

# Pension Funds and Capital Market Development: How Much Bang for the Buck?

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Claudio Raddatz  
Sergio Schmukler



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# Presentation

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1. Motivation
2. Pension Fund Holdings
3. Pension Fund Investment Behavior
4. Effects of Regulation
5. Conclusions

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# 1. Motivation: Broad Ideas

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- ✦ Pension funds and capital market development
- ✦ Capital market development good for growth
- ✦ Institutional investors increasingly important for capital market development and asset management
- ✦ Privately-managed, defined-contribution pension funds particularly relevant
- ✦ Many reforms, since pension funds would play dynamic role
- ✦ Issues of risk diversification, access to finance, liquidity, primary vs. secondary markets

# 1. Motivation: Pension Fund Importance

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- ✦ Long-run savings, so long-term financing to domestic corporations (primarily)
- ✦ Steady flow of funds for years, so stable capital
- ✦ Invest in at least one fund until retirement, thus system stability
- ✦ Large size, so pension funds better at: asset and risk management, information, transaction costs
- ✦ Domestic allocation, so invest in broad range of domestic assets and diversify risk
- ✦ Thus, pension funds to contribute the most

# 1. Motivation: Pension Fund Growth

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- ✦ Many countries reformed, replacing public PAYG with private DC pension system
- ✦ Assets under management became important
- ✦ First country, Chile in 1981
- ✦ Followed by developed countries
  - UK and Sweden
- ✦ And developing countries
  - Argentina, Bolivia, Colombia, Costa Rica, the Dominican Republic, El Salvador, Mexico, Peru, and Uruguay
  - Hungary, Kazakhstan, Lithuania, Poland, and Slovakia
- ✦ Plus, corporate sector around the world

# 1. Motivation: This Paper

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- ✦ Analyze how pension fund invest
  - i. Micro level data and systematic analysis
  - ii. Factors that can restrict the funds' ability to allocate assets and to contribute to capital market development
    - Regulations (investable instruments)
    - Incentives (industrial organization)
    - Market development (available instruments, liquidity)
  
- ✦ Underlying theme
  - i. Document nature of pension fund investment behavior
  - ii. Inform the discussion on pension funds (and institutional investors) and capital market development

# 1. Motivation: This Paper

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- ✦ Many of questions on asset allocation and trading
  - Where do pension funds invest (asset classes, type of assets, country origin, and maturity)?
  - How much do pension funds diversify their holdings?
  - How do portfolios vary with different regulations?
  - How actively do pension funds trade?
  - Do they buy/sell the same assets simultaneously?
  - Is their trading activity associated with returns?
  - Are there changes over time in their trading behavior?
  - Is their trading pattern different across asset classes?

# 1. Motivation: This Paper

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- ✦ Several cuts of the data to characterize portfolio holdings and trading patterns
- ✦ Many measures, including:
  - Portfolio similarity across funds
  - Turnover
  - Herding
  - Momentum trading
- ✦ Caveats
  - Only some of the many results here
  - The results here to be presented very fast

# 1. Motivation: This Paper

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- ✦ Unique and rich dataset from case of Chile
- ✦ Detailed portfolios of the universe of funds
- ✦ Period: 1996- 2005
- ✦ Monthly frequency
- ✦ Portfolios matched with returns of each instrument
- ✦ Combined and cleaned dataset
  - 7,501,210 observations
  - 104,789 different securities
  - 57 pension funds

# 1. Motivation: Three factors

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## 1. Heavy regulation

- To protect pensioners' assets
- To foster domestic capital market development
- May affect portfolio allocation and trading patterns

## 2. Incentives managers face

- Herding behavior
- Short-term investments

## 3. Domestic market development

- Two-way relation

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## 2. Pension Fund Holdings

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- ✚ Stylized facts around three topics
  - a. Pension fund size and relative importance
  - b. In which asset classes do pension funds invest?
  - c. Similarity

## 2. Pension Fund Holdings

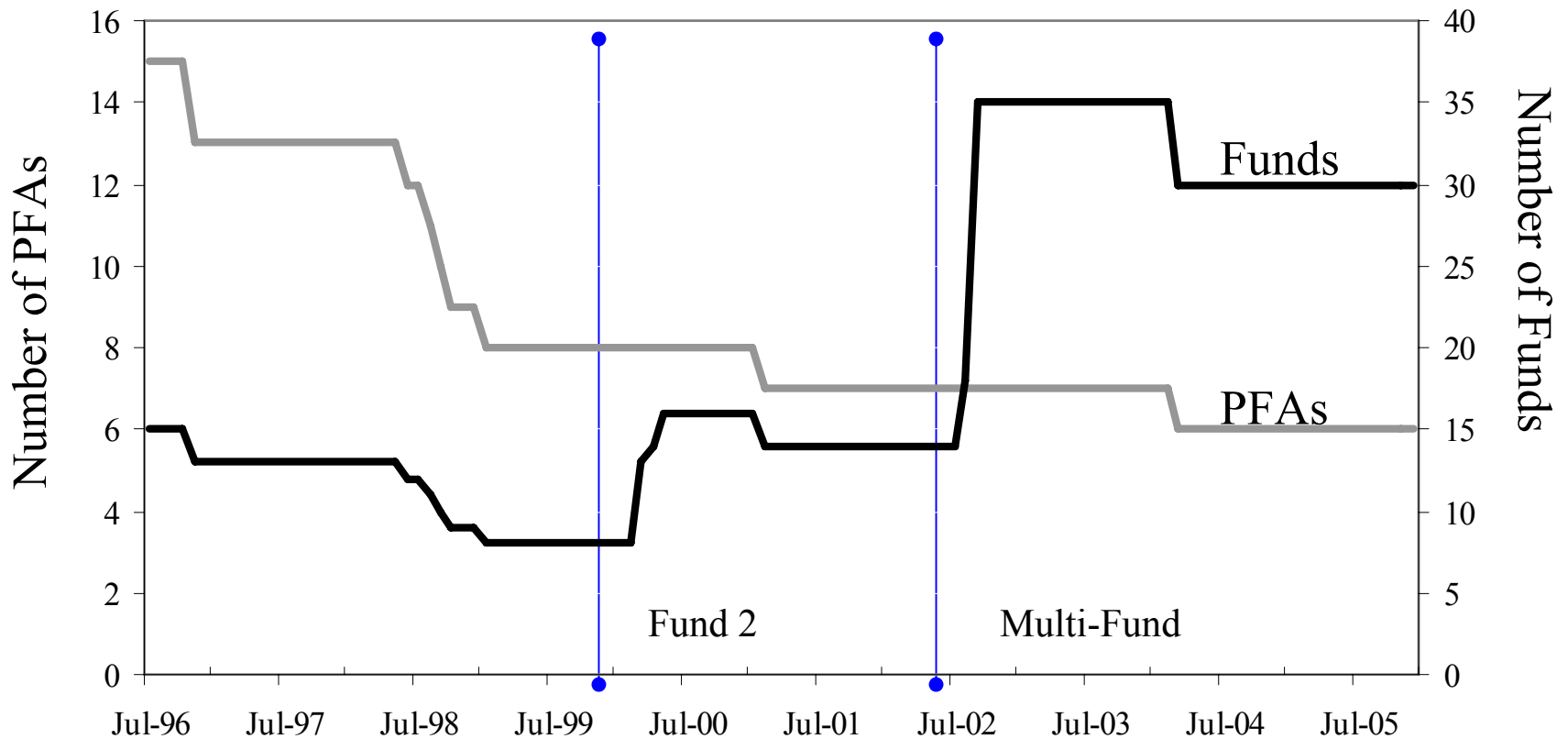
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# 2. Pension Fund Holdings

## Important Institutional Investors

Number of PFAs and Funds

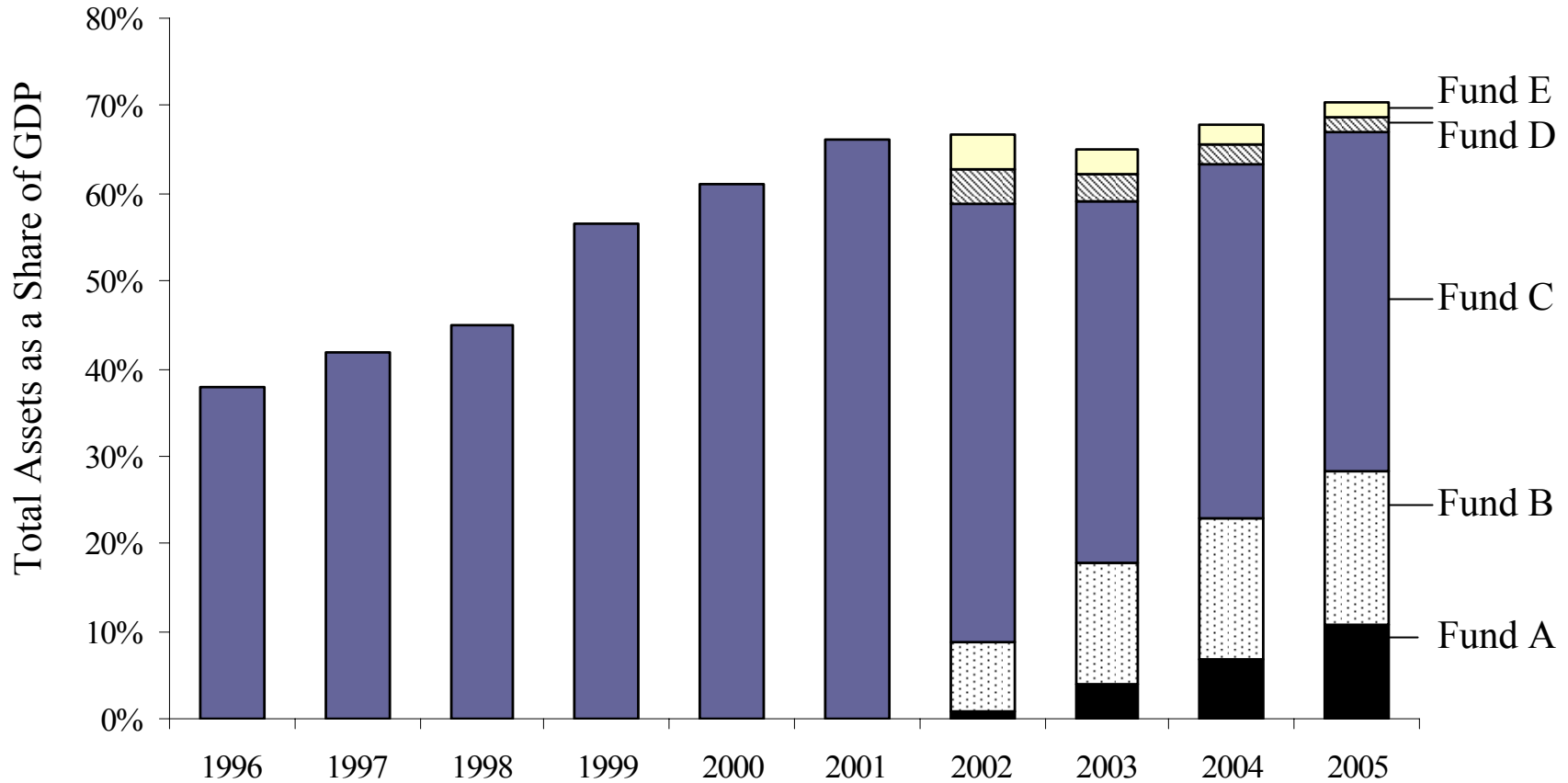


# 2. Pension Fund Holdings

## Important Institutional Investors

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Pension System Holdings as a Share of GDP



## 2. Pension Fund Holdings

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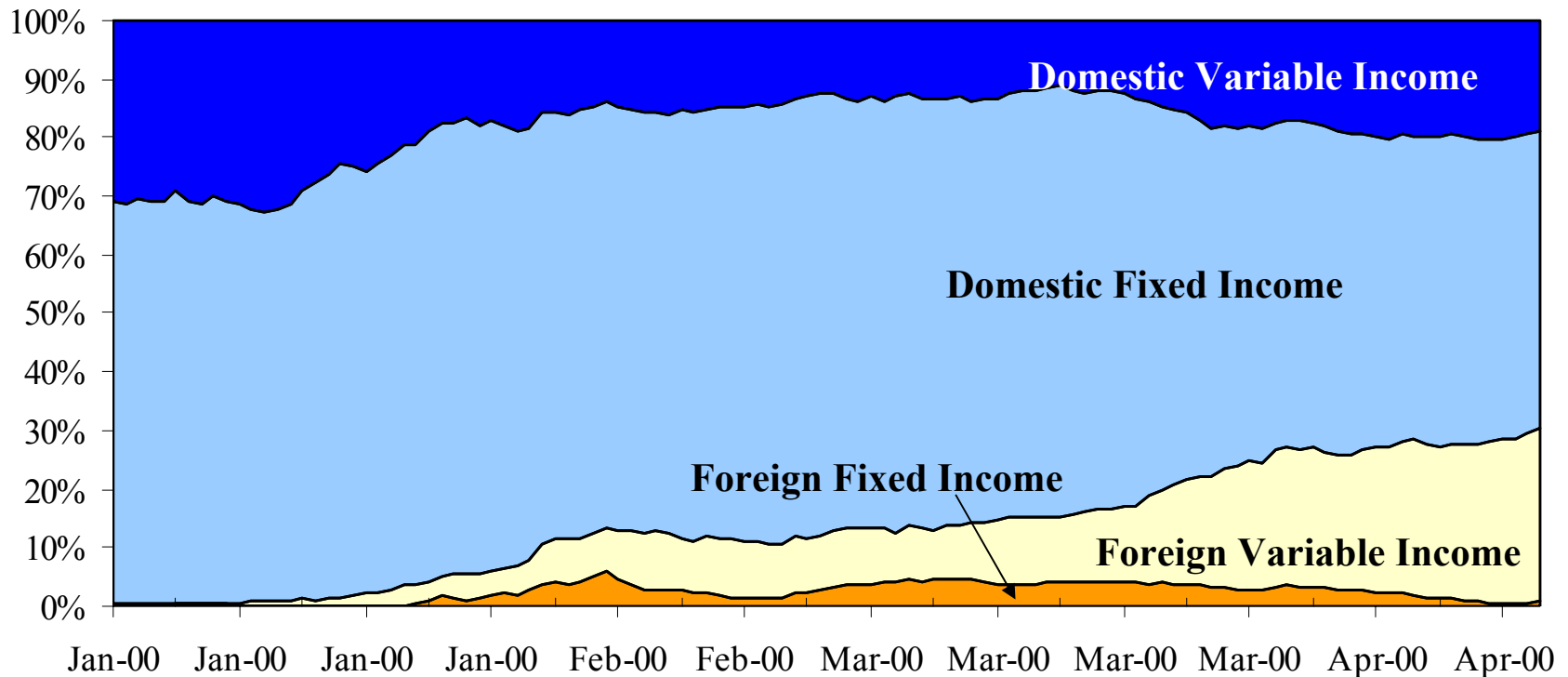
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# 2. Pension Fund Holdings

## Increasing Participation of Foreign Assets

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Holdings in Domestic and Foreign Assets

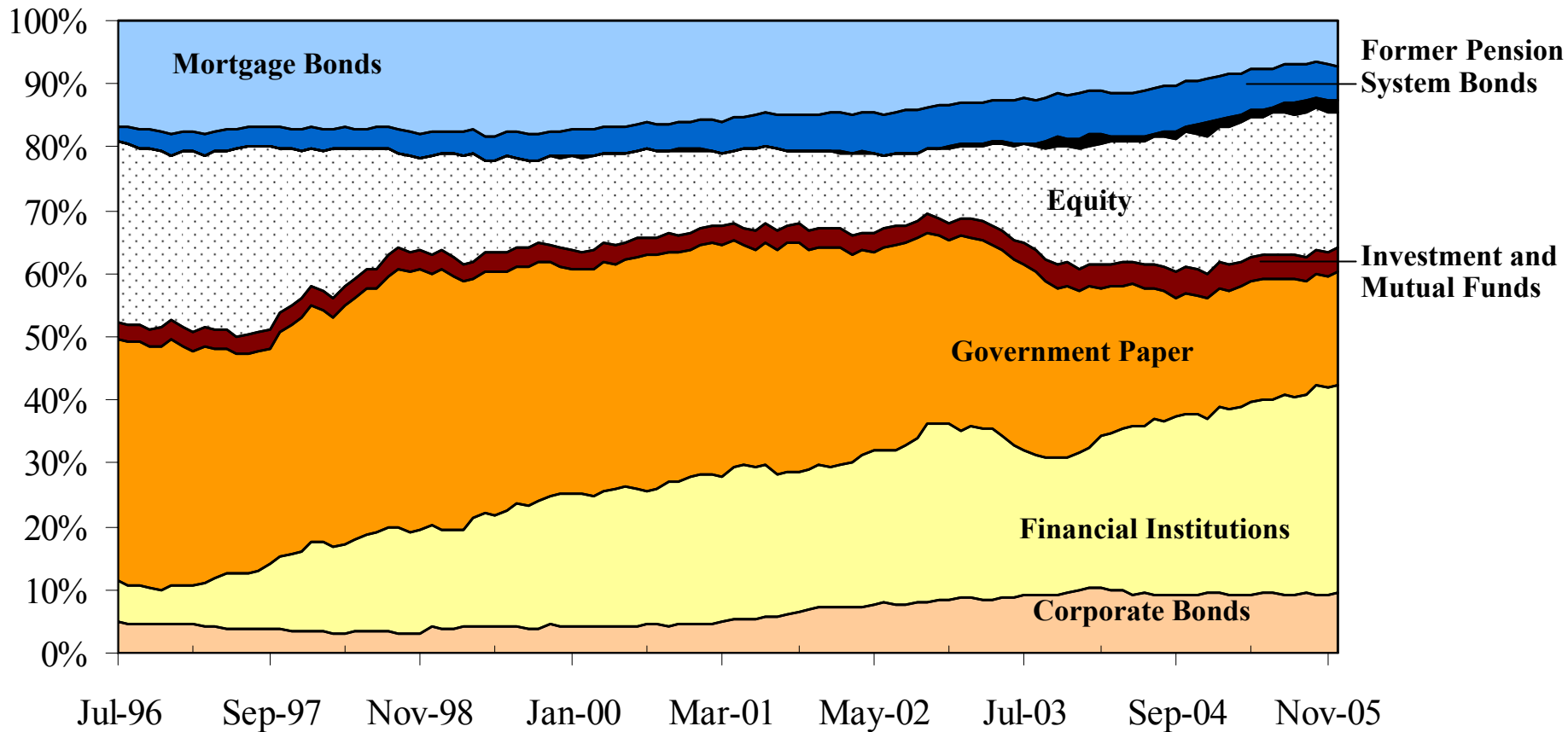


# 2. Pension Fund Holdings

## Large Allocation in Liquid Domestic Assets

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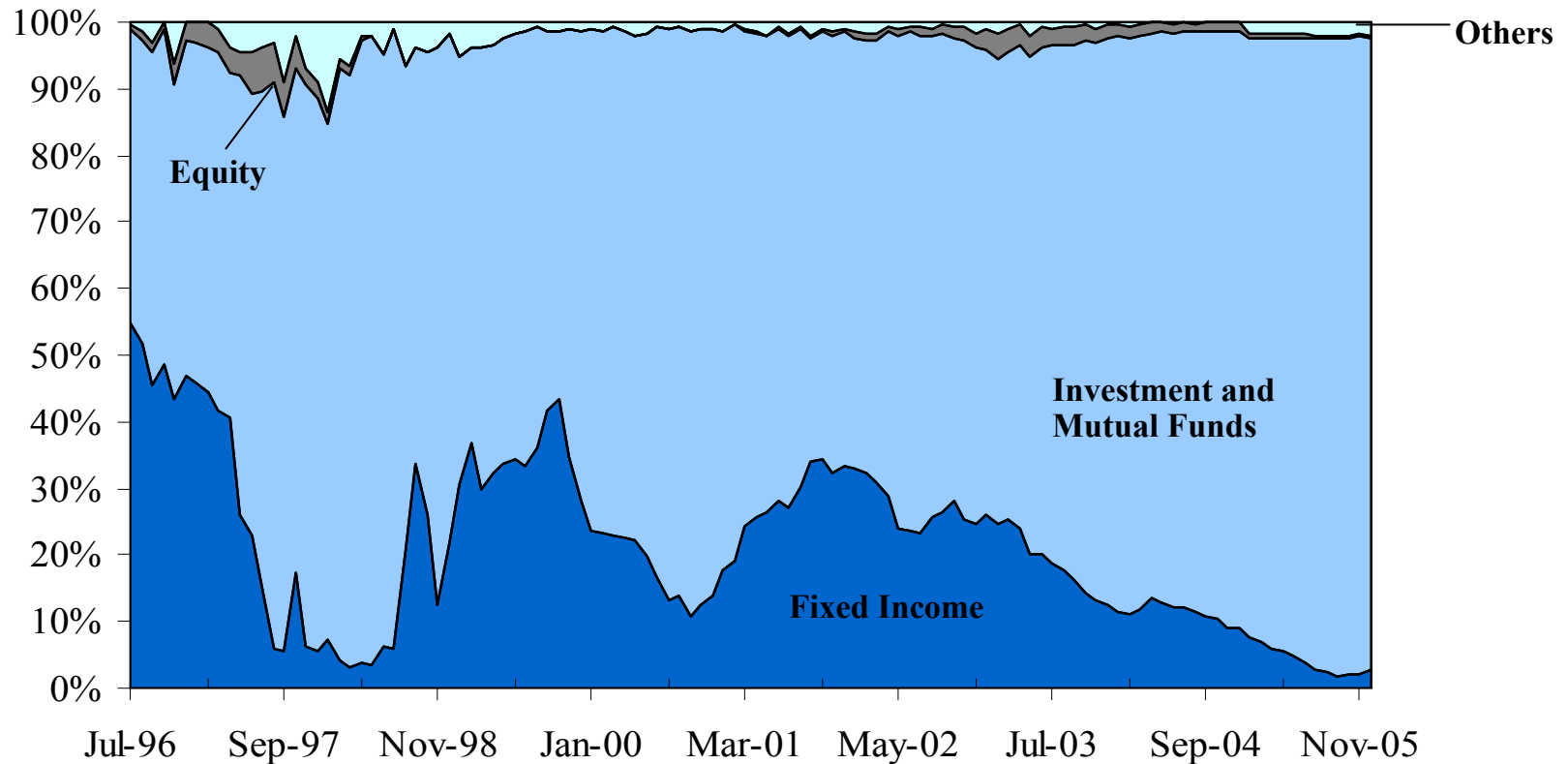
Domestic Holdings by Asset Class



# 2. Pension Fund Holdings

## Large Allocation in Foreign Investment and Mutual Funds

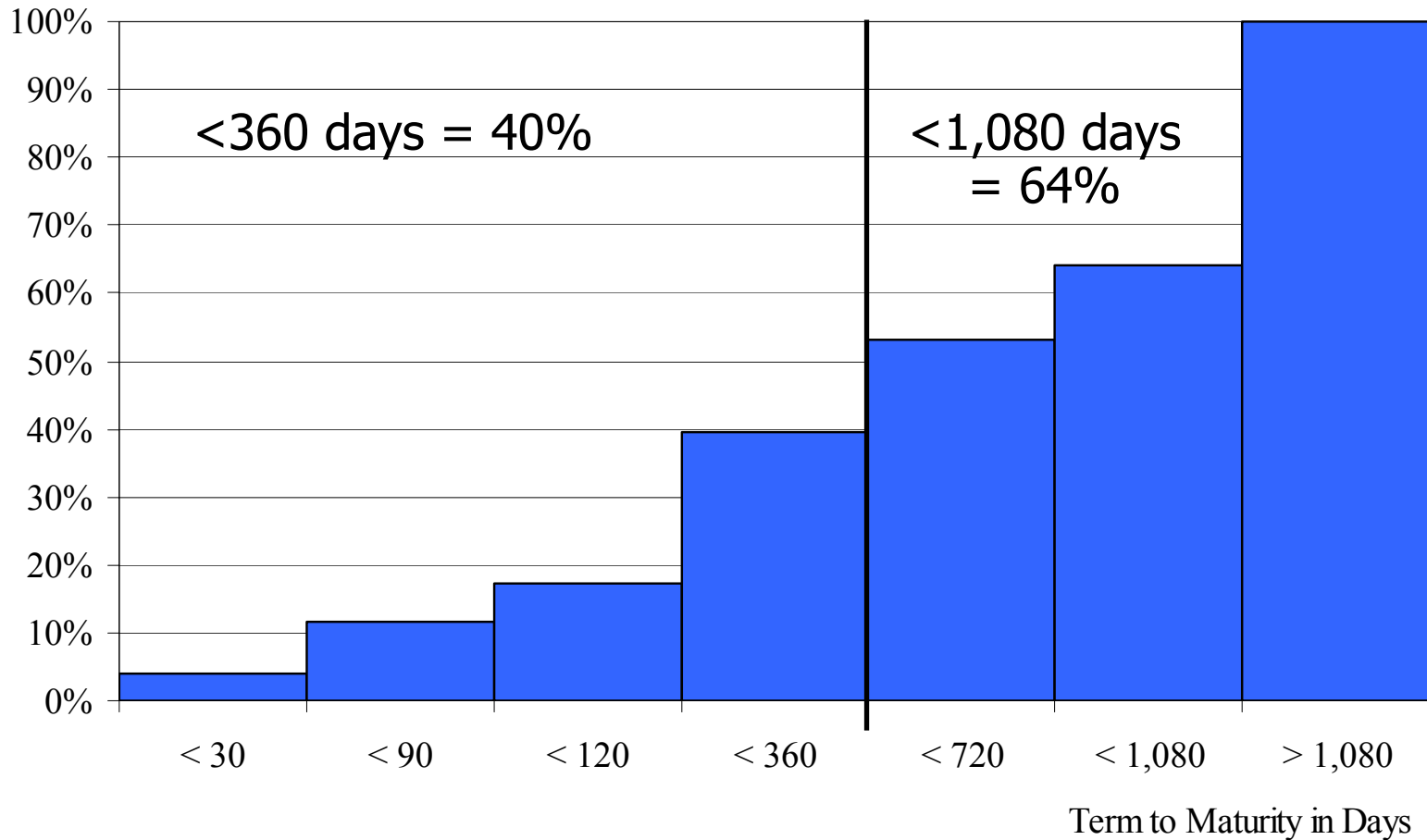
Foreign Holdings by Asset Class



# 2. Pension Fund Holdings

## Tilted Towards Short-Term

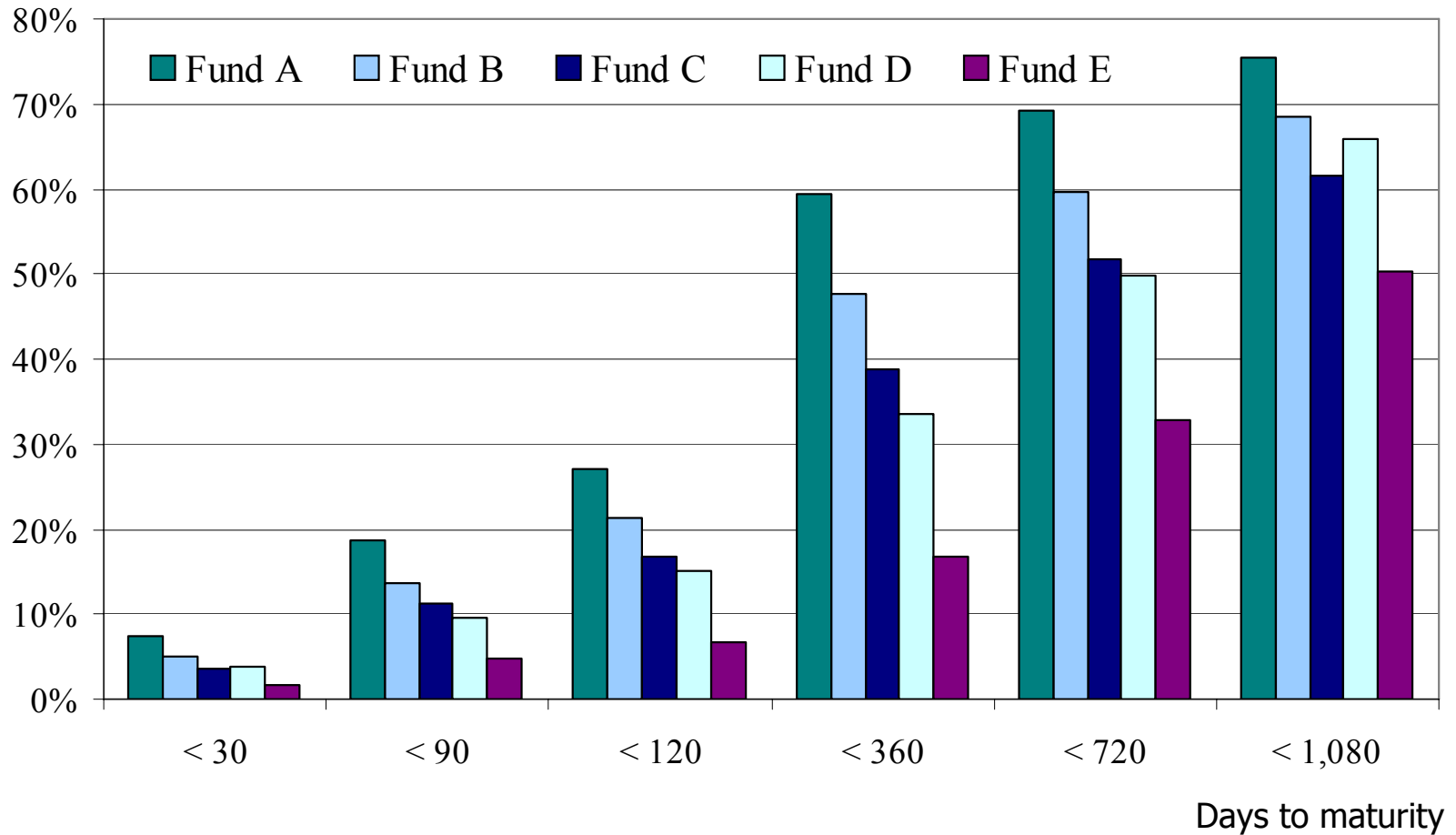
PFA Portfolio Maturity Structure  
(% Fixed-Term Instruments)



# 2. Pension Fund Holdings

## Tilted Towards Short-Term

PFA Portfolio Maturity Structure by Fund Type  
(% Fixed-Term Instruments)



## 2. Pension Fund Holdings

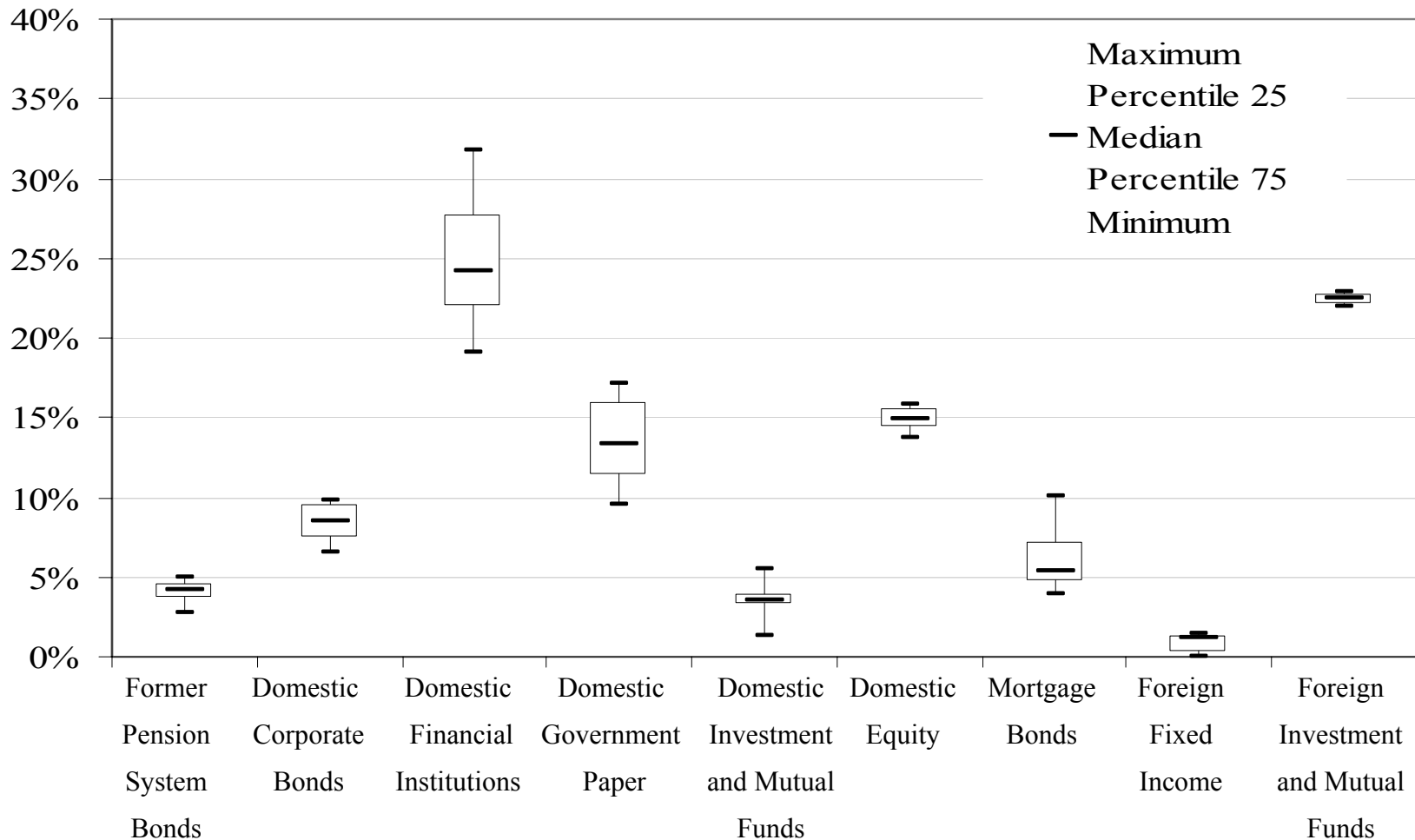
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- ✚ Stylized facts around three topics
  - a. Pension fund size and relative importance
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# 2. Pension Fund Holdings

## Similar PFA Portfolios

### PFA Allocation by Asset Class



# 2. Pension Fund Holdings

## Similar PFA Portfolios

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### Distance Observed vs. Expected Across Asset Classes

	Average Distance Across Asset Classes		Expected Distance
	December 2005	2003-2005	Random Allocation
	(1)	(2)	(3)
Fund A	7.4%	10.6%	33%
Fund B	7.4%	10.0%	33%
Fund C	9.7%	10.0%	33%
Fund D	16.1%	12.7%	33%
Fund E	15.1%	13.7%	33%

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# 3. Pension Fund Investment Behavior

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## ✚ Stylized facts on

- a. Do pension funds trade frequently?
- b. Do pension funds herd?
- c. Do pension funds follow momentum strategies?

# 3. Pension Fund Investment Behavior

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## ✚ Stylized facts on

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# 3. Pension Fund Investment Behavior

## Low Level of Trading

### Trading Statistics (Monthly)

	Average Percentage of Assets Traded Relative to Assets Held	Average Trading (% Portfolio Value)
<b>All Asset Classes</b>	11.0%	4.1%
<b>Domestic Assets</b>		
Former Pension System Bonds	5.9%	0.0%
Corporate Bonds	7.2%	0.1%
Financial Institutions	34.6%	0.4%
Government Paper	9.5%	0.8%
Investment and Mutual Funds	6.4%	0.1%
Equity	37.4%	1.4%
Mortgage Bonds	13.5%	0.4%
<b>Foreign Assets</b>		
Fixed Income	37.2%	0.2%
Investment and Mutual Funds	47.6%	0.9%
Equity	54.2%	0.0%

# 3. Pension Fund Investment Behavior

## More Turnover in Government Bonds

### Turnover Statistics Within Asset Class (Monthly, in %)

	Grinblatt et al. (1995)	Ferson and Khang (2002)
<b>Domestic Assets</b>		
Former Pension System Bonds	5.15	5.09
Corporate Bonds	4.95	4.63
Financial Institutions	10.13	10.18
Government Paper	10.9	10.58
Investment and Mutual Funds	3.91	3.5
Equity	4.44	3.36
Mortgage Bonds	4.73	4.43
<b>Foreign Assets</b>		
Fixed	16.48	15.53
Investment and Mutual Funds	8.06	7.73
Equity	5.53	5.22

# 3. Pension Fund Investment Behavior

## Fixed-Term Assets Held up to Maturity

### Proportion of Units Purchased and Held up to Maturity

	Ratio of Units at First Purchase to Maximum Units in Portfolio		Ratio of Units at Expiration to Maximum Units in Portfolio	
	Average	Standard Deviation	Average	Standard Deviation
<b>Domestic Assets</b>				
Former Pension System Bonds	<b>0.96</b>	0.05	<b>0.98</b>	0.05
Corporate Bonds	<b>0.97</b>	0.05	<b>0.98</b>	0.06
Financial Institutions	<b>0.98</b>	0.01	<b>0.95</b>	0.05
Government Paper	<b>0.91</b>	0.08	<b>0.93</b>	0.07
Mortgage Bonds	<b>0.96</b>	0.04	<b>0.85</b>	0.13
<b>Foreign Assets</b>				
Fixed Income	<b>0.93</b>	0.04	<b>0.97</b>	0.05

# 3. Pension Fund Investment Behavior

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## ✚ Stylized facts on

- a. Do pension funds trade frequently?
- b. Do pension funds herd?
- c. Do pension funds follow momentum strategies?

# 3. Pension Fund Investment Behavior

## Tendency to Herd (Statistically)

### Average Herding Statistic by Asset Class

	All Assets	Assets Traded by More Than One PFA	Assets Traded by More Than Half of PFAs
<b>All Asset Classes</b>	<b>2.26**</b>	<b>0.88**</b>	<b>1.77**</b>
<b>Domestic Assets</b>			
Former Pension System Bonds	-2.53	-11.02	<b>2.07**</b>
Corporate Bonds	<b>2.38**</b>	<b>5.04**</b>	<b>5.74**</b>
Financial Institutions	<b>0.81**</b>	<b>1.86**</b>	<b>1.66**</b>
Government Paper	-0.10	-2.45	<b>2.73**</b>
Investment and Mutual Funds	<b>2.41**</b>	<b>3.03**</b>	<b>1.35**</b>
Equity	<b>0.96**</b>	<b>1.28**</b>	<b>0.66**</b>
Mortgage Bonds	<b>8.84**</b>	<b>4.45**</b>	<b>0.92**</b>
<b>Foreign Assets</b>			
Fixed Income	-0.01	<b>3.09**</b>	<b>15.60**</b>
Investment and Mutual Funds	<b>1.43**</b>	<b>2.23**</b>	<b>1.51**</b>
Equity	-0.23	-0.32	-

# 3. Pension Fund Investment Behavior

## Tendency to Herd (Dynamically)

Regression of Probability of Buying an Asset on Lagged Probability

	All Assets	Assets Traded by More Than One PFA	Assets Traded by More Than Half of PFAs
<b>All Asset Classes</b>	-33.65	7.20**	27.93**
<b>Domestic Assets</b>			
Former Pension System Bonds	-58.66	-59.60	-
Corporate Bonds	-18.83	-4.32	-
Financial Institutions	-24.41	-11.81	-
Government Paper	-31.67	-6.07	9.93
Investment and Mutual Funds	-34.33	-	-
Equity	22.39**	26.16**	34.10**
Mortgage Bonds	-26.70	4.91	-
<b>Foreign Assets</b>			
Fixed Income	-18.25	-13.27	-
Investment and Mutual Funds	1.49	15.31**	15.89**
Equity	-26.37	6.72	-

# 3. Pension Fund Investment Behavior

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## ✚ Stylized facts on

- a. Do pension funds trade frequently?
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# 3. Pension Fund Investment Behavior

## Tendency to Follow Momentum Strategies

Regression of Fraction of PFAs Buying an Asset on Lagged Return

	All Assets	Assets Traded by More than One PFA
<b>All Asset Classes</b>	0.10	-0.12
<b>Domestic Assets</b>		
Former Pension System Bonds	1.88**	1.34**
Corporate Bonds	0.32*	0.07
Financial Institutions	-0.28	0.82*
Government Paper	0.34**	0.49**
Investment and Mutual Funds	-0.57	1.22
Equity	0.26**	0.27**
Mortgage Bonds	-1.70**	-2.67**
<b>Foreign Assets</b>		
Fixed Income	-0.03	0.03
Investment and Mutual Funds	0.98**	0.88**
Equity	0.39*	0.38

# 3. Pension Fund Investment Behavior

## Tendency to Follow Momentum Strategies

### Average Lagged Momentum Statistics

	Grinblatt et al. (1995)	Ferson and Khang (2002)	Kaminsky et al. (2004)
<b>All Asset Classes</b>	3.16**	3.89**	53.39**
<b>Domestic Assets</b>			
Former Pension System Bonds	0.01	0.01	31.93**
Corporate Bonds	0.08	0.24**	0.83
Financial Institutions	-0.00	-0.00	1.82**
Government Paper	0.22	0.76**	9.39**
Investment and Mutual Funds	-0.05	-0.15*	-1.01*
Equity	2.71**	2.44**	23.20**
Mortgage Bonds	-0.28**	0.07*	-19.8**
<b>Foreign Assets</b>			
Fixed Income	0.10**	0.14**	0.85
Investment and Mutual Funds	0.69*	0.63*	10.35**
Equity	0.04**	0.04*	1.66*

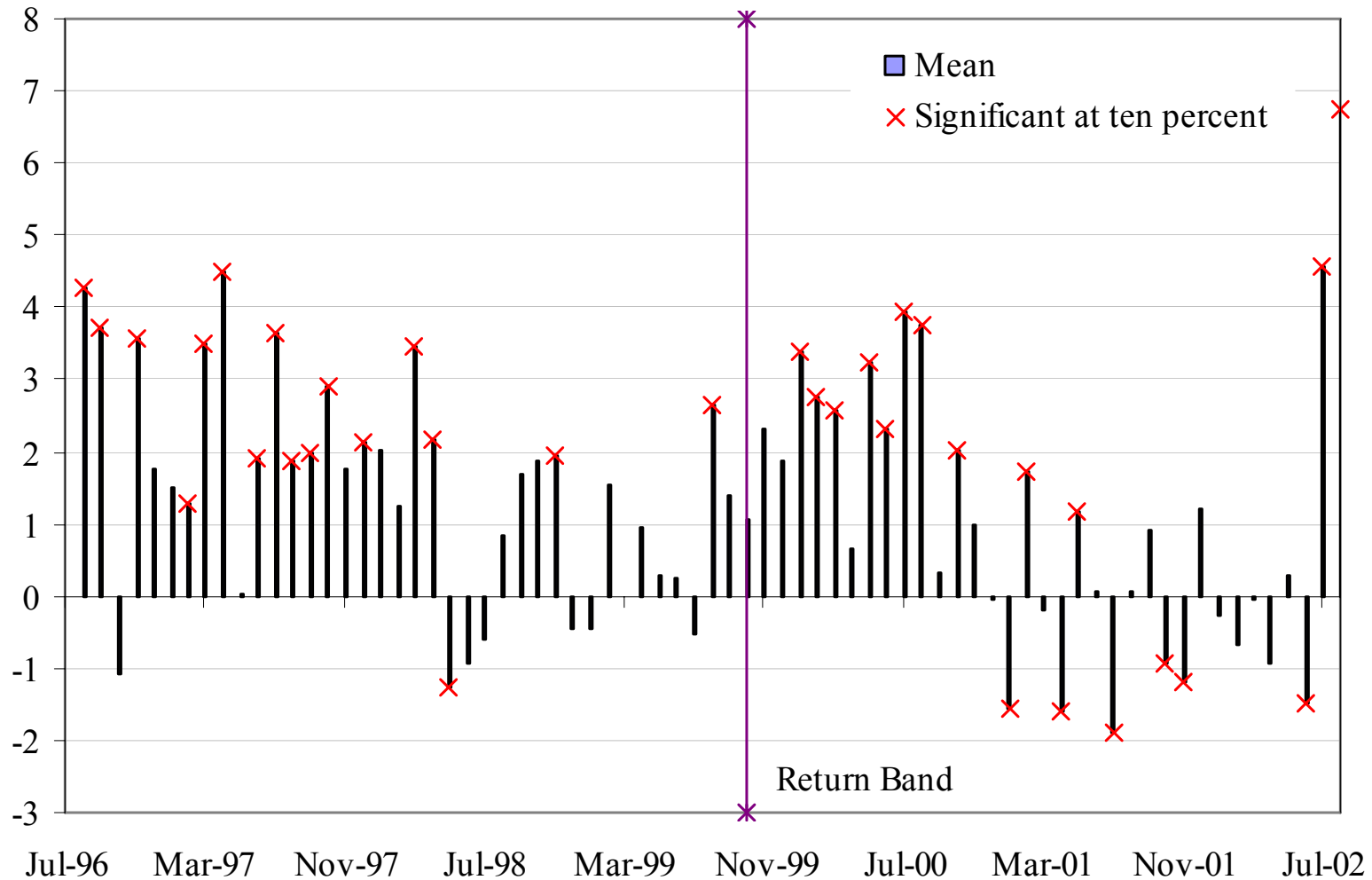
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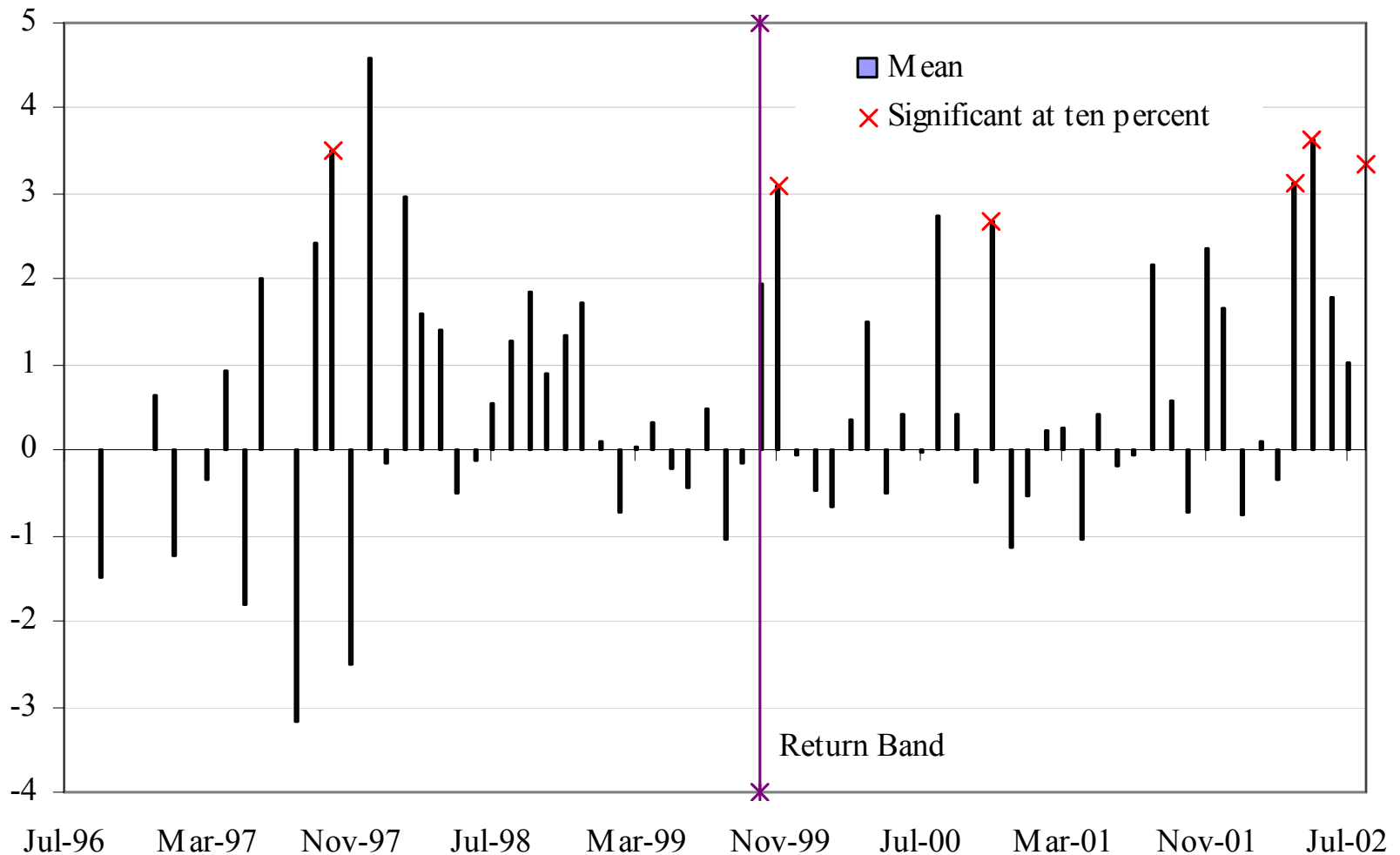
# 4. Effects of Regulation

## Average Herding Statistic - Domestic Government Paper



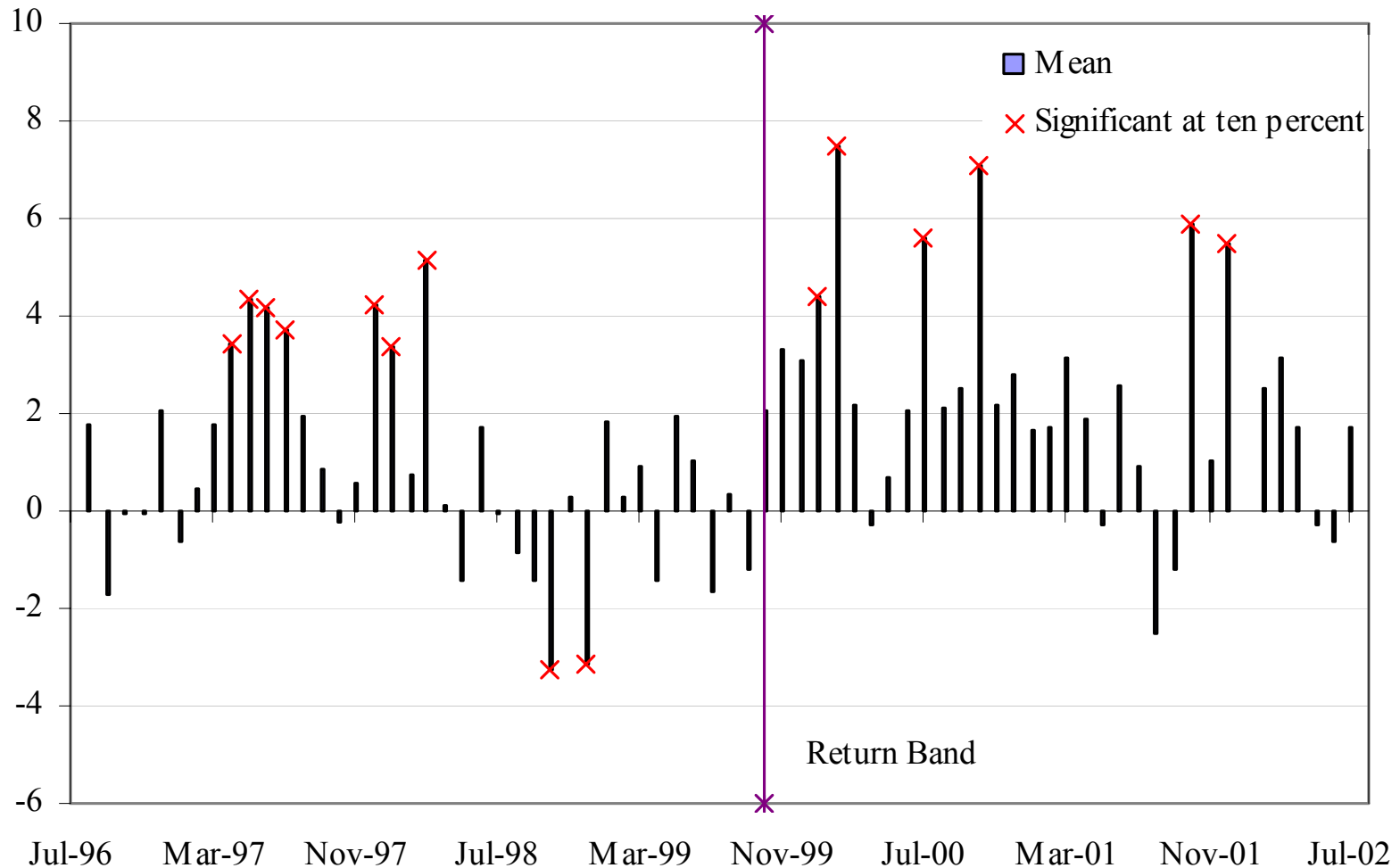
# 4. Effects of Regulation

## Average Herding Statistic – Foreign Investment and Mutual Funds



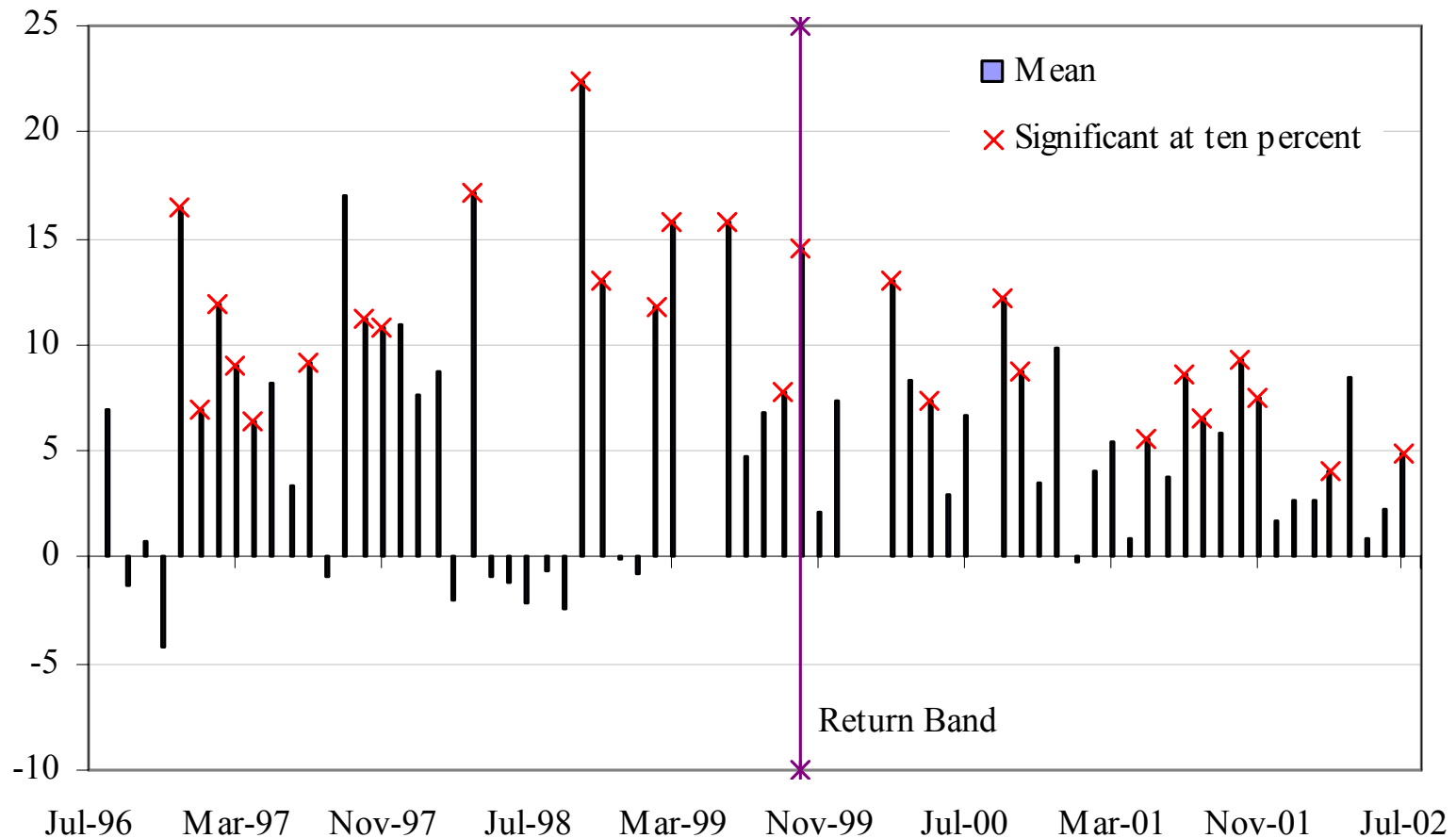
# 4. Effects of Regulation

## Average Herding Statistic – Domestic Equity



# 4. Effects of Regulation

## Average Herding Statistic – Domestic Corporate Bonds



## 4. Effects of Regulation

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Assets Held in Portfolio Relative to Assets Approved  
by Risk-Rating Committee  
(Median Across PFAs)

	2002	2003	2004	2005
Domestic Equity	71.6%	64.9%	69.2%	65.5%
Domestic Investment Funds	74.3%	70.6%	73.2%	74.2%
Domestic Mutual Funds	-	0.0%	25.0%	52.4%
Foreign Investment Funds	-	33.3%	64.3%	50.0%
Foreign Mutual Funds	14.5%	18.0%	16.7%	16.1%

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## 5. Conclusions: Summary of Main Results

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- i. Large fraction in assets that can be easily liquidated
  - Deposits, government bonds, and short-term instruments
- ii. Low turnover measures
  - Infrequently position change (even with inflows)
  - Fixed-income instruments held to maturity
  - PFAs do not actively manage positions
- iii. Similarity in investment decisions
  - Similar portfolios at asset-class level
  - Herd in investment decisions (domestic equities and corporate bonds, foreign funds, and mutual funds)

# 5. Conclusions: Summary of Main Results

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## iv. Significant fraction of funds follows momentum

- Buy past winners and sell past losers
- Government bonds, domestic equities, and quotas of foreign (international) investment and mutual funds
- No evidence of contrarian trading
- Momentum trading not the main cause of herding
- Liquidity considerations might matter for strategies across asset classes

# 5. Conclusions: Summary of Main Results

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## v. Not driven just by regulations

- Patterns of trading do not vary around regulatory changes in the band of minimum return
- Patterns do not vary across fund types facing different regulatory return requirements
- Funds not investing in all investable assets
- However:
  - Regulations on foreign holdings affect investment over time
  - Decline in herding and momentum after multi funds

## 5. Conclusions: Bottom Line

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- ✦ PFA large and important investors
- ✦ Hold large amount of bank deposits, government paper, and short-term assets
- ✦ Hold similar portfolios
- ✦ Buy and hold assets without active trading
- ✦ Simultaneously buy and sell similar assets
- ✦ When trading, follow momentum strategies

## 5. Conclusions: Bottom Line

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- ✦ Patterns not driven just by regulations
- ✦ Not fully consistent with initial expectations of dynamic force behind market development
  - On bright side, allows development of certain primary markets (e.g., some corporate bonds)
  - But not much on secondary markets
- ✦ Role expected for pension funds needs revision

## 5. Conclusions: Bottom Line

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- ✦ Benchmark for role of pension funds needs thought
  - What should a long-term investor look like?
  - In how much trading should these funds engage?
- ✦ How to enable small issuances?
  - How to promote access to capital market finance to smaller corporations and countries?
- ✦ How to prompt liquidity across securities?
- ✦ How should secondary markets function?

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Thank you