

Scale, scope and complexity: assessing banking business models

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The current debate about bank business models

- The banking crisis emanating from the US in 2007-2008 and continuing in the still-unresolved sovereign debt crisis in Europe have given rise to an enormous public reaction against past actions of banks and bankers.
- Following large tax-payer support for the banking sector, banks have come under enormous pressure to change break with the past.
- Basel 3 and other changes in prudential regulation have created strong incentives to reduce the use of securitisation and other complex financial instruments.
- Heightened capital requirements have encouraged derisking and shedding of certain asset classes.
- Compensation practices have been subjected to numerous challenges. There have been numerous, high-profile departures of senior bankers into hedge fund or other sectors.
- Efforts to force changes in banking structure are being backed by major legislation (Volker Rule, Vickers, Liikanen...)
- Aggressive litigation has challenged many business practices.
- Proposals for breaking up banks are gaining momentum.

Are banks too big and complex?

- “If banks are too big to fail, they are too big, period” (Robert Reich’s call for anti-trust action against banks).
 - Bolton, Santos, Scheinkman model of “cream skimming” in banking
 - Increased concentration in banking in US has coincided with growth in US financial sectors share in US GDP. (Philippon)
- “Too interrelated to fail”...”Too complex to manage”
 - Volker Rule, Vickers Report, Liikanen Report
 - SIFI capital surcharge as a Pigovian tax on size (J. Stein)

The big bank puzzle

- Past studies of economies of scale in banking fail to explain size distribution of banking firms.
- Typical banking sector characterized by a large number of small and medium sized banking institutions and a handful of very large banks.

Listed, US Bank Holding Companies

	1990	2000	2009
Number	304	852	612
Top 10 share of total assets	35%	59%	75%

- *“For years the Federal Reserve was concerned about the ever-growing size of our largest financial institutions. Federal Reserve research had been unable to find economies of scale in banking beyond a modest size.” (Alan Greenspan, 2010)*

Past studies of economies of scale in banking

- Earlier estimates: banks achieve minimum efficient scale at relatively small sizes; diseconomies scale at very large sizes.
 - E.g., Berger et al (1993) suggest minimum efficient scale achieved at \$300 million, i.e., at the 6 percentile of the size of banks.
- Key assumption of these earlier studies:
 - a) Competitive input pricing, including labor inputs
 - b) Homogeneous outputs across banks...not controlling for quality differences (e.g., profitability, risk)
 - Recently, Wheelock&Wilson and Hughes and Mester find some (mixed) evidence of stronger economies of scale
 - By changing functional form (W&W)
 - Controlling for risk through leverage (H&M)
 - But maintain competitive input pricing

Anderson and Jøeveer (2012)

- Allow for rent extraction by powerful bankers
- Find evidence of very strong economies of scale in returns.
- Bankers capture a larger fraction of returns in larger banks.
- Apparent pure scale economies are largely accounted for by
 - Funding efficiency
 - Leverage
 - Presence in wholesale banking activities

Economies of Scope?

- Our previous results suggest that economies of scope may account for the greater returns obtain by the large banks.
- Why?
 - Many wholesale banking activities (custody, global markets market making, investment banking) are dominated by a small number of players.
 - The fact that the same banks are often dominant across a wide range of very different activities suggest they may reap synergy gains.
- How? Eg., “systems”
 - Hub and spoke organizational form to mobilize collateral globally (Lehmann Brothers)

Lehman Brothers International (Europe) Hub and spoke structure

- “The Lehman group set up a system for the acquisition and holding by hub companies (i.e. LBIE in Europe) of all securities which any Lehman company wished to acquire in the relevant territory, so that the hub company held all the securities, between acquisition and sale, for the account of its Lehman affiliates. But the practice within the group was for the hub company to use the securities for its own purposes, including lending to the street for liquidity management, selling to meet short positions of its own or of other affiliates, and generally acting in a comprehensively un-trusteelike manner in relation to the holding, while crediting the relevant affiliate (for whom the security was held) with both its value and with any intermediate income, such as dividends on shares...

Lehman Brothers International (Europe) Collateral System

- “Regulatory and capital adequacy concerns in the mid 1990s led to the erection of a remarkable and complex computer automated structure whereby the relevant securities were made the subject of daily repos or open ended stock loans between the hub company and the relevant affiliate (for the account of which they had been purchased) for the whole of the period between acquisition from and disposal to the street. It operated on a daily basis without any human intervention at all....The purpose of the repos and stock loans was then to transfer beneficial ownership of the security in question back to the hub company for the whole period of its holding within the group.”

*Mr. Justice Briggs, “Has English Law Coped with the Lehman Collapse.”
BACFI, Denning Lecture 2012.*

Outline

- Evidence on bank returns
- Evidence on compensation
- Evolving business models of large US bank holding companies

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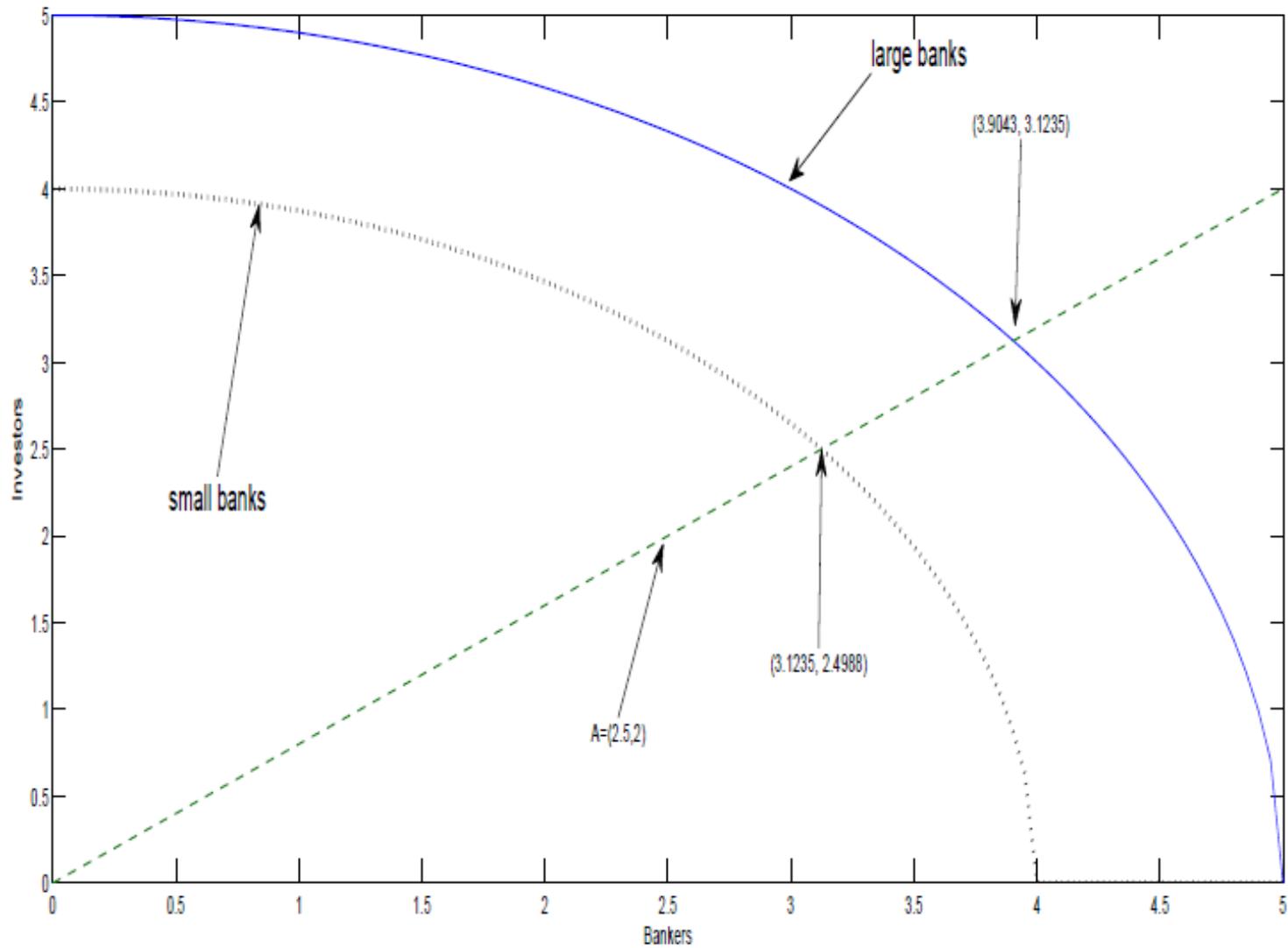
Evidence on returns

- Rent extraction in banking
- Evidence of scale economies in returns
- Accounting for apparent scale economies (regression analysis)

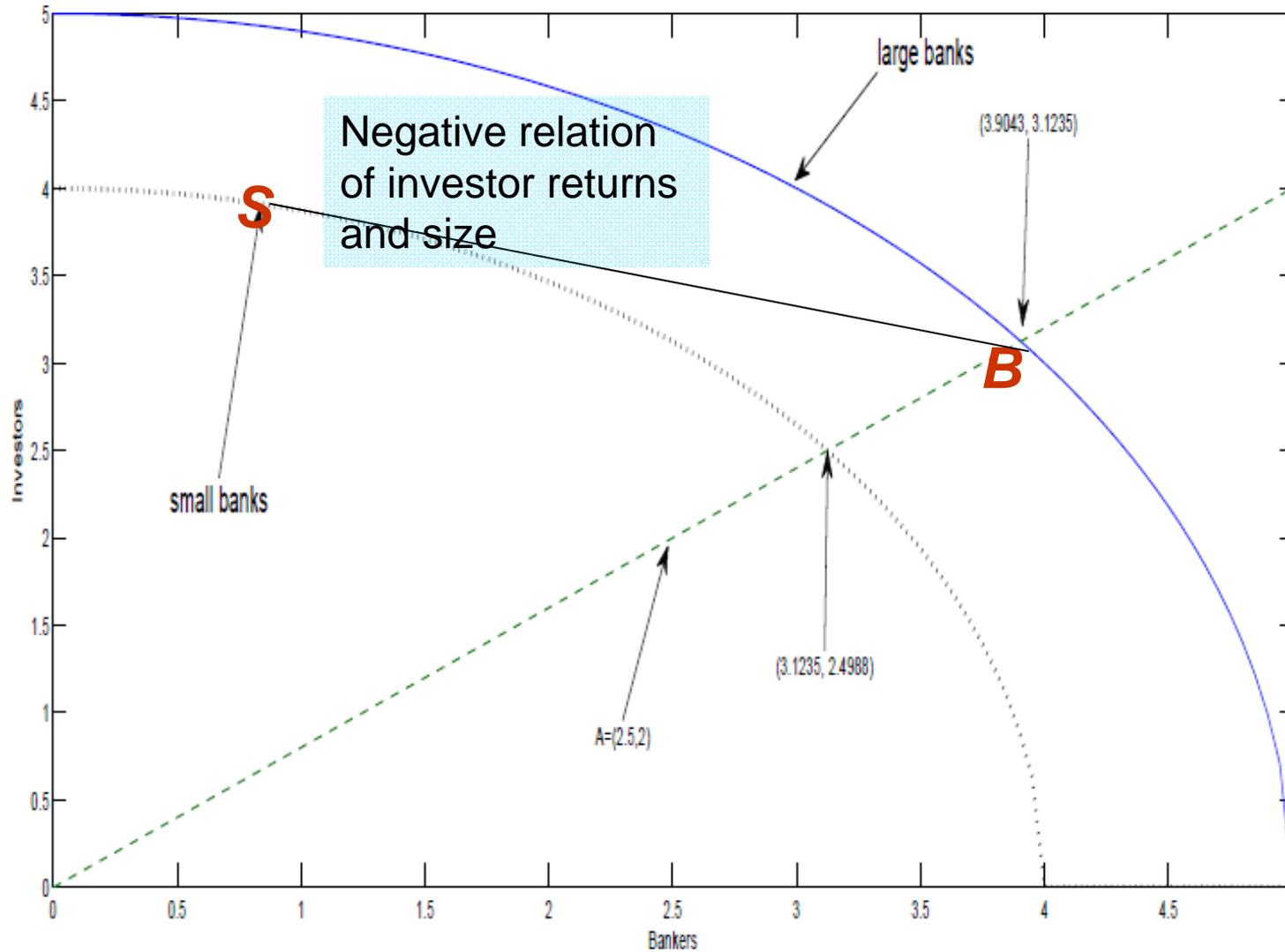
A principal/agent approach to bank returns

- Banking creates value (rents) through the combination of financial capital provided by investors and human capital provided by bankers.
- Banks are multi-product firms and some activities may exhibit economies of scale.
- Rents accrue to bankers and bank investors.
- Bankers may have bargaining power depending on mix of businesses, degree of product market competition, corporate governance...

Measuring bank efficiency



Miss-specification when bankers' are omitted

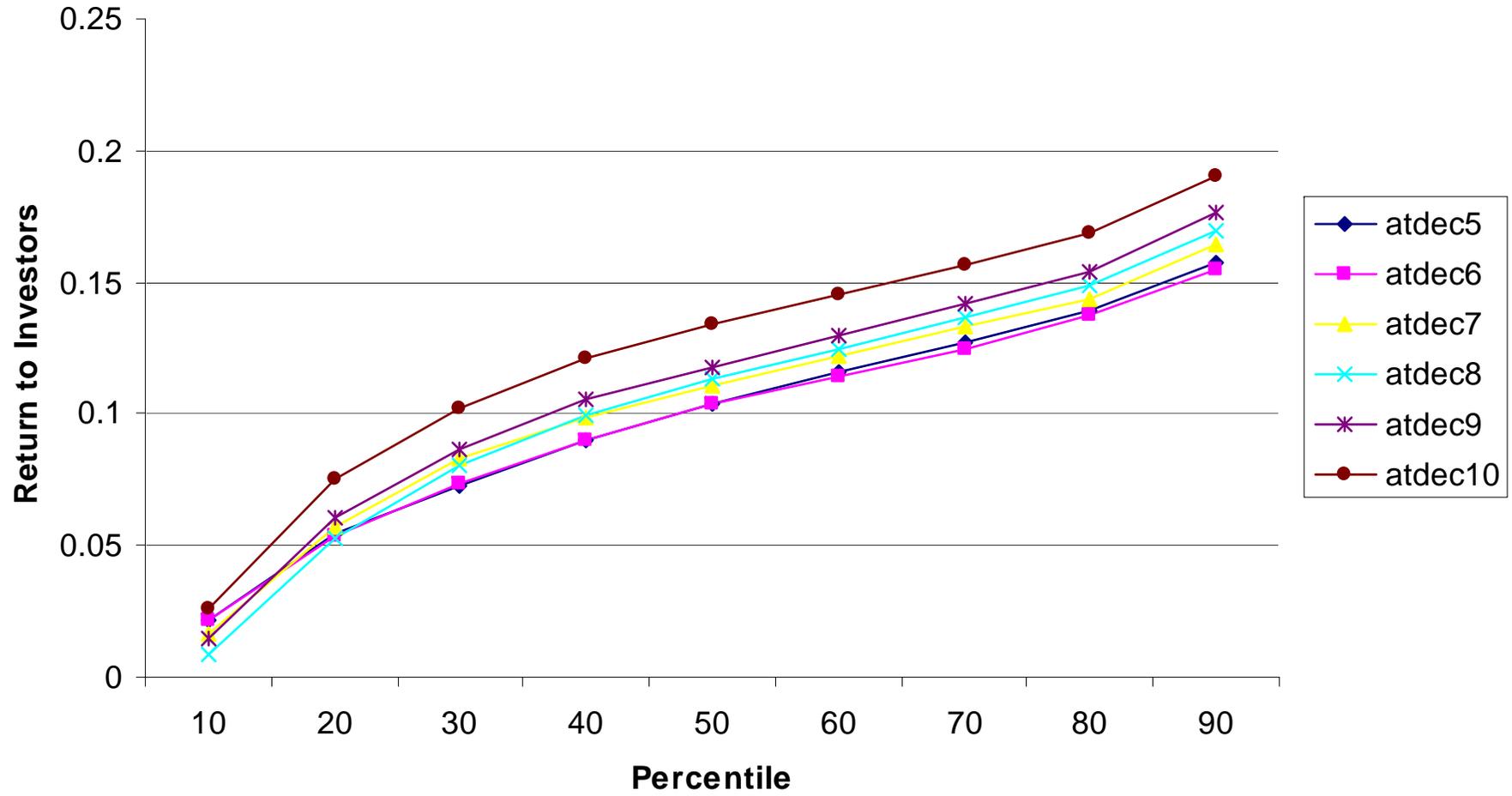


Evidence of scale economies

- Distribution of returns by size (total assets) decile
- Returns:
 - Return to bank investors: ROE
 - Estimated rents to bankers
 - Estimated total rents

$$1+trent = ((1+r)^2 + (1+b)^2)^{1/2}$$

Distribution of Bank Investors' Return by Size Decile

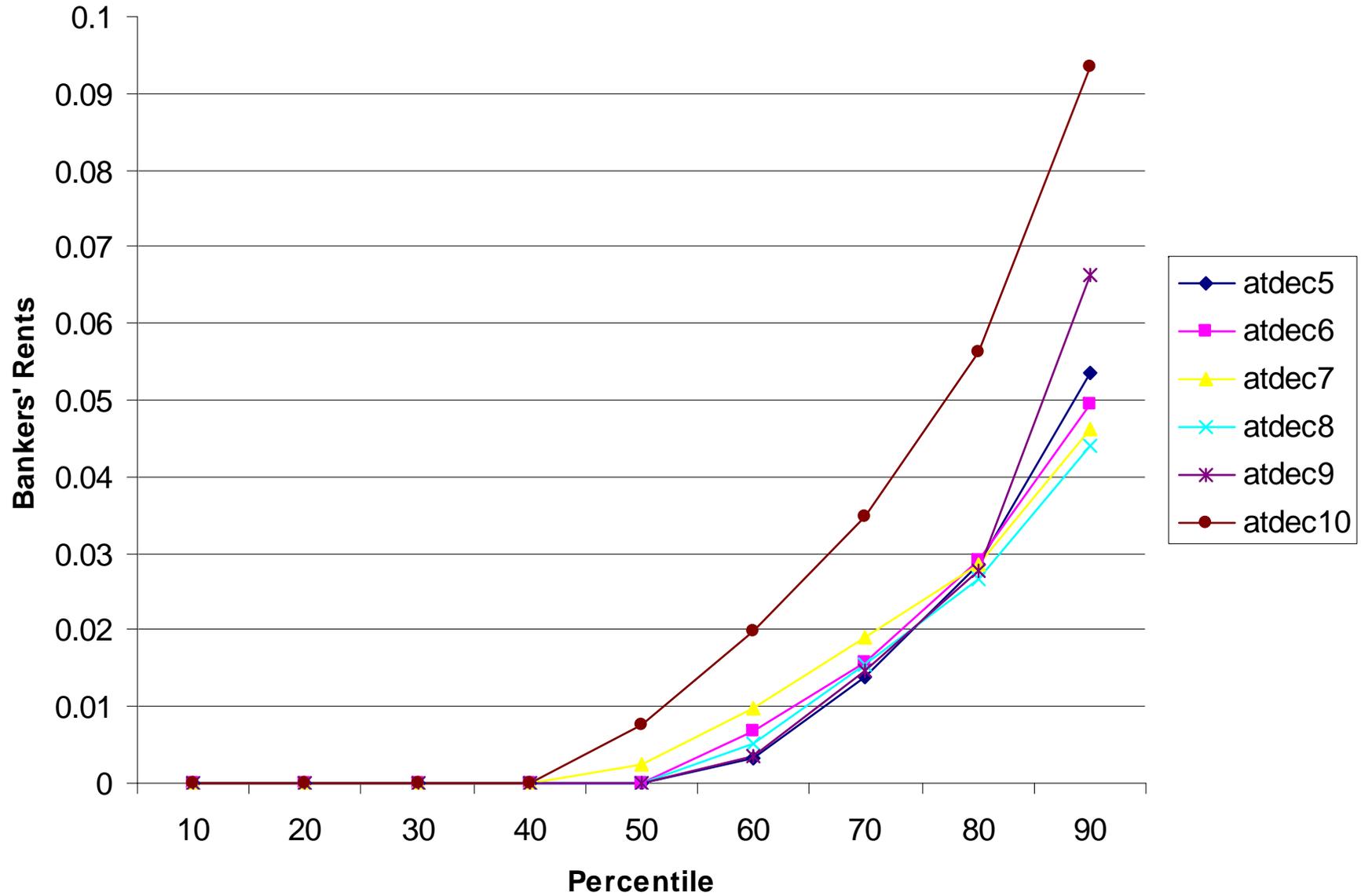


Measuring rents to bankers

- Banker's bonuses?
 - Problems with Execucomp
- Our approach:

Bankers rents = total employee compensation - estimated competitive wage bill
- Competitive compensation rate:
 - average compensation at small, reference banks.
- Banker's rent scaled by book equity

Distribution of Bankers Rents by Size Decile



Estimation framework

$$return_{it} = \alpha_t + \beta X_{it} + \epsilon_{it}$$

- Dependent variable:
 - bank return: investors' return, bankers' return, total return
- Explanatory variables:
 - Pure scale effects: nonlinear
 - Asset size, **at**
 - Top decile dummy, **at10**
 - Year effects
 - Scope

Two measure of scope

- From income statements
- Cindx: the dispersion of bank's activities across 5 business lines (FRY9c income data)
 - Commercial banking (cb)
 - Global markets (gm);
 - Investment banking (ib);
 - Private banking (pb);
 - Fund management (fm)

$$Cindx = \sum_i \left(\frac{rev_i}{totrev} \right)^2$$

Two measure of scope (2)

- From balance sheets
- *Bsindx*: the dispersion of bank's activities across 9 business lines (FRY9c balance sheet data)
 - Held to mat. securities
 - Available for sale securities
 - Cash, interbank lending, repos
 - Loans and lease finance
 - Trading assets
 - Real estate and fixed assets
 - Investments in subsidiaries
 - Other assets

$$Bsindx = \sum_i \left(\frac{bs_i}{totassets} \right)^2$$

Additional explanatory variables:

- Funding efficiency
 - Net interest margin (nim)
- Wholesale banking
 - Non-interest income as a share of total income (niish)
- Leverage:
 - Capital ratio: $ilev = \text{book capital} / \text{total assets}$

Data

- Bank holding companies, incorporated in US and regulated by the Federal reserve.
- Regulatory filings (FRY9c) income statement, balance sheet, off-balance sheet, lines of business
- Data cover 2003-2012
 - Change in lines of business reporting in 2003
 - Focus on medium and large size banks (top 5 size deciles)
- Also some data on management board compensation (Execucomp)

First Results

scale and scope

Dependent variable	niseq	mxlrrrentseq	trentseq	niseq	mxlrrrentseq	trentseq	niseq	mxlrrrentseq	trentseq
at	0.000** (2.50)	0.000*** (3.37)	0.000*** (2.88)	0.000 (1.14)	0.000*** (2.86)	0.000** (2.26)	0.000** (2.37)	0.000*** (3.37)	0.000*** (2.87)
at10	-0.002 (-0.24)	0.032*** (5.61)	0.009** (2.02)	-0.011 (-1.26)	0.026*** (4.94)	0.004 (0.99)	-0.003 (-0.28)	0.032*** (5.65)	0.009** (2.02)
cindx				-0.105*** (-4.25)	-0.062*** (-3.47)	-0.058*** (-3.95)			
bsindx							-0.009 (-0.29)	-0.000 (-0.00)	0.002 (0.11)
cons	0.126*** (40.64)	-0.015*** (-3.48)	1.524*** (670.10)	0.200*** (11.41)	0.033** (2.46)	1.564*** (150.91)	0.131*** (7.71)	-0.015 (-1.37)	1.523*** (144.16)
yr dummy	yes	yes	yes	yes	yes	yes	yes	yes	yes
R-sq	0.115		0.172	0.119		0.178	0.115		0.172
Nobs	7456	7456	7456	7456	7456	7456	7456	7456	7456

The dependent variables are return on equity (*niseq*), bankers' rent as a per cent of equity (*mxlrrrentseq*), and total rent (*trentseq*). The explanatory variables are total assets (*at*), a dummy variable if a bank is in the 10th size decile (*at10*), concentration index based on income structure (*cindx*), concentration index based on assets structure (*bsindx*), and year dummies. The regressions of *niseq* and *trentseq* are estimated by OLS. The *mxlrrrentseq* model is estimated by Tobit regression. T-ratios based on clustered standard errors are reported in parentheses. *, **, and *** indicates significant at the 10%, 5% and 1% levels respectively.

Results

- **Evidence on scale economies**
 - Without cindx the size (at) and the 10th decile dummy (at10) have a positive significant relation with all bank return measures. Evidence on scale economies.
- **Evidence on scope economies**
 - When cindx is included size (at) loses power. Cindx is negatively significantly related to bank return measures. Hence, the higher concentration of bank activities is related to lower bank returns.

Results

- Scope (diversity of business lines) benefits investors but not necessarily bankers
- High funding efficiency (high nim) is positive for investors return but negative for bankers (expensive wholesale needs highly paid bankers)
- Share of non-interest income to total income is positively related only to total bank return measure. The interaction term with at10 has positive impact for both total return and bankers' return specifications.
- Inverse leverage is positively related to investors' return and negatively related to bankers' return.

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- **Evidence on compensation**
- Evolving business models of large US bank holding companies

Evidence on compensation

- Preceding estimates of bankers' returns use same competitive benchmarks (by year) for all banks.
- This may miss out on differences in skill (and compensation) in different banking activities.
- No data on compensation by banker or by line of business
- We estimate an average wage equation controlling for line of business and scope.

Wage equation

- Dependent variable:
 - Average total compensation
- Explanatory variables:
 - Size (at, at10)
 - Business lines income shares in business line (rev_i),
i=global markets, investment banking, fund mgmnt,
private banking
 - Scope (cindx or bsindx)
 - Year dummies

Wage equation interpretation

- O-ring production functions (only as strong as the weakest link)
 - Bankers of different skills will be concentrated in business lines of different complexity, varying from low (commercial banking) to moderate (global markets) to high (investment banking and global custodianship).
- Some business lines have big scale economies
 - (global custodianship)
- Some shared common factors of production create synergies and scope economies
 - systems, global footprint to service global clients, legal.

Dependent variable	Wage	Wage
at	0.000** (2.35)	0.000** (2.30)
at10	8.324*** (4.19)	7.705*** (3.75)
cindx	77.929*** (2.95)	
bsindx		45.810*** (3.15)
shin_ gm	106.597*** (2.85)	59.067** (2.53)
shin_ ib	136.397*** (3.79)	112.636*** (4.96)
shin_ pb	175.229*** (5.35)	129.514*** (3.75)
shin_ fm	148.296*** (2.75)	33.889 (0.67)
cons	-21.016 (-0.83)	19.079* (1.67)
R-sq	0.262	0.244
Nobs	7456	7456

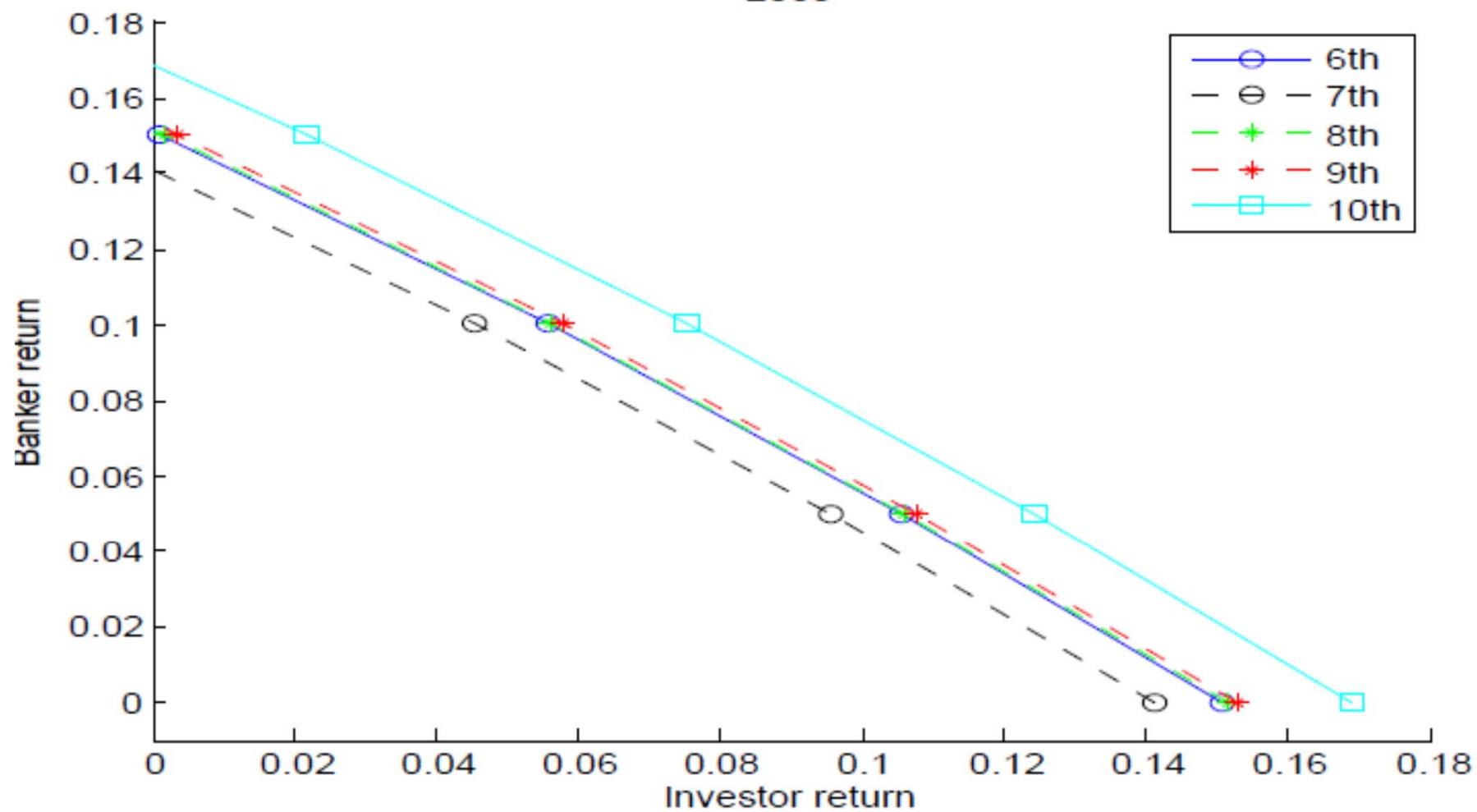
Results

- Relative to commercial banking there is a significant premium paid to bankers in:
 - Global markets
 - Investment banking
 - Private banking (implying a fiduciary duty)
- Evidence that economies of scope work by reducing overall compensation relative to lines of business run as stand-alone operations
- Even controlling for these other factors, larger banks have higher compensation levels.

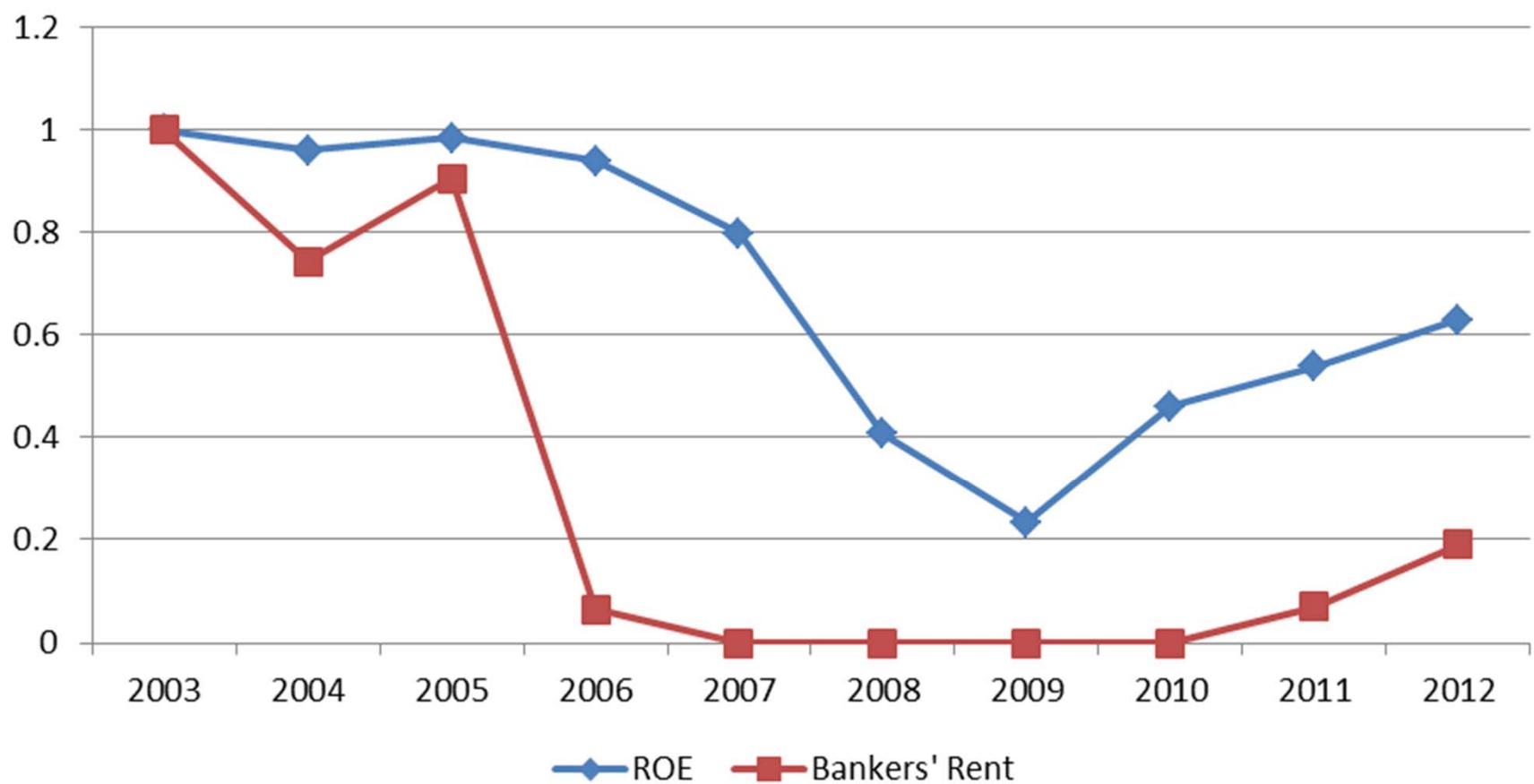
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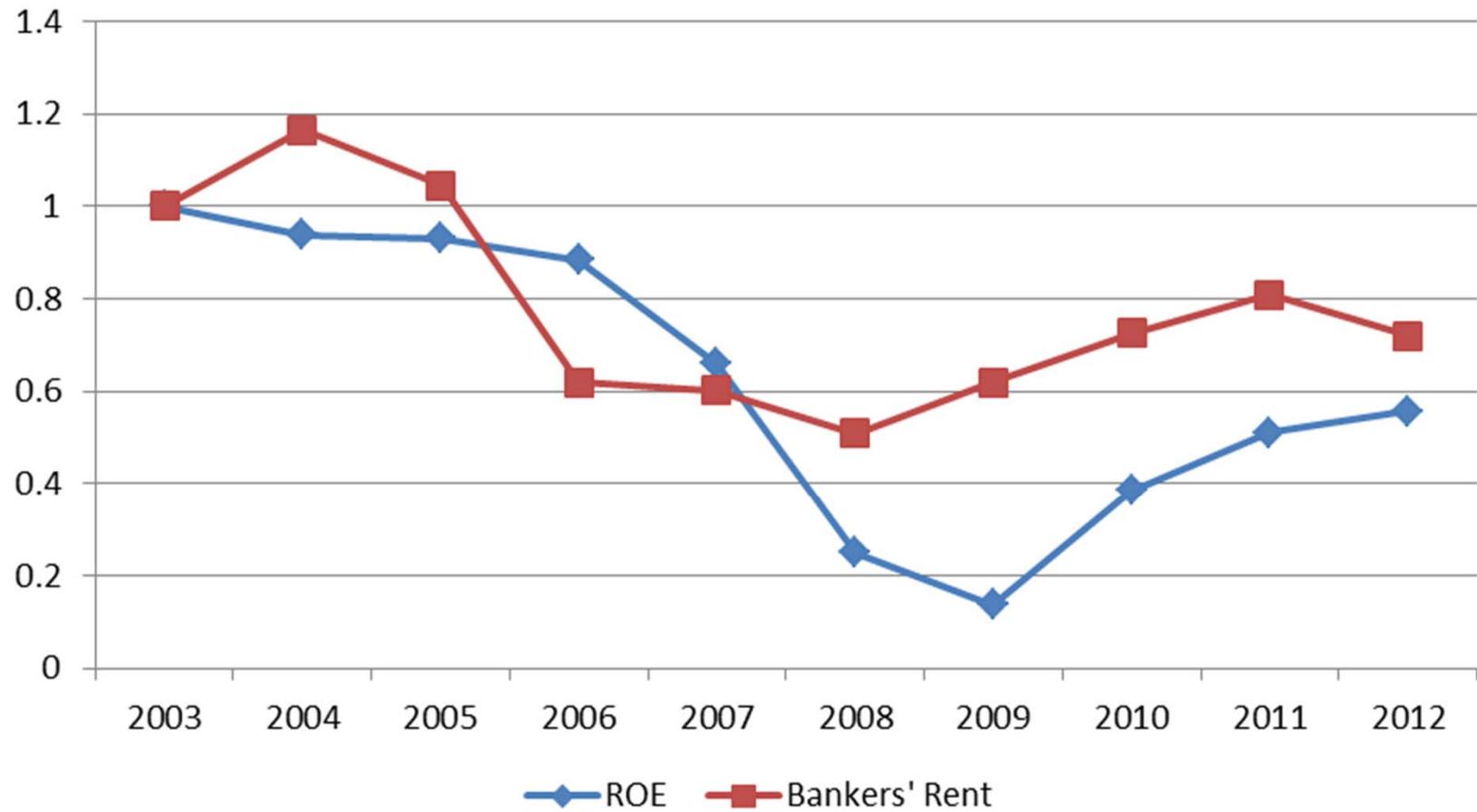
2003



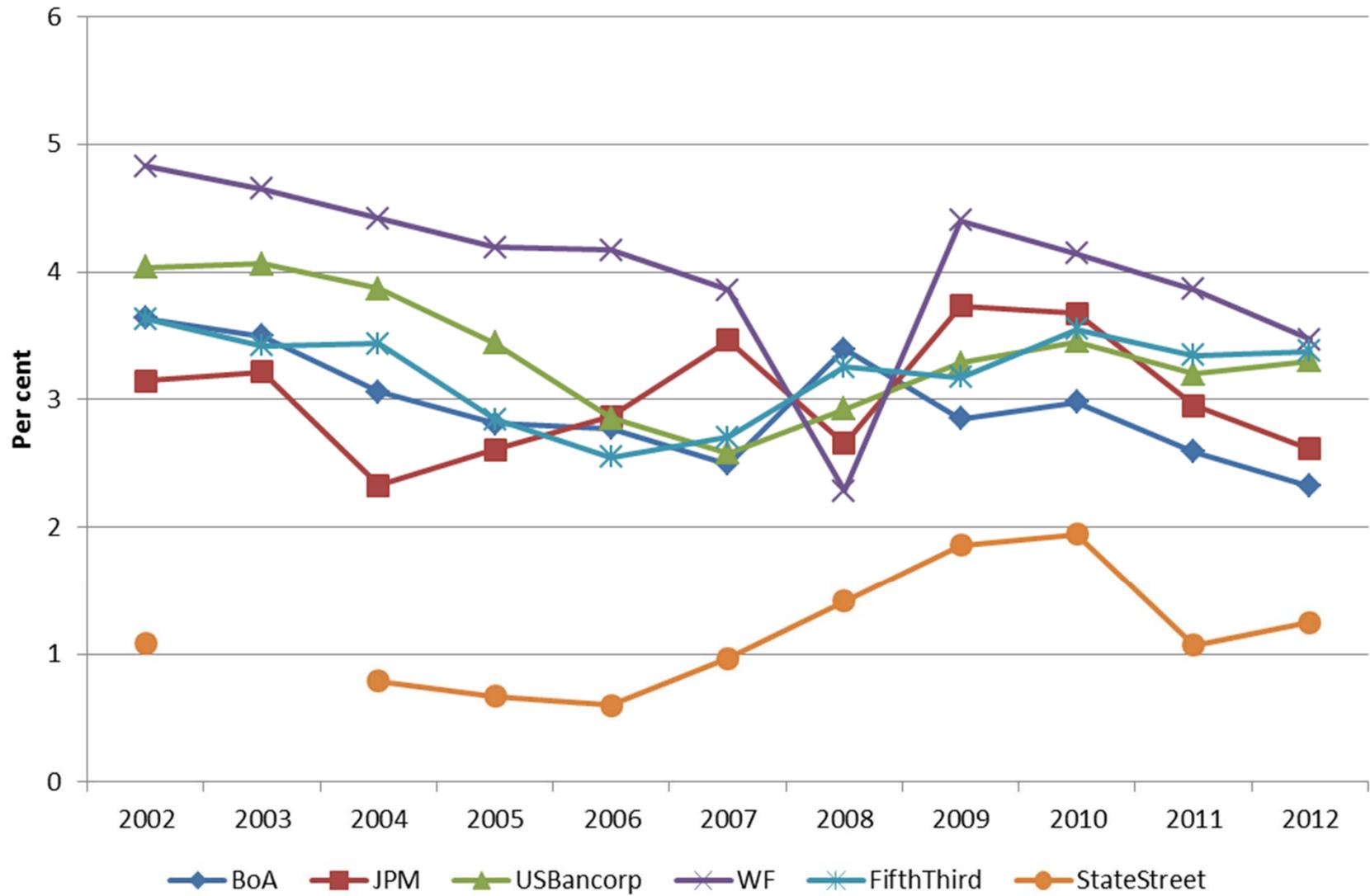
Returns to banking (medians, top 5 size deciles)



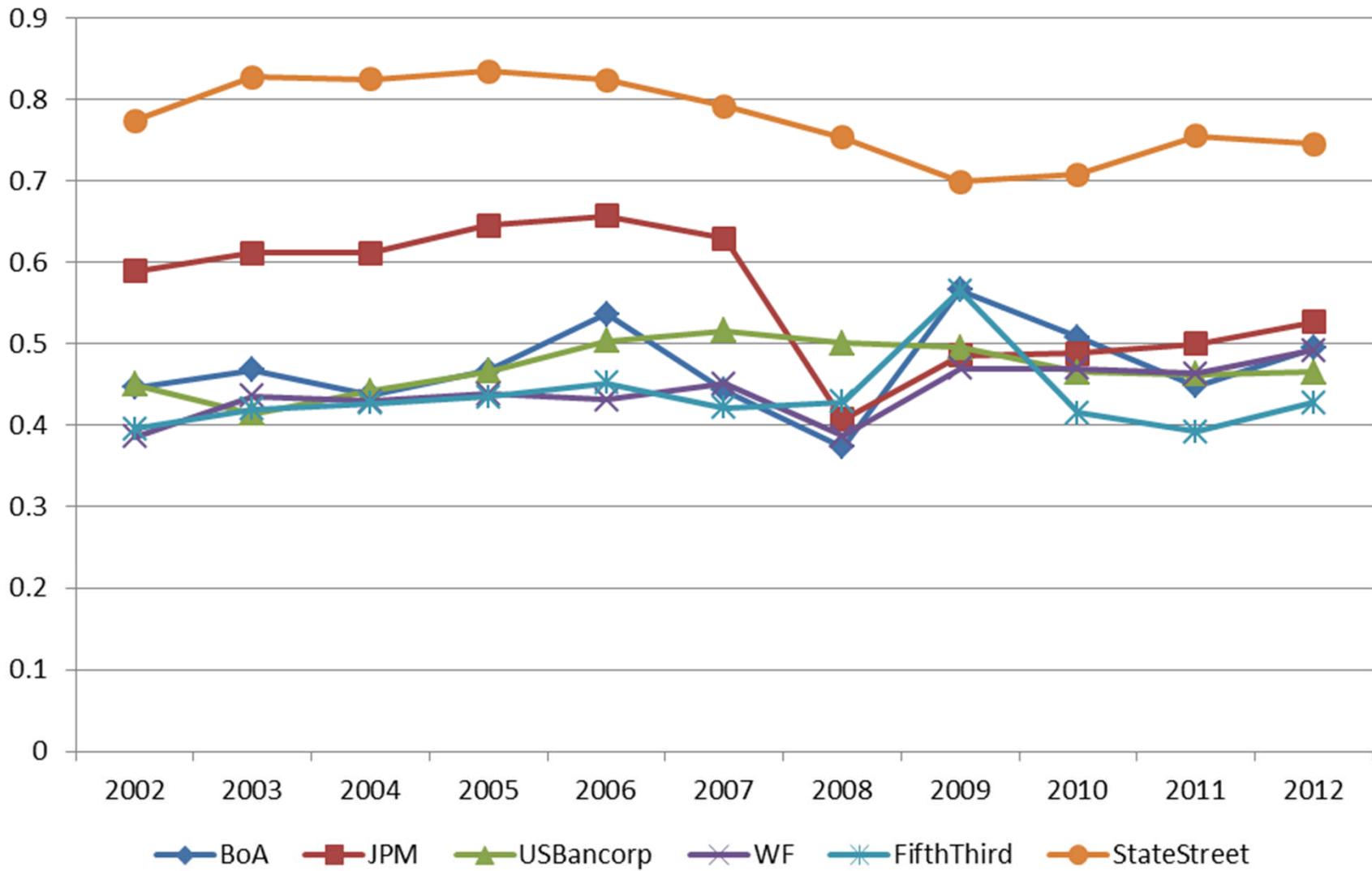
Returns to banking (medians, top decile only)



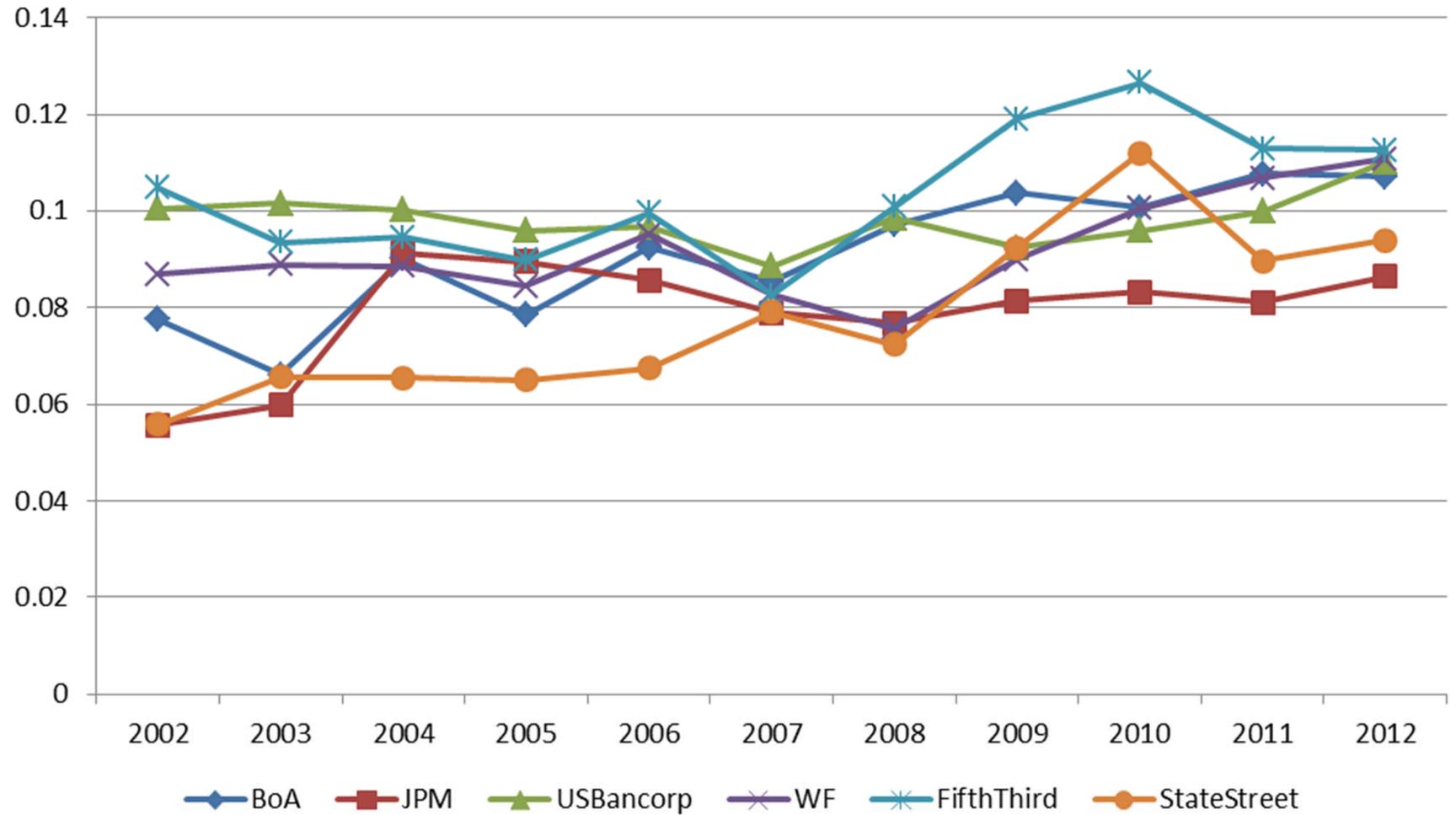
Funding Efficiency (nim)



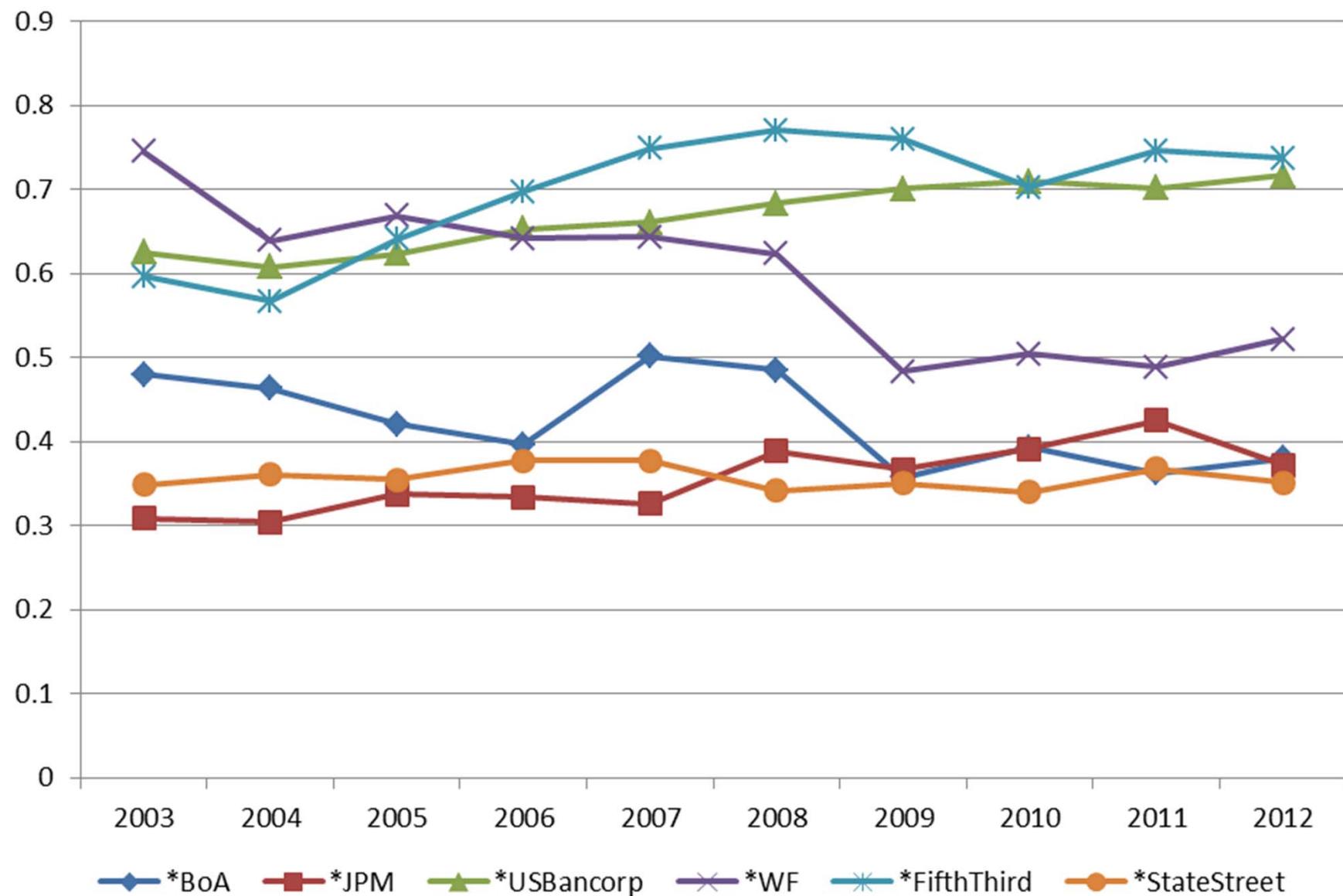
Wholesale banking share (niish)



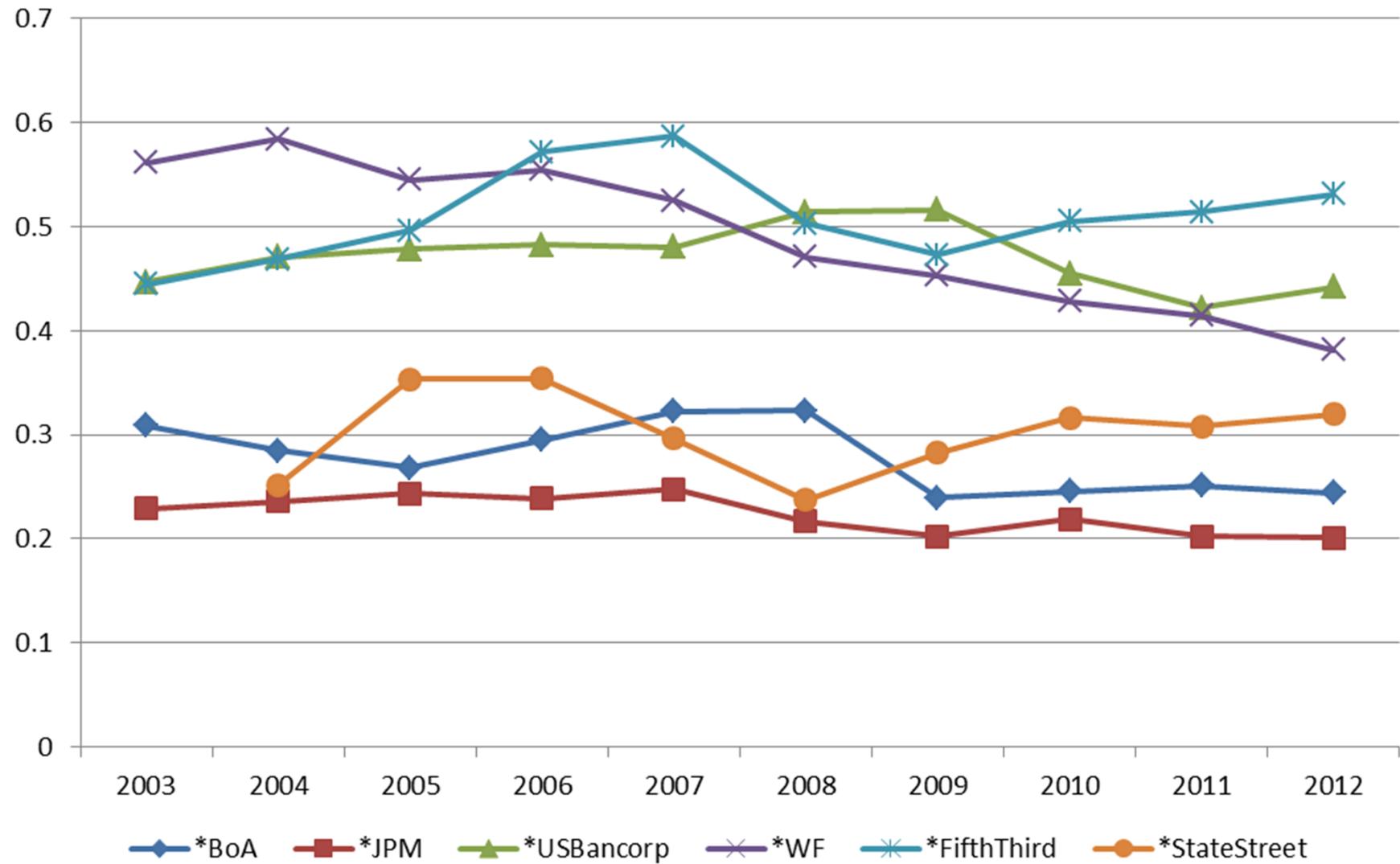
Capital ratio (ilev)



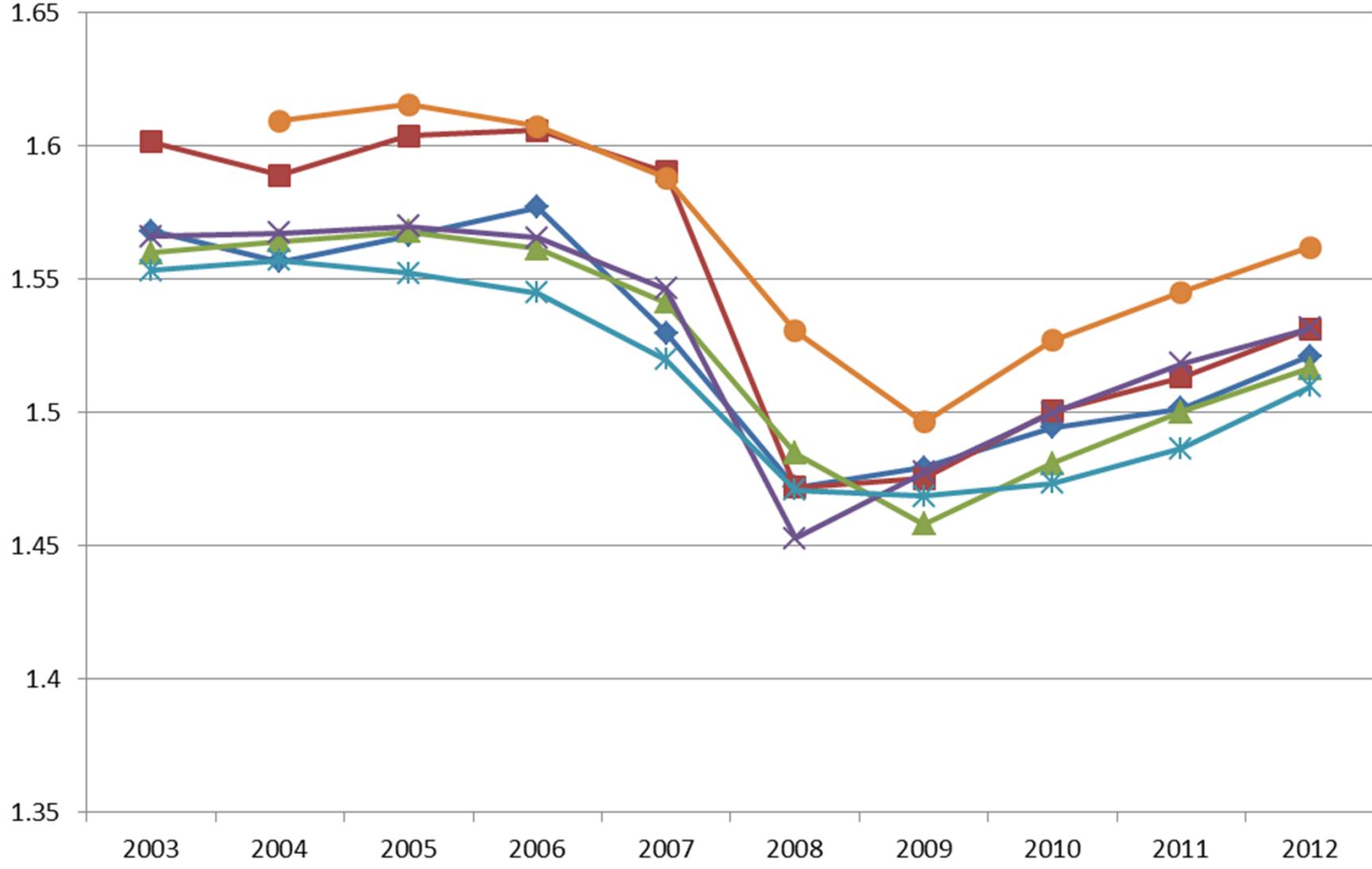
Scope (cindx)



Scope (bsindx)

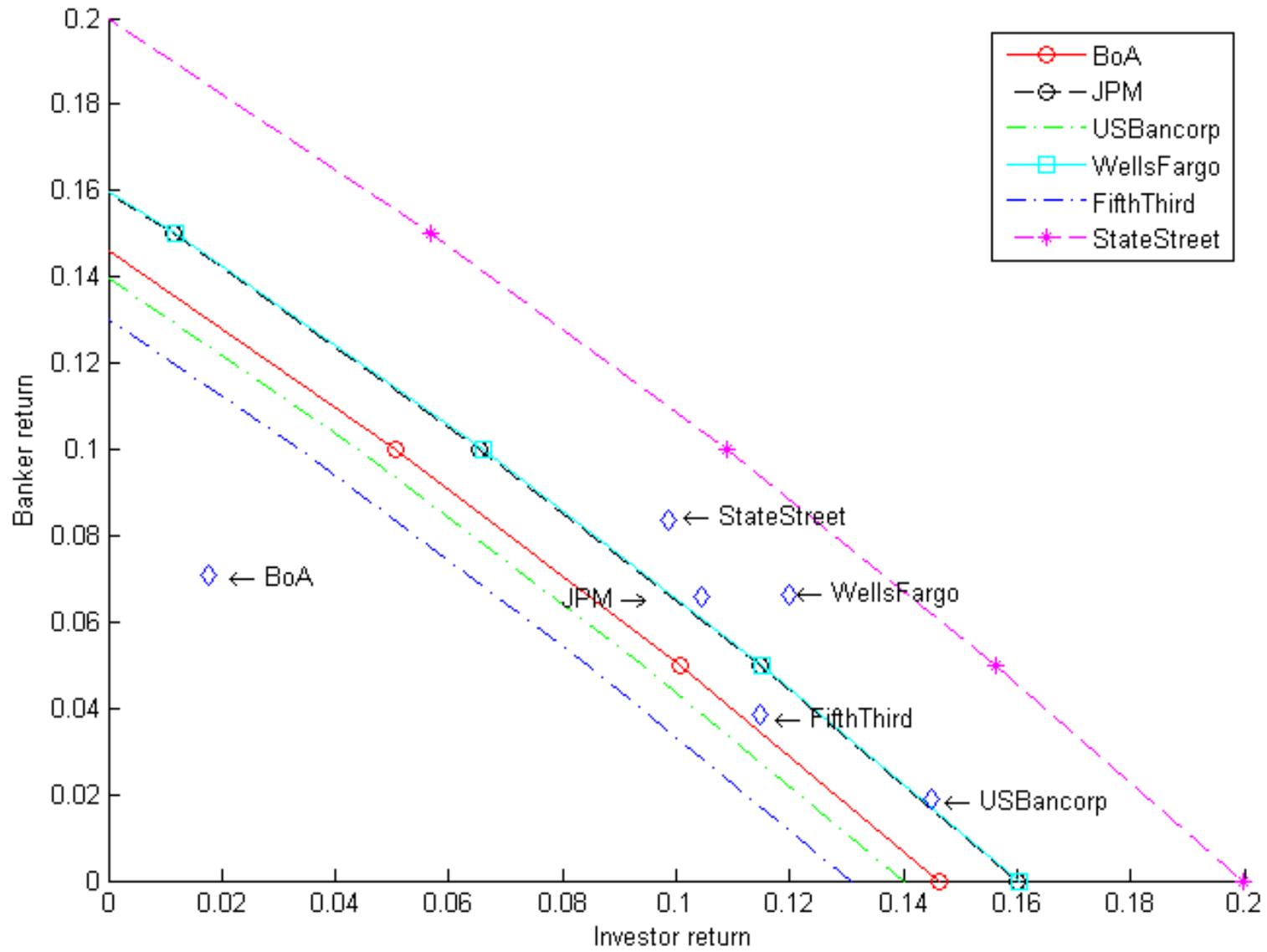


Predicted total return



BoA JPM USBancorp WF FifthThird StateStreet

2012



Summary

- Before controlling for other factors we find strong economies of scale, especially in bankers' rents.
- Apparent pure scale economies are largely accounted for by
 - Scope
 - Funding efficiency
 - Presence in wholesale banking activities
 - Leverage
- Regulatory pressures since 2008 have challenged the pursuit of scope and suggest a trade-off of safety and efficiency