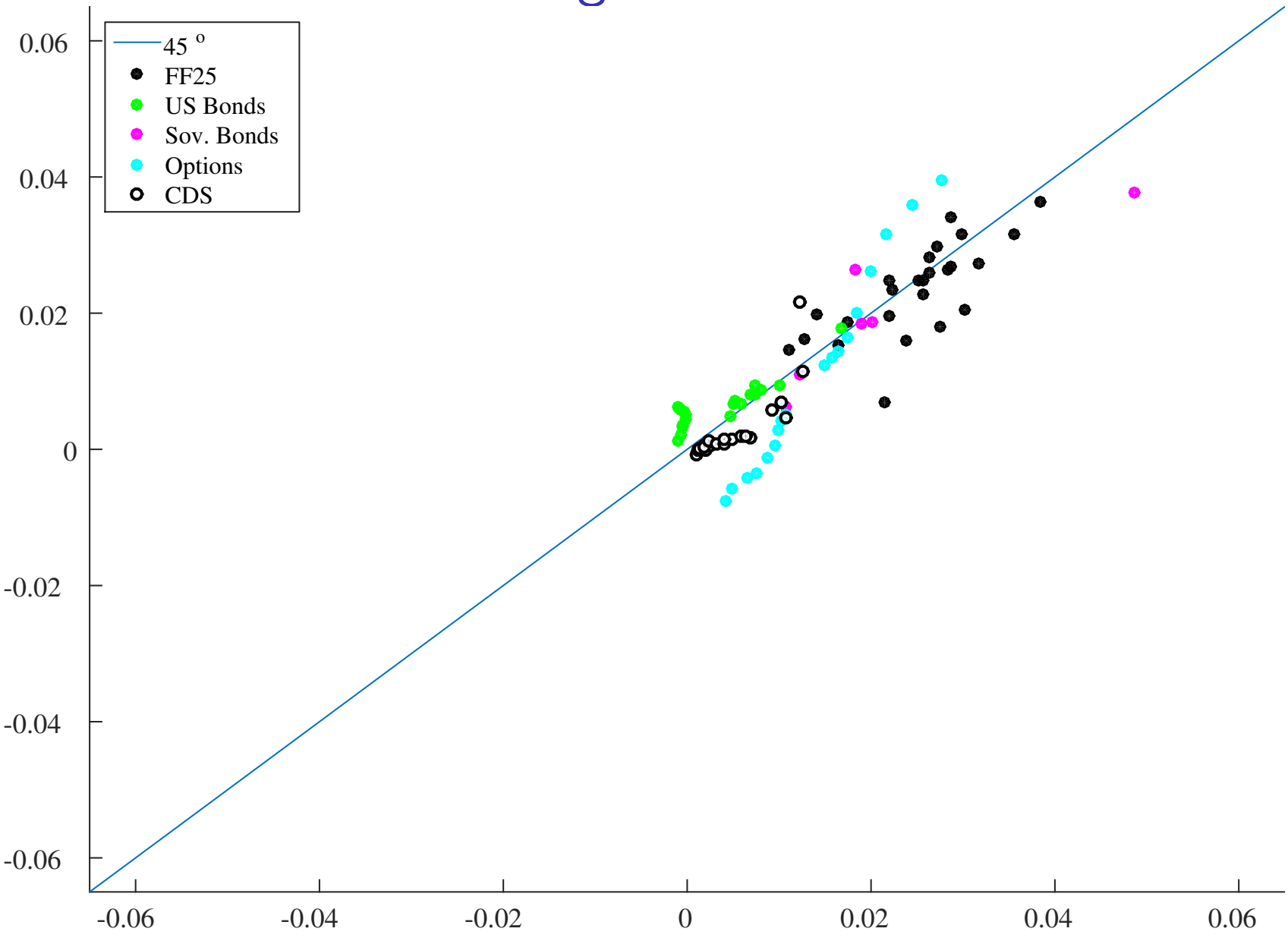

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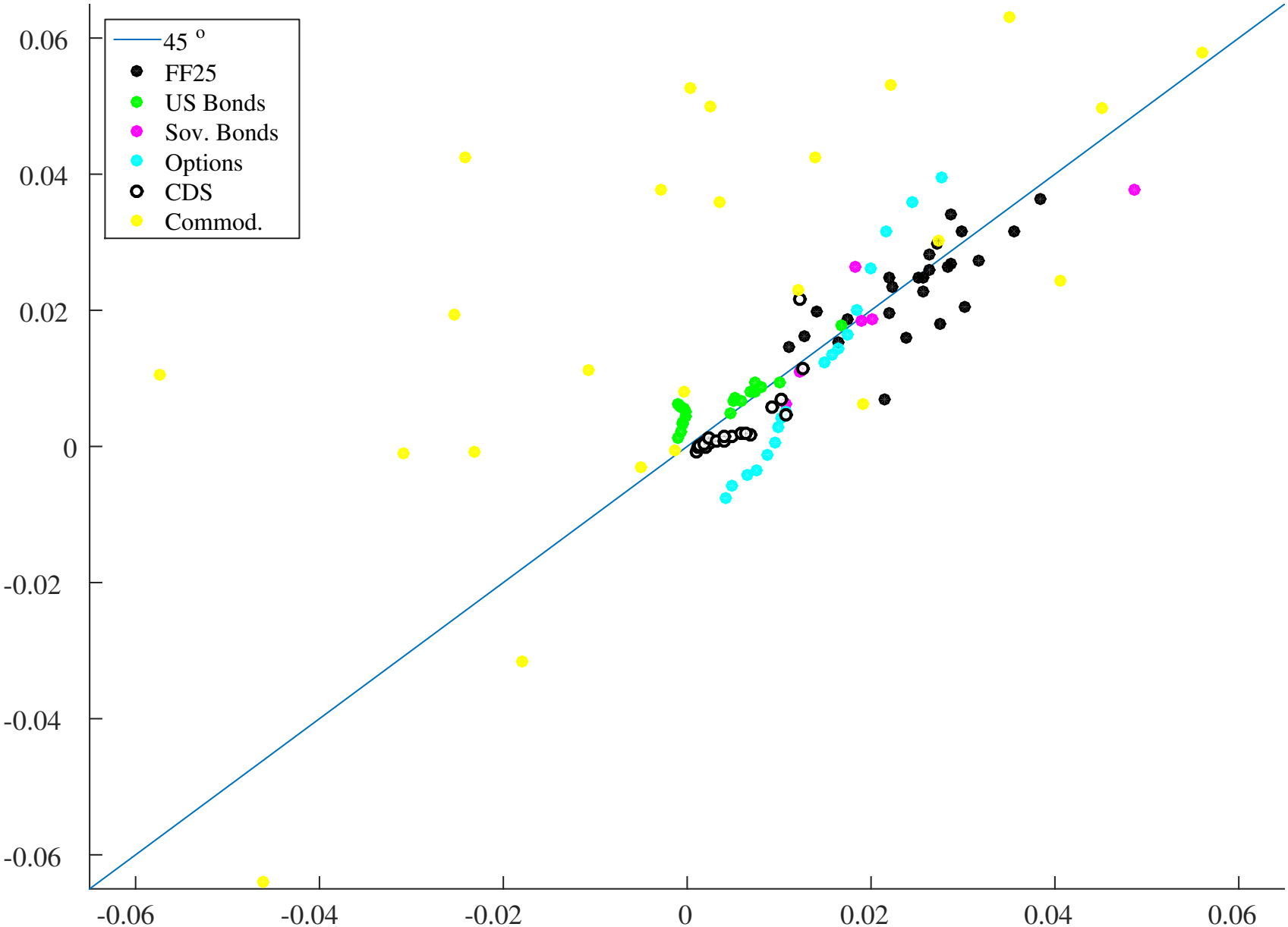

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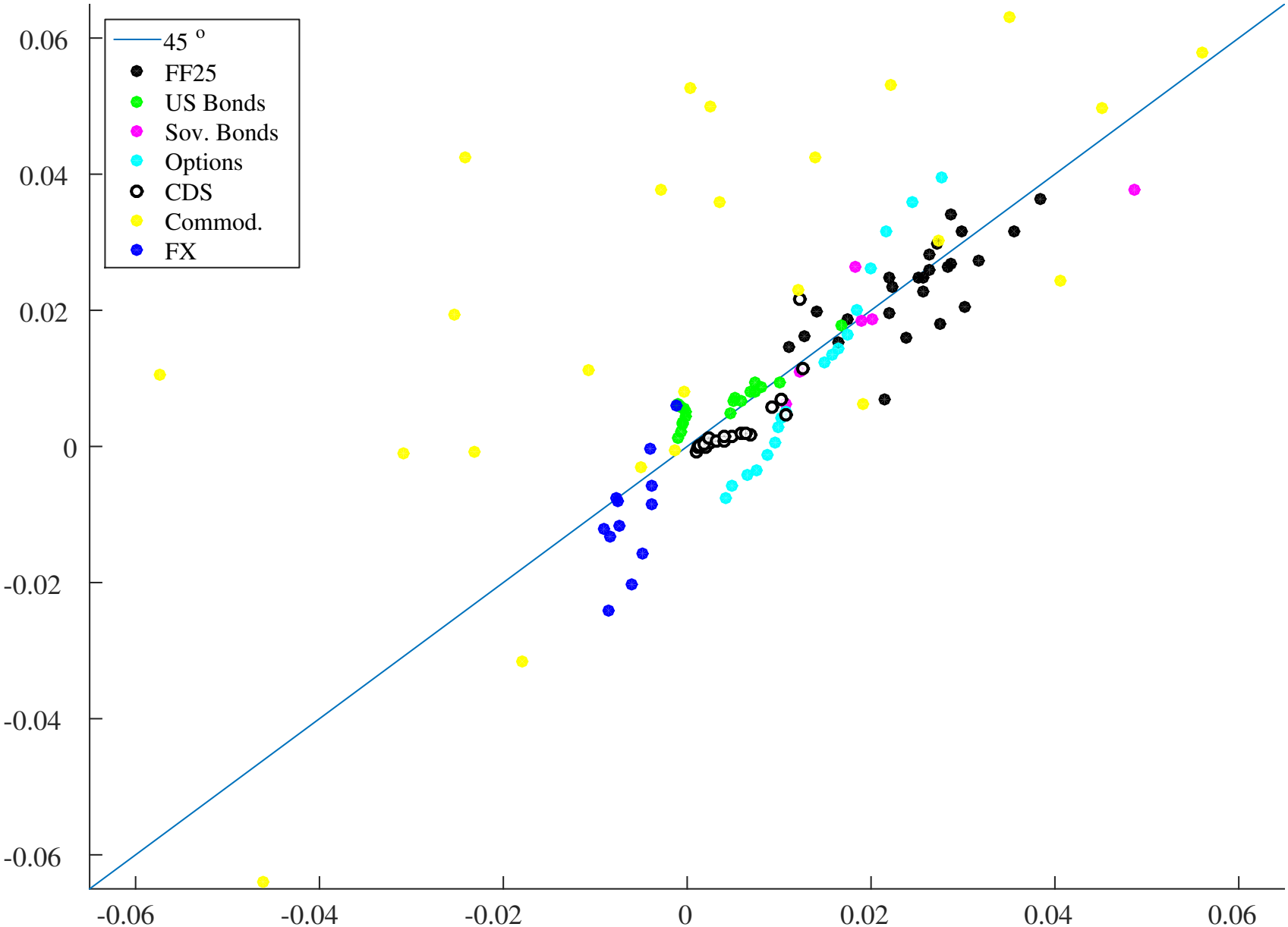

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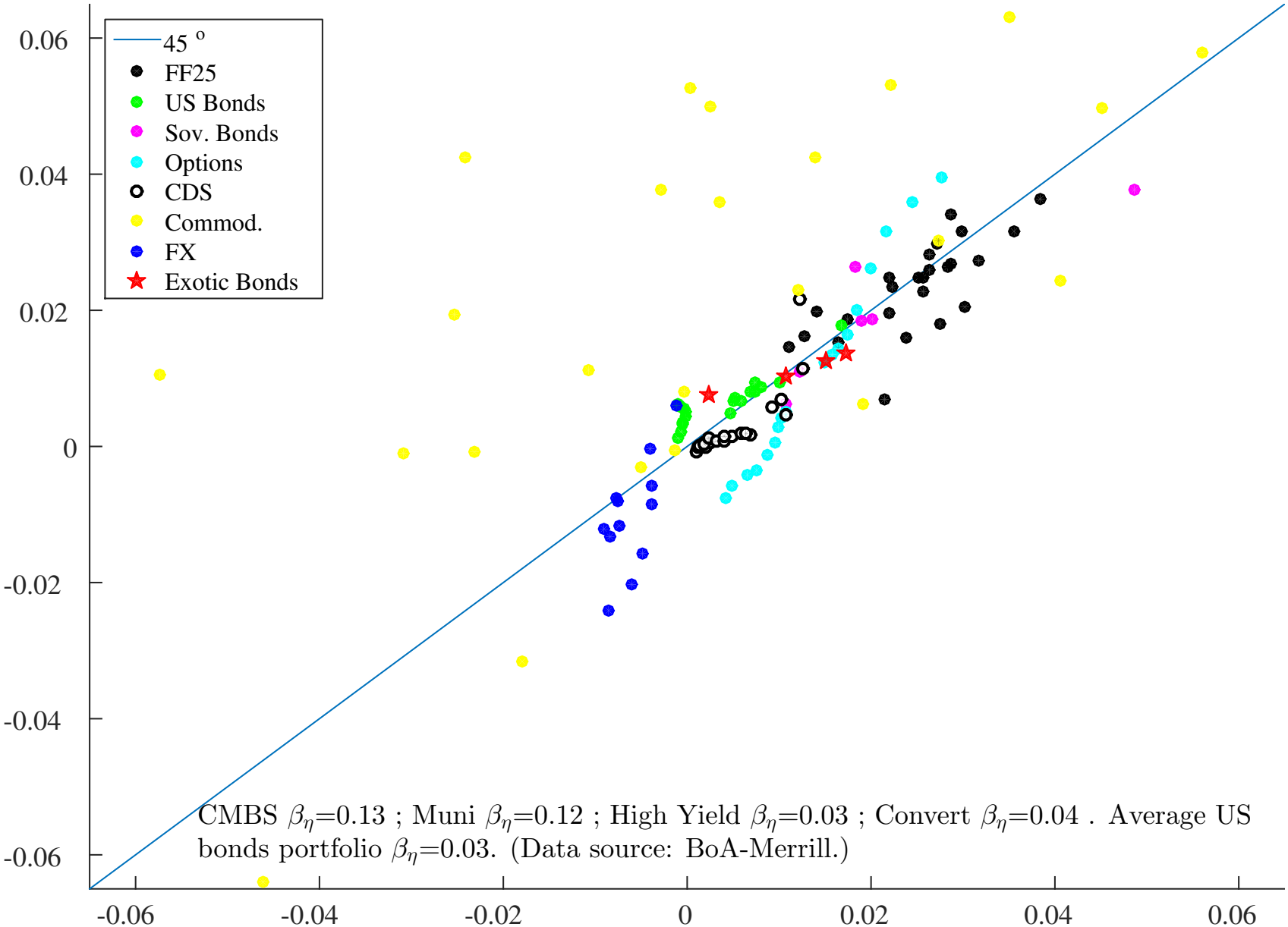

Capital Ratio vs. Other Pricing Factors

Benchmark:	CAPM	FF3F	FF5F	Momentum	PS-liquidity	LMW
Capital	9.35	9.14	8.81	9.69	7.87	7.56
	(2.52)	(1.98)	(2.46)	(2.84)	(1.75)	(1.76)
Market	1.49	1.62	1.33	1.54	1.21	
	(0.80)	(0.90)	(0.74)	(0.81)	(0.69)	
SMB		0.39	0.59			
		(0.42)	(0.68)			
HML		2.23	2.01			
		(1.36)	(1.46)			
CMA			-0.33			
			(-0.09)			
RMW			0.08			
			(0.04)			
MOM				-1.20		
				(-0.14)		
PS^{nt}					5.71	
					(0.64)	
LMW^{-}						0.77
						(0.58)
LMW						0.63
						(0.31)
Adj. R^2	0.71	0.80	0.69	0.73	0.67	0.70
MAPE, %	0.63	0.65	0.62	0.61	0.59	0.63
RRA	3.69	3.32	3.50	3.74	2.61	2.58
Assets	124	124	124	124	124	124
Quarters	172	172	172	172	172	172
Adj. R^2 w/o Capital	0.32	0.65	0.65	0.27	0.67	0.50
MAPE w/o Capital	0.85	0.86	0.82	0.85	0.83	0.87

Placebo Test: Are Primary Dealers Special?

What if we use capital risk factor constructed based on non-primary brokers?

	FF25	US bonds	Sov. bonds	Options	CDS	Commod.	FX	All
Capital	16.25	12.37	43.26	-85.93	66.77	-10.20	-2.61	11.03
	(2.45)	(0.69)	(1.24)	(-2.33)	(2.55)	(-1.52)	(-0.12)	(1.04)
Market	-2.45	3.82	5.56	-6.53	6.86	-0.87	11.76	1.40
	(-1.66)	(2.51)	(1.74)	(-1.20)	(2.99)	(-0.49)	(2.45)	(0.80)
Intercept	4.40	0.38	0.26	7.22	-0.41	-0.38	-2.14	0.25
	(3.36)	(1.49)	(0.22)	(1.48)	(-2.72)	(-0.62)	(-2.14)	(0.95)
R^2	0.54	0.82	0.81	0.97	0.86	0.11	0.50	0.46
MAPE, %	0.36	0.14	0.32	0.23	0.15	1.30	0.45	0.90
MAPE-R, %	0.62	0.30	1.29	1.33	0.34	1.67	1.06	0.90
RRA	1.94	1.49	3.95	-10.95	5.16	-1.33	-0.34	1.32
Assets	25	20	6	18	20	23	12	124
Quarters	165	148	65	103	47	105	135	172

Equity Shock vs Debt Shock?

Decompose capital shock into equity growth shock and debt growth shock

	FF25	US bonds	Sov. bonds	Options	CDS	Commod.	FX	All
ME	7.22	4.72	5.03	13.77	5.56	8.72	19.13	9.71
	(1.62)	(1.34)	(0.86)	(1.54)	(1.32)	(1.56)	(4.30)	(2.35)
BD	-2.00	4.09	-6.89	-5.85	-10.19	2.06	-0.18	-0.26
	(-1.51)	(1.53)	(-2.24)	(-0.93)	(-2.12)	(1.14)	(-0.08)	(-0.07)
Market	0.76	4.54	1.85	0.91	-0.52	0.00	8.62	1.68
	(0.46)	(2.01)	(0.48)	(0.19)	(-0.17)	(0.00)	(2.12)	(0.93)
Intercept	0.85	0.22	-0.19	-0.06	-0.42	0.43	-0.79	-0.18
	(0.56)	(1.19)	(-0.12)	(-0.02)	(-3.25)	(0.38)	(-0.76)	(-0.40)
R^2	0.51	0.89	0.90	0.99	0.86	0.28	0.54	0.77
MAPE, %	0.35	0.09	0.29	0.12	0.15	1.21	0.44	0.64
MAPE-R, %	0.44	0.41	0.47	0.68	0.22	1.53	0.52	0.64
RRA	2.39	1.55	1.38	4.20	1.50	2.65	6.57	3.21
Assets	25	20	6	18	20	23	12	124
Quarters	172	148	65	103	47	105	135	172

Intermediary Equity Return as Factor

Primary dealers' equity return as single factor (direct test of He-Krishnamurthy with log preferences)

	FF25	US bonds	Sov. bonds	Options	CDS	Commod.	FX	All
Capital	-0.38	5.31	6.22	14.16	9.32	0.94	18.97	3.41
	(-0.14)	(3.10)	(1.77)	(2.99)	(2.91)	(0.31)	(3.44)	(1.07)
Intercept	2.43	0.35	0.39	-5.19	-0.37	0.29	-1.08	-0.03
	(1.79)	(1.68)	(0.48)	(-2.67)	(-3.73)	(0.46)	(-1.38)	(-0.06)
R^2	0.00	0.84	0.72	0.94	0.63	0.00	0.58	0.40
MAPE, %	0.56	0.13	0.46	0.32	0.20	1.39	0.42	0.78
MAPE-R, %	0.54	0.44	1.14	1.02	0.20	1.41	1.05	0.78
RRA	-0.21	2.99	3.12	7.73	4.15	0.50	11.14	1.92
Assets	25	20	6	18	20	23	12	124
Quarters	172	148	65	103	47	105	135	172

	FF25	US bonds	Sov. bonds	Options	CDS	Commod.	FX	All
Capital	5.97	6.62	6.94	28.50	12.96	6.94	19.26	8.69
	(1.89)	(2.55)	(1.52)	(1.71)	(3.00)	(1.77)	(3.40)	(2.39)
Market	1.38	2.17	2.39	2.92	1.62	0.06	8.63	1.74
	(0.89)	(1.15)	(0.60)	(0.54)	(0.56)	(0.03)	(1.81)	(0.97)
Intercept	0.33	0.29	0.27	-1.08	-0.40	0.65	-0.75	-0.22
	(0.24)	(2.23)	(0.22)	(-0.24)	(-2.60)	(0.57)	(-0.68)	(-0.26)
R^2	0.45	0.85	0.74	0.99	0.68	0.26	0.59	0.68
MAPE, %	0.39	0.12	0.43	0.16	0.19	1.22	0.44	0.61
MAPE-R, %	0.48	0.32	0.47	0.76	0.16	1.37	0.51	0.61
RRA	2.14	2.39	2.26	10.09	3.76	2.43	7.34	3.12
Assets	25	20	6	18	20	23	12	124
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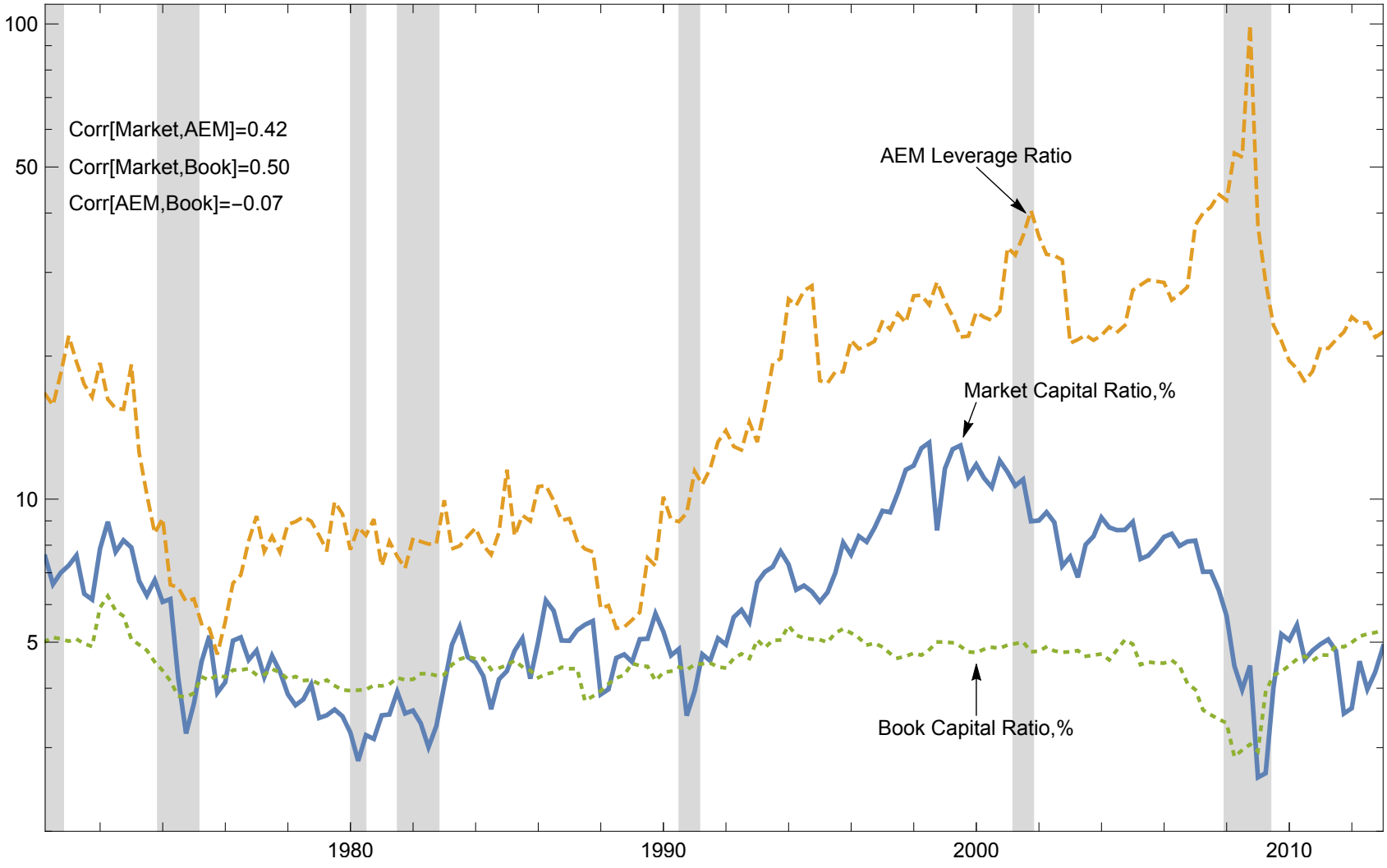
Comparison to Adrian-Etula-Muir (2014)

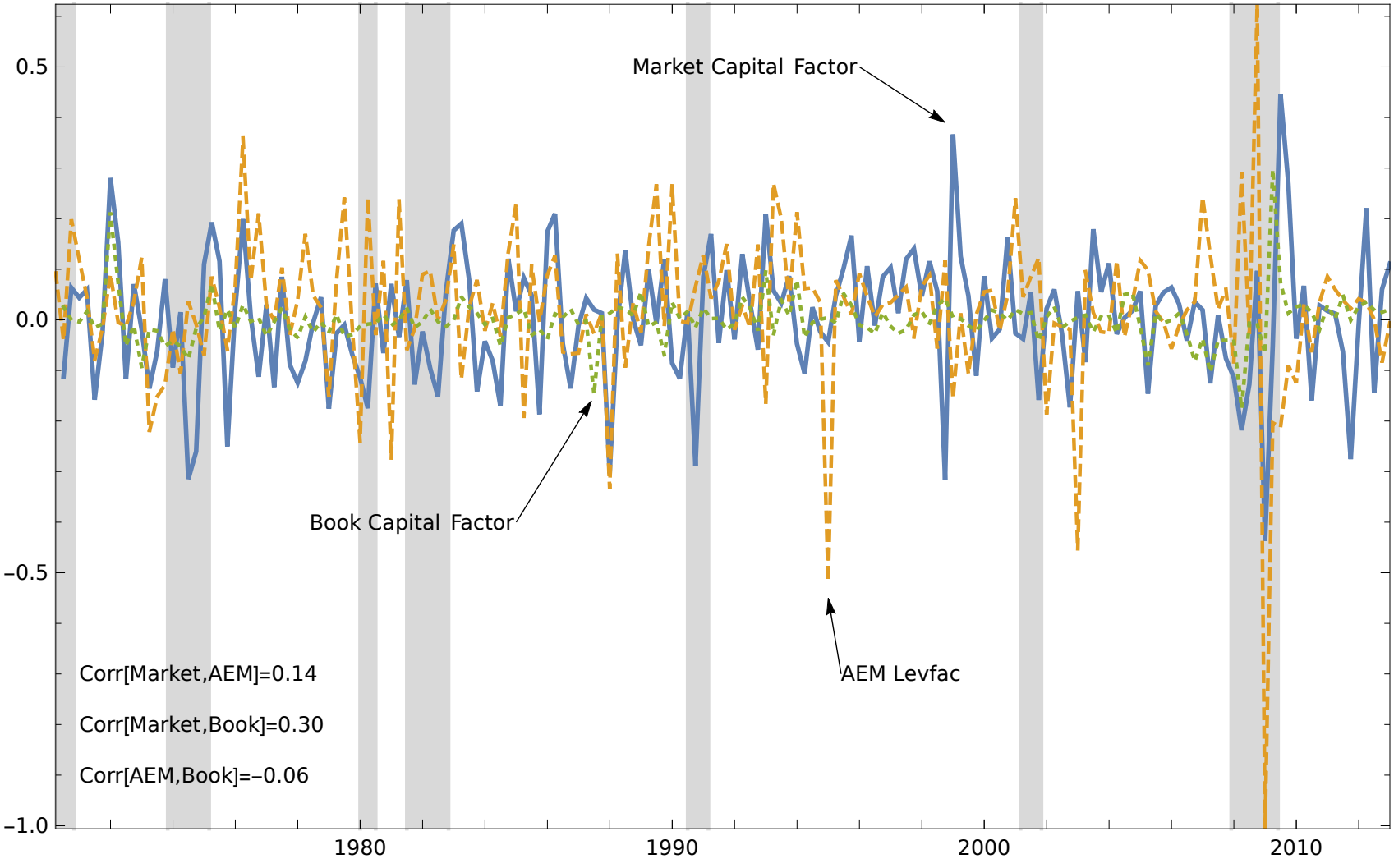
- An important paper: Adrian-Etula-Muir (JF, 2014, later AEM)
  - Broker-dealer leverage in **Flow of Funds** explains the cross-section of expected returns (mainly **equities and bonds**)
  - Leverage is procyclical (high leverage in good times); positive price of risk for leverage factor
- We focus on **Primary Dealers** (from NY Fed website) who are *significant and active players* in most markets
- We construct the capital ratio using **Compustat-CRSP**, hence using market information
  - Implied leverage ($\frac{1}{\text{capital ratio}}$) is counter-cyclical, in direct contrast to AEM
  - Will explain in detail what drives the difference
- Empirically, our factor works in **all asset classes** in a consistent manner, unlike the AEM factor

AEM Leverage and Intermediary Capital Ratio: Level



- Leverage and capital ratio should be **negatively** correlated...

AEM Leverage and Intermediary Capital Ratio: Factor



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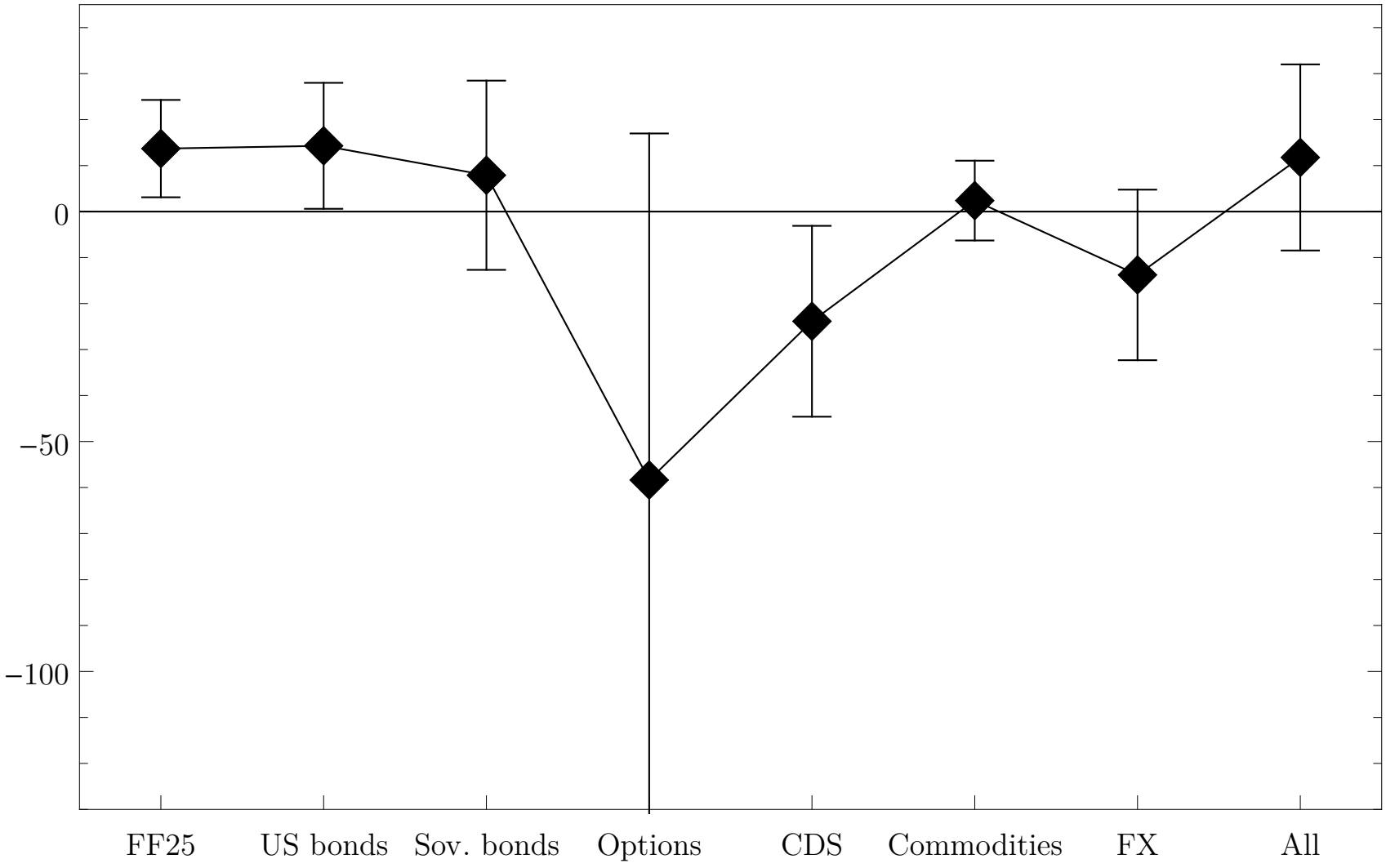
AEM Leverage Factor Risk Price by Asset Class



AEM vs. Capital Factor

	FF25	US bonds	Sov. bonds	Options	CDS	Commod.	FX	All
Capital	-1.53	7.73	10.59	12.59	5.76	9.03	14.30	8.23
	(-0.32)	(3.32)	(2.95)	(1.00)	(2.59)	(1.38)	(2.92)	(1.99)
Market	0.57	2.48	0.37	1.83	2.17	0.18	7.10	1.44
	(0.29)	(0.73)	(0.07)	(0.44)	(1.01)	(0.09)	(1.90)	(0.76)
AEM	18.26	13.44	-11.77	-25.60	-20.80	5.73	-12.34	4.85
	(2.23)	(1.88)	(-0.56)	(-0.85)	(-3.24)	(0.70)	(-1.38)	(0.61)
Intercept	1.18	0.28	-0.84	-1.12	-0.16	1.05	-1.17	0.05
	(0.64)	(0.63)	(-0.78)	(-0.36)	(-1.94)	(0.60)	(-1.02)	(0.05)
R^2	0.71	0.88	0.85	0.99	0.94	0.30	0.62	0.62
MAPE, %	0.27	0.11	0.29	0.10	0.09	1.14	0.38	0.62
MAPE-R, %	0.40	0.23	0.40	0.79	0.40	1.28	0.72	0.62
RRA	-0.54	2.85	3.39	4.49	1.58	3.22	5.63	2.93
Assets	25	20	6	18	20	23	12	124
Quarters	172	148	65	103	47	105	135	172

Potential Difference from AEM

- It is intriguing that we have countercyclical leverage while AEM have procyclical leverage
- Equilibrium leverage pattern depends on the theory you write (either equity-constraint or debt-constraint)
- But what differ in our data?

	AEM	HKM
Data Source	Flow of Funds	CRSP/Compustat/Datastream
Universe	Public+Private	Public
Book vs. Market	Book values	Market equity, book debt
Reporting if hold. co.	BD operations only	Holding company

- Importance of private/public distinction unlikely due to size concentration (can show that even in public universe, all driven by largest 25 firms)

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Book vs Market

- One common thought: FoF is accounting data (**book** leverage), while we use **market** leverage
- Not the answer. For primary dealers, market and book capital ratios exhibit a correlation of 50%
- Mark-to-market accounting for broker-dealers make the difference small
  - For stand-alone public broker-dealers (SIC 6211,6221), we find a 75% correlation between market leverage and book leverage
  - For our sample of primary dealers including big banks (mark-to-market?), book and market leverages are also positively correlated

Book Capital Ratio in Our Test

	FF25	US bonds	Sov. bonds	Options	CDS	Commod.	FX	All
Capital	2.11	-1.54	6.55	10.11	7.65	2.36	-9.14	2.36
	(1.53)	(-0.33)	(2.07)	(2.18)	(2.59)	(1.62)	(-1.06)	(1.33)
Market	-1.72	4.81	-1.00	2.32	0.54	-1.35	13.26	1.57
	(-1.33)	(1.19)	(-0.34)	(0.91)	(0.19)	(-0.74)	(2.08)	(0.96)
Intercept	3.93	0.32	1.20	-0.44	-0.38	0.78	-2.84	0.15
	(3.39)	(4.36)	(2.15)	(-0.21)	(-3.46)	(1.12)	(-1.90)	(0.23)
R^2	0.10	0.82	0.95	0.97	0.69	0.11	0.72	0.37
MAPE, %	0.52	0.13	0.17	0.18	0.18	1.27	0.37	0.76
MAPE-R, %	0.73	0.24	0.91	0.85	0.36	1.33	1.07	0.76
RRA	8.63	-7.38	20.39	39.31	16.41	9.12	-43.97	9.66
Assets	25	20	6	18	20	23	12	124
Quarters	172	148	65	103	47	105	135	172

Holding Company vs Subsidiary

- We include primary dealers' entire balance sheet
  - Holding company level, not just their trading arms
  - Say JPMorgran. Losses on JPMorgan's other businesses likely adversely affect the trading arm's risk-return trade-off
  - We postulate this drives the difference
- A piece of suggestive evidence
  - AEM implied capital ratio (i.e., inverse of AEM leverage) has -59% correlation with primary dealers
  - But, AEM implied capital ratio is 12% correlated with non-primary dealers (smaller with broker-dealer arms only)
- Which is the right measure?

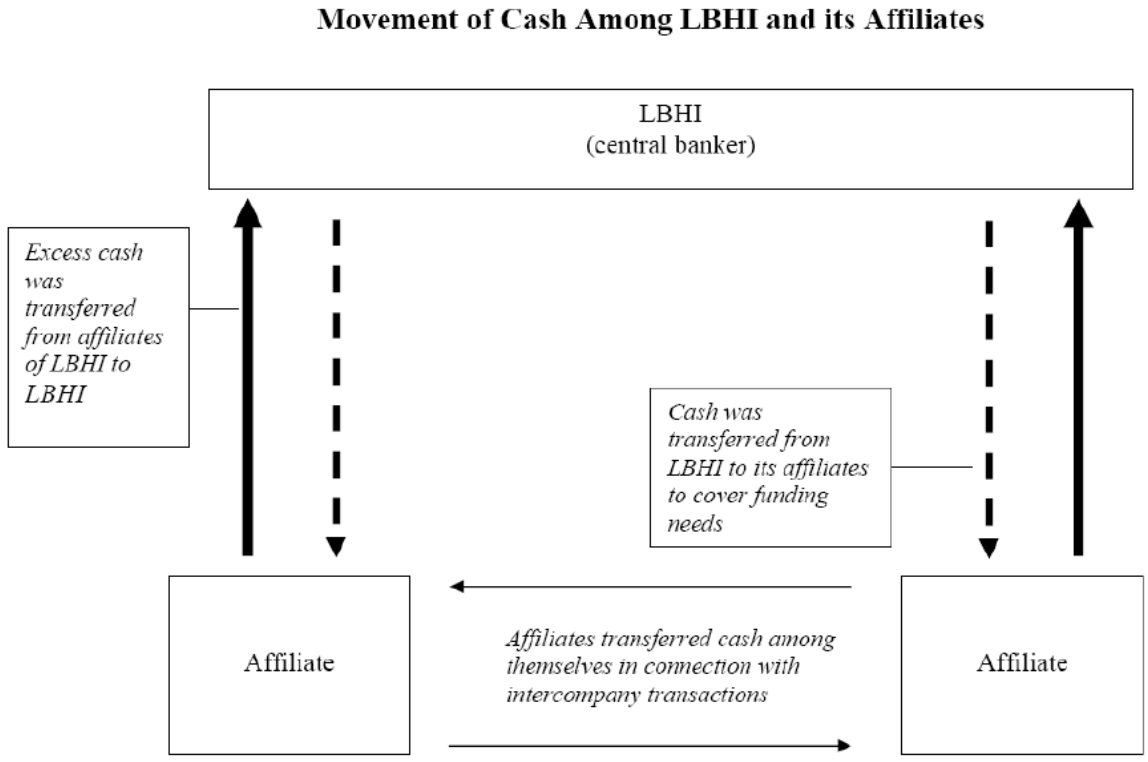
Holding Company or Subsidiary Leverage (1)?

- Houston, James, and Marcus (1997): bank subsidiary's loan growth is more correlated to the holding company's capital position
- Anecdotal post-mortem evidence suggest capital is fungible within broker-dealer holding companies
  - Drexel Burnham Lambert Group bankruptcy in 1990 led to the liquidation of its broker-dealer arm
    - Post-Drexel, the SEC moved toward group-wide risk assessments of BD holdings companies
  - In 2008, Lehman Brothers' European affiliate took down the holding company and its US broker-dealer with it

Holding Company or Subsidiary Leverage (2)?

Lehman Brothers Holdings acted as a "central banker" for Lehman subsidiaries

- Holding company used its liquid assets to guarantee the obligations of its subsidiaries to their clearing banks



Source: Bankruptcy Examiners' Report (Valukas, 2010)

- Holding company leverage is the economically meaningful one

Conclusion and What We Learn

- Primary dealers' capital ratio has strong explanaroty power across financial assets, especially sophisticated ones
  - Interestingly, the implied price of risk across different markets lines up reasonably well
  - Supporting evidence that intermediaries (primary dealers) are marginal investors in many financial assets
- Sophisticated asset markets might be segmented, but connected through primary dealers with limited capital
  - Contagion effect: Kyle-Xiong (2001), Kondor-Vayanos (2014)
- Intriguing heterogeneity among financial intermediaries: primary dealers vs non-primary dealers, broker-dealer arm and holding companies
  - We propose a simple general equilibrium model with heterogeneous leverage patterns

Broker Dealer Liquidity Positions

- During the week of September 8, LBI lost $2.1 billion of liquidity primarily as a result of
  - Lost repo capacity, which resulted in an increase in the box (most of the lost capacity was absorbed with no impact to liquidity to the repo overfunding policy that maintained repo lines in excess of Lehman's funding requirements)
  - Increase in haircut as repo counterparties became less comfortable with non-Government, non-Agency collateral
- During the week of September 8, LBIE lost $11.0 billion primarily as a result of
  - $4.2 billion decrease in operational cash cushion of its prime broker business (although this cushion is meant to protect its prime broker business, it is commingled with and included in LBIE liquidity)

Change in LBI Liquidity During 9/8 Week ($ Billion)

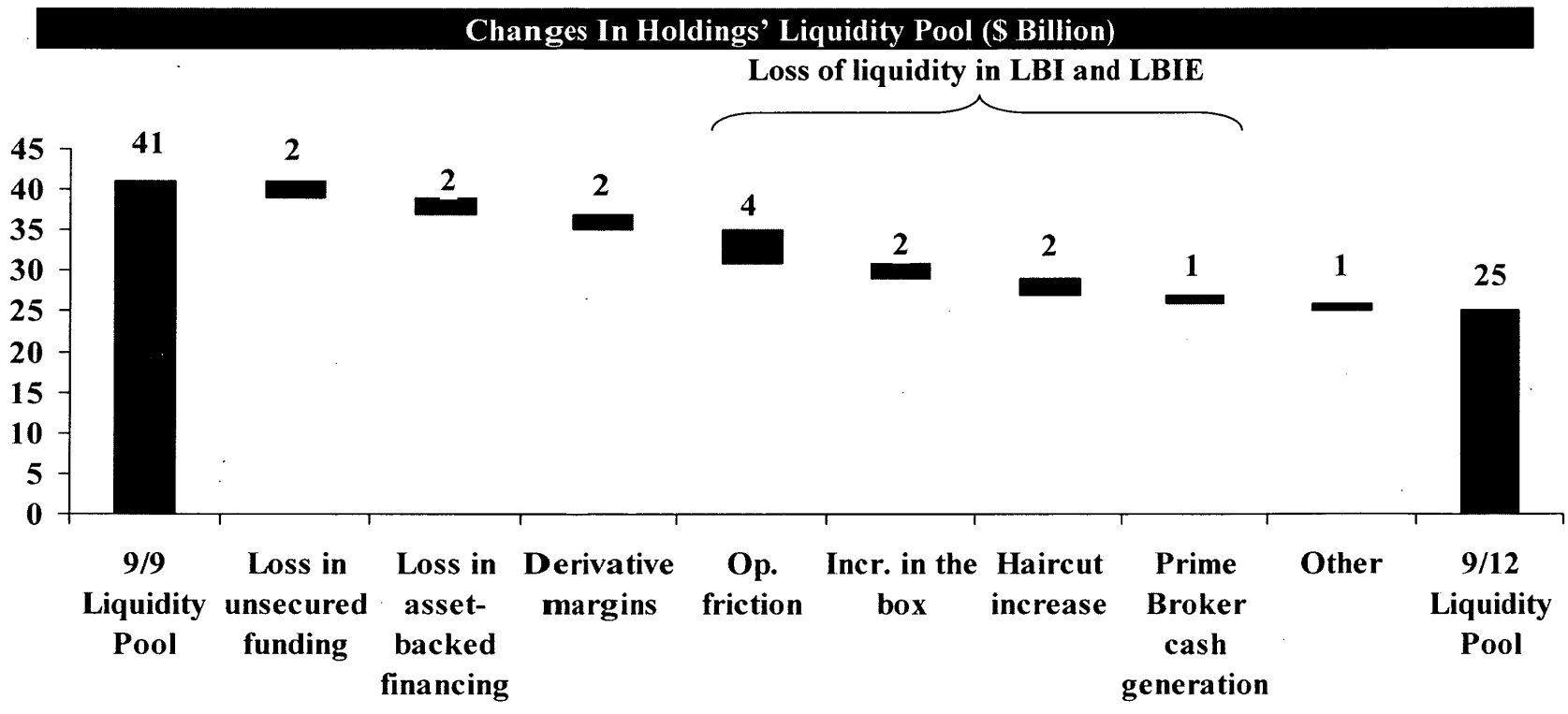
Secured funding haircut increase	(1.6)
Box increase	(1.5)
Other	(0.3)
Change in 15c3 reserve formula	1.3
Total	(2.1)

Change in LBIE Liquidity During 9/8 Week ($ Billion)

Prime Broker	(4.2)
Margin	(0.9)
Secured funding haircut increase	(0.4)
Operational friction & other	(5.5)
Total	(11.0)

Liquidity Situation Post Q3 Earnings Announcement

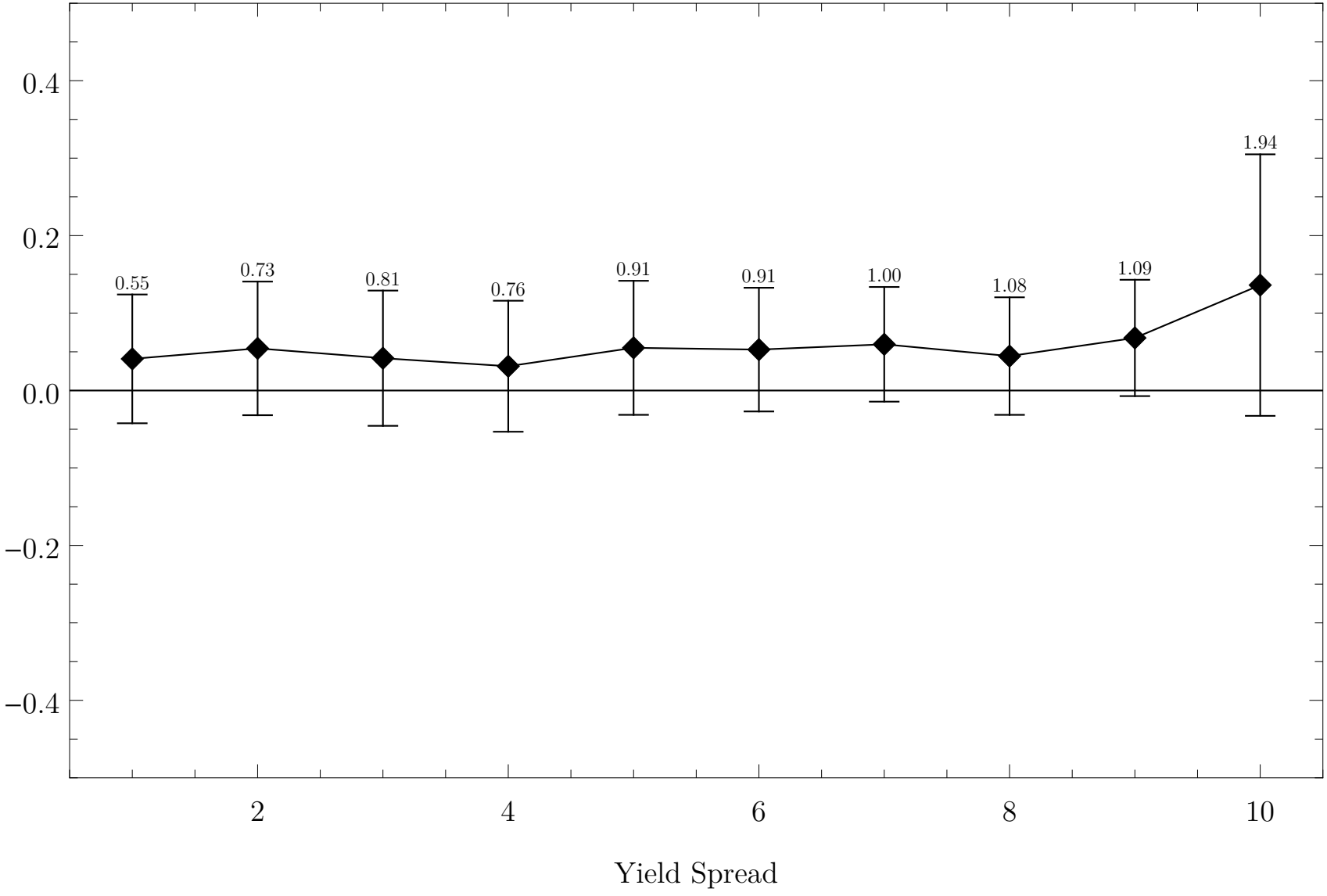
- Post earnings announcement on September 9, Holdings' liquidity decreased by $16 billion from $41 billion to $25 billion - $16 billion of which was required by clearing banks at the start of the day and approximately $7 billion of which was in liquid securities that became near impossible to monetize immediately in this extremely stressed market environment – primarily because of a loss of repo capacity.
- As a result, the result of "free cash" available intra day was less than $2 billion. With LBIE facing a projected cash shortage of $4.5 billion on September 15, Lehman had no choice but to place LBIE into administration because of potential director liability. This resulted in a cross-default of and triggered the filing on September 15.



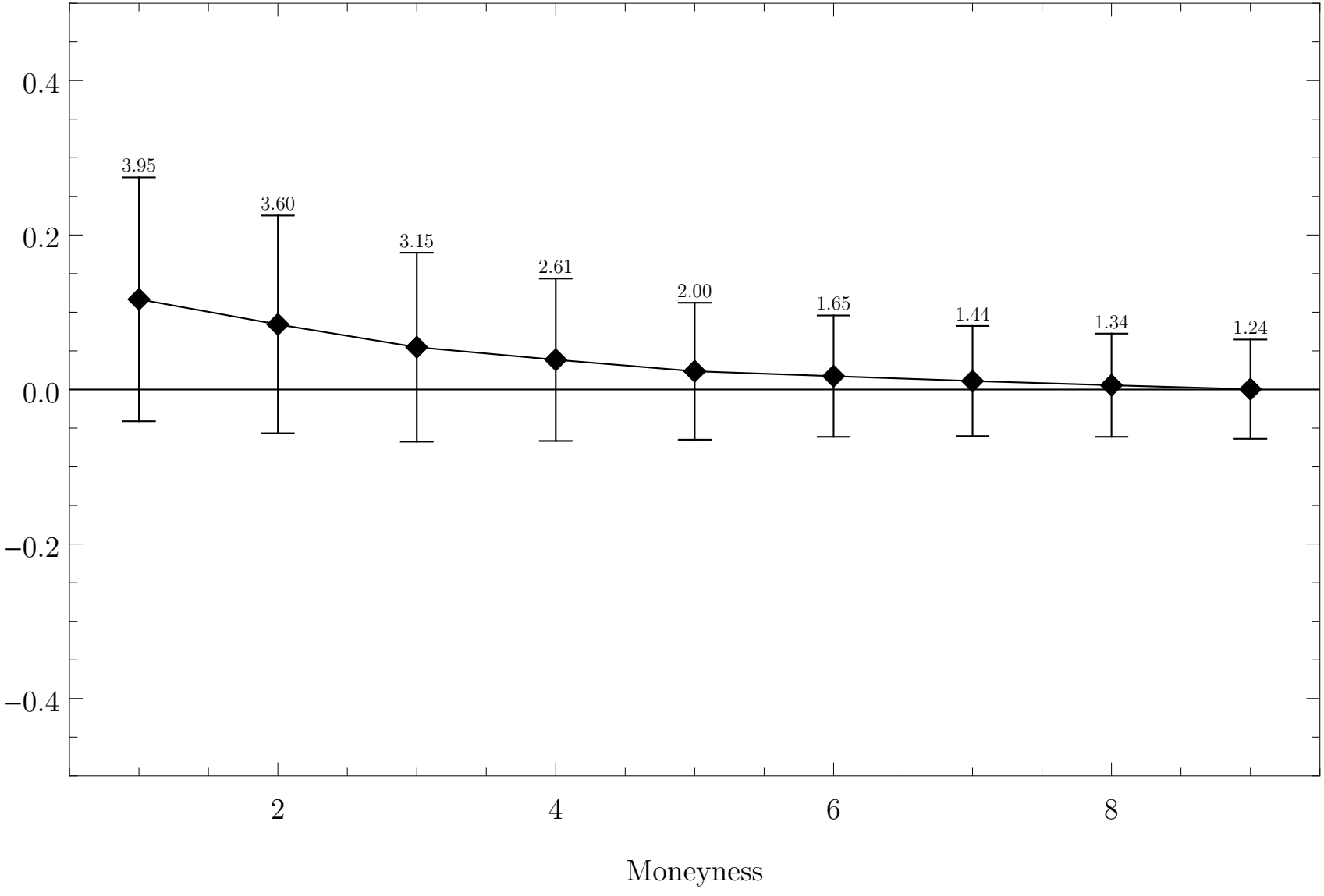
Expected Returns and Betas by Asset Class

	FF25	US bonds	Sov. bonds	Options	CDS	Commod.	FX	All
Mean($\mu_i - r_f$)	2.18	0.72	1.97	1.11	0.28	0.37	-1.01	0.82
Std($\mu_i - r_f$)	0.70	0.39	1.13	1.47	0.52	1.70	0.82	1.40
Mean($\beta_{i,\eta}$)	0.07	0.03	0.22	-0.01	0.06	-0.09	-0.08	0.01
Std($\beta_{i,\eta}$)	0.11	0.04	0.14	0.05	0.04	0.10	0.03	0.11
Mean($\beta_{i,W}$)	1.02	0.06	0.09	0.83	0.04	0.27	0.15	0.41
Std($\beta_{i,W}$)	0.30	0.07	0.12	0.11	0.03	0.26	0.04	0.44
Mean(R^2)	0.78	0.09	0.30	0.79	0.63	0.04	0.04	0.42
$p(\chi^2(\beta = 0))$	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Assets	25	20	6	18	20	23	12	124
Quarters	172	148	65	103	47	105	135	172

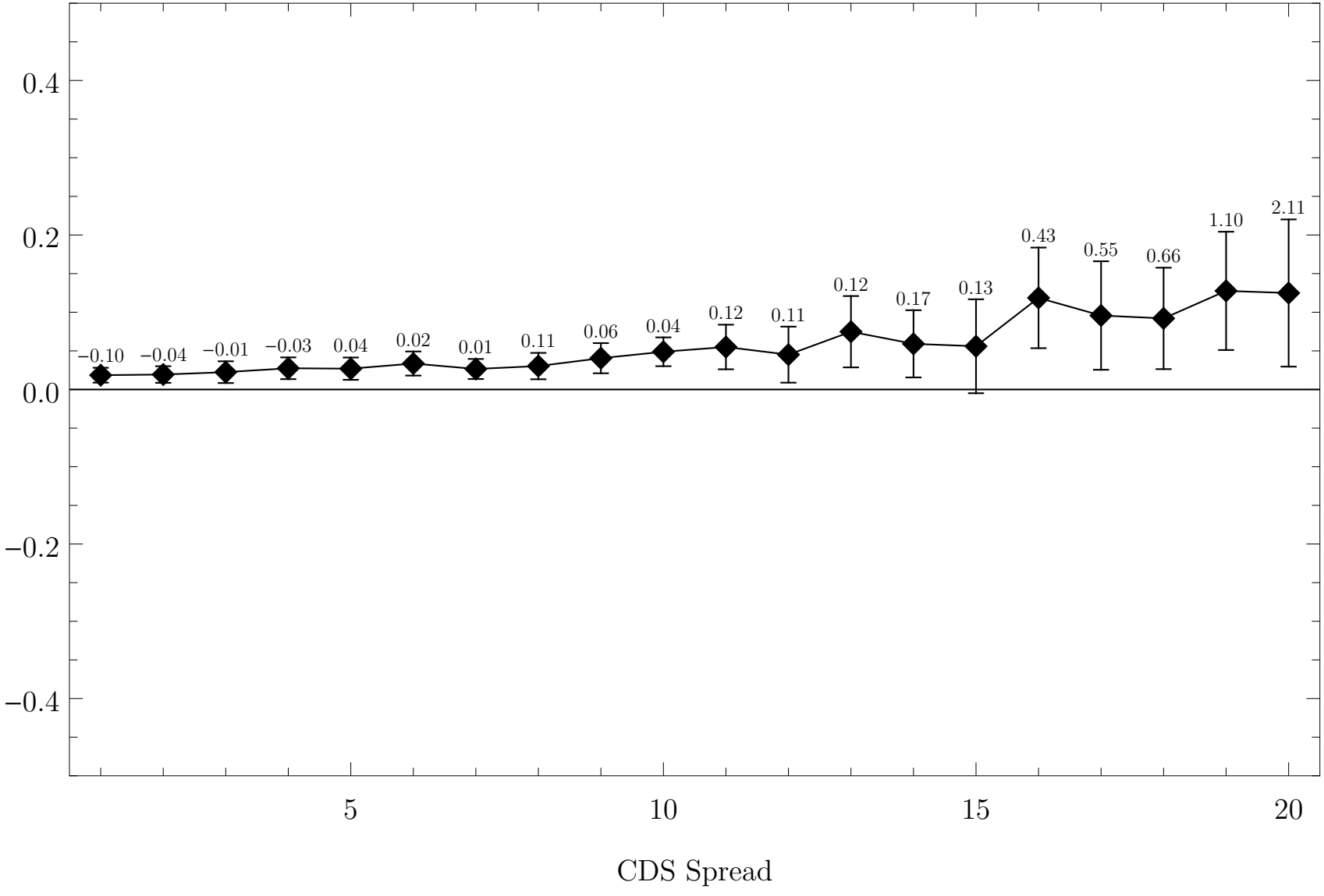
Capital Risk Beta's for US Corporate Bond Portfolios



Capital Risk Beta's for Put Options Portfolios



Capital Risk Beta's for CDS portfolios



Cross-sectional Tests at the Monthly Frequency

	FF25	US bonds	Sov. bonds	Options	CDS	Commod.	FX	All
Capital	1.38	1.30	1.80	22.67	5.51	-0.51	6.85	3.10
	(1.16)	(0.71)	(1.35)	(0.80)	(3.09)	(-0.39)	(3.51)	(2.10)
Market	0.07	1.44	1.75	2.08	-0.14	0.43	3.03	0.78
	(0.17)	(1.71)	(2.16)	(0.74)	(-0.16)	(0.60)	(1.76)	(1.52)
Intercept	0.59	0.12	0.02	-2.26	-0.16	-0.04	-0.34	-0.19
	(1.68)	(4.39)	(0.06)	(-0.77)	(-3.90)	(-0.21)	(-1.30)	(-1.06)
R^2	0.27	0.78	0.71	0.96	0.72	0.04	0.32	0.70
MAPE, %	0.16	0.05	0.17	0.07	0.07	0.40	0.16	0.28
MAPE-R, %	0.17	0.24	0.40	0.37	0.11	0.55	0.17	0.28
RRA	1.92	1.79	2.39	31.15	7.74	-0.71	10.03	4.30
Assets	25	20	6	18	20	23	12	124
Quarters	516	449	196	310	143	316	407	516

Dealer Heterogeneity

- Should we expect to find the same price of risk in each asset class?
- Question of how similar marginal investors. Our setting essentially assumes dealers are homogeneous marginal investors
- Correlation of capital ratios within our intermediary group
  - US vs. foreign: 86% correlation
  - Large primary vs. small primary: 61% correlation
  - Median pairwise correlation among primary dealers: 47%
  - Non-primary dealers vs. primary: 38% correlation