



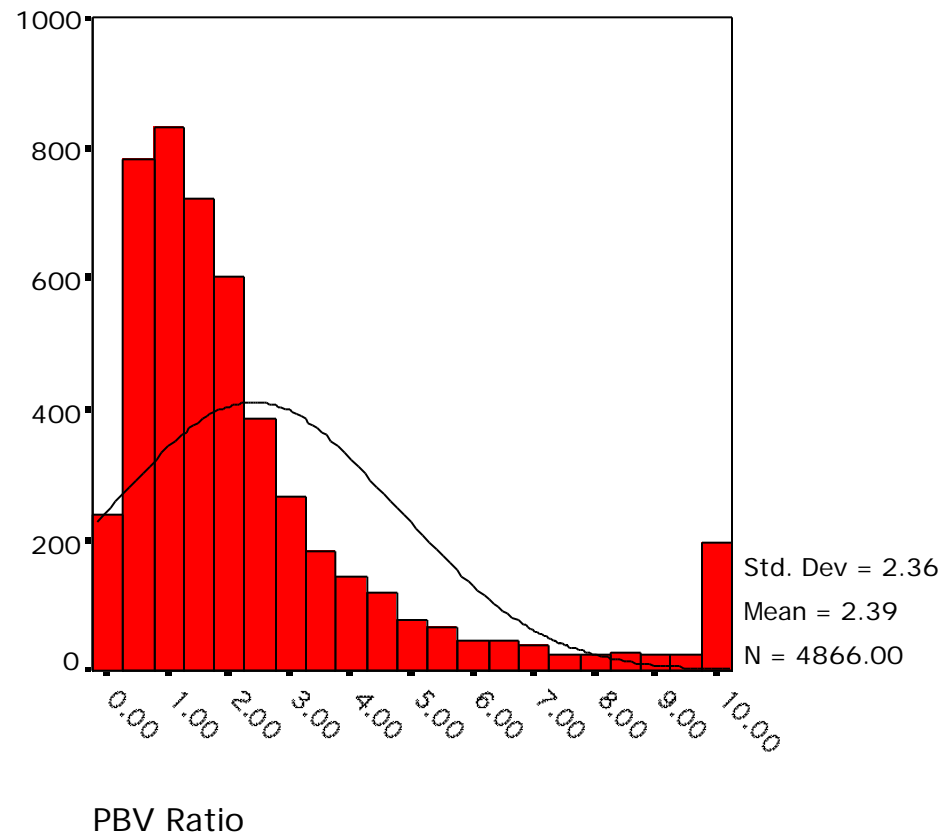
Book Value Multiples

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Price-Book Value Ratio: Definition

- The price/book value ratio is the ratio of the market value of equity to the book value of equity, i.e., the measure of shareholders' equity in the balance sheet.
- Price/Book Value =
$$\frac{\text{Market Value of Equity}}{\text{Book Value of Equity}}$$
- Consistency Tests:
 - If the market value of equity refers to the market value of equity of common stock outstanding, the book value of common equity should be used in the denominator.
 - If there is more than one class of common stock outstanding, the market values of all classes (even the non-traded classes) need to be factored in.

Price to Book Value: Distribution



Price Book Value Ratio: Stable Growth Firm

- Going back to a simple dividend discount model,

$$P_0 = \frac{DPS_1}{r - g_n}$$

- Defining the return on equity (ROE) = $EPS_0 / \text{Book Value of Equity}$, the value of equity can be written as:

$$P_0 = \frac{BV_0 * ROE * \text{Payout Ratio} * (1 + g_n)}{r - g_n}$$

$$\frac{P_0}{BV_0} = \text{PBV} = \frac{ROE * \text{Payout Ratio} * (1 + g_n)}{r - g_n}$$

- If the return on equity is based upon expected earnings in the next time period, this can be simplified to,

$$\frac{P_0}{BV_0} = \text{PBV} = \frac{ROE * \text{Payout Ratio}}{r - g_n}$$

Price Book Value Ratio: Stable Growth Firm Another Presentation

- This formulation can be simplified even further by relating growth to the return on equity:

$$g = (1 - \text{Payout ratio}) * \text{ROE}$$

- Substituting back into the P/BV equation,

$$\frac{P_0}{BV_0} = \text{PBV} = \frac{\text{ROE} - g_n}{r - g_n}$$

- The price-book value ratio of a stable firm is determined by the differential between the return on equity and the required rate of return on its projects.

Price Book Value Ratio for a Stable Growth Firm: Example

- Jenapharm was the most respected pharmaceutical manufacturer in East Germany.
- Jenapharm was expected to have revenues of 230 million DM and earnings before interest and taxes of 30 million DM in 1991.
- The firm had a book value of assets of 110 million DM, and a book value of equity of 58 million DM. The interest expenses in 1991 is expected to be 15 million DM. The corporate tax rate is 40%.
- The firm was expected to maintain sales in its niche product, a contraceptive pill, and grow at 5% a year in the long term, primarily by expanding into the generic drug market.
- The average beta of pharmaceutical firms traded on the Frankfurt Stock exchange was 1.05.
- The ten-year bond rate in Germany at the time of this valuation was 7%; the risk premium for stocks over bonds is assumed to be 5.5%.

Estimating a Price/Book Ratio for Jenapharm

- Expected Net Income = $(\text{EBIT} - \text{Interest Expense}) \times (1-t) \times 1+g = (30 - 15) \times (1-0.4) \times (1.05) = 9.45 \text{ mil DM}$
- Return on Equity = $\text{Expected Net Income} / \text{Book Value of Equity} = 9.45 / 58 = 16.29\%$
- Cost on Equity = $7\% + 1.05 (5.5\%) = 12.775\%$
- Price/Book Value Ratio = $(\text{ROE} - g) / (r - g) = (.1629 - .05) / (.12775 - .05) = 1.46$
- Estimated MV of equity = $\text{BV of Equity} \times \text{Price/BV ratio} = 58 \times 1.46 = \$ 84.50 \text{ mil DM}$

Price Book Value Ratio for High Growth Firm

- The Price-book ratio for a high-growth firm can be estimated beginning with a 2-stage discounted cash flow model:

$$P_0 = \frac{EPS_0 * \text{Payout Ratio} * (1 + g) * \left[1 - \frac{(1 + g)^n}{(1 + r)^n} \right]}{r - g} + \frac{EPS_0 * \text{Payout Ratio}_n * (1 + g)^n * (1 + g_n)}{(r - g_n)(1 + r)^n}$$

- Dividing both sides of the equation by the book value of equity:

$$\frac{P_0}{BV_0} = \frac{ROE * \text{Payout Ratio} * (1 + g) * \left[1 - \frac{(1 + g)^n}{(1 + r)^n} \right]}{r - g} + \frac{ROE_n * \text{Payout Ratio}_n * (1 + g)^n * (1 + g_n)}{(r - g_n)(1 + r)^n}$$

where ROE = Return on Equity in high-growth period
 ROE_n = Return on Equity in stable growth period

PBV Ratio for High Growth Firm: Example

- Assume that you have been asked to estimate the PBV ratio for a firm which has the following characteristics:

	High Growth Phase	Stable Growth Phase
Length of Period	5 years	Forever after year 5
Return on Equity	25%	15%
Payout Ratio	20%	60%
Growth Rate	$.80 * .25 = .20$	$.4 * .15 = .06$
Beta	1.25	1.00
Cost of Equity	12.875%	11.50%

The riskfree rate is 6% and the risk premium used is 5.5%.

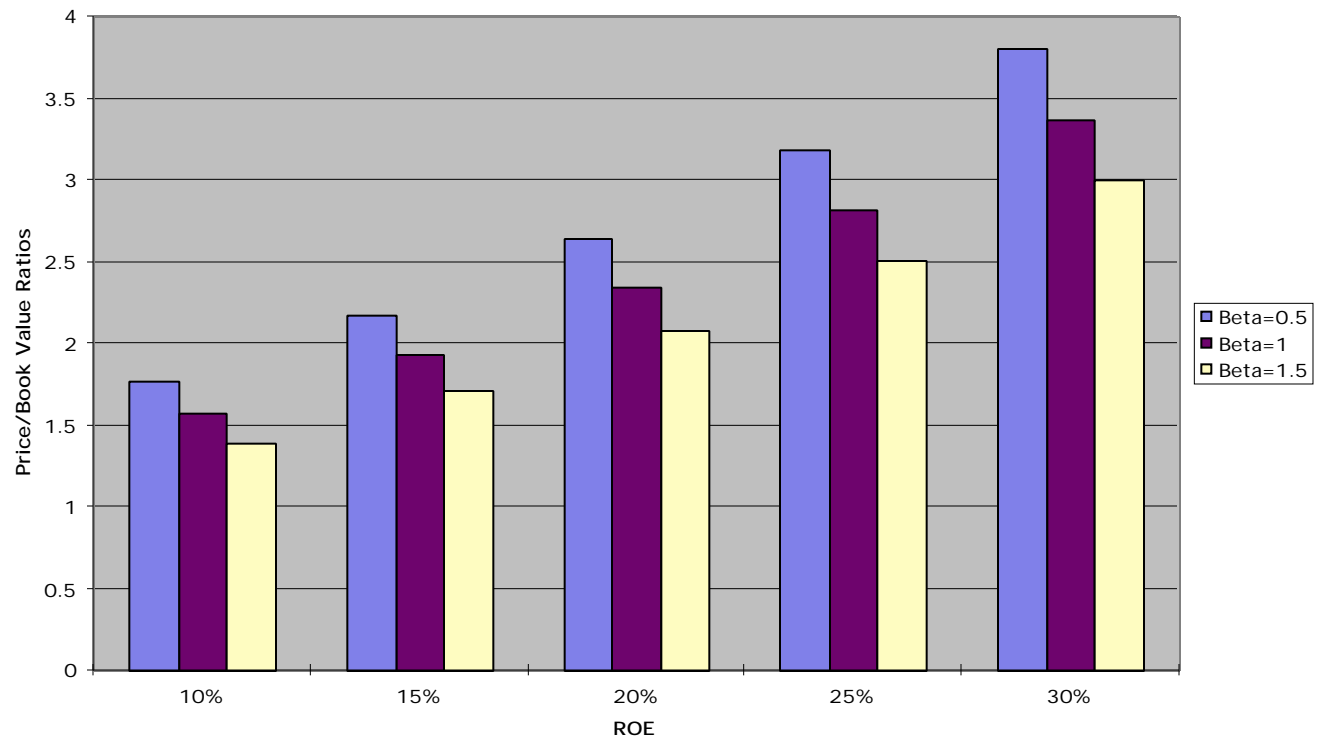
Estimating Price/Book Value Ratio

- The price/book value ratio for this firm is:

$$PBV = \frac{0.25 * 0.2 * (1.20) * \left(1 - \frac{(1.20)^5}{(1.12875)^5}\right)}{(.12875 - .20)} + \frac{0.15 * 0.6 * (1.20)^5 * (1.06)}{(.115 - .06) (1.12875)^5} = 2.66$$

PBV and ROE: The Key

PBV and ROE: Risk Scenarios



PBV/ROE: Oil Companies

<i>Company Name</i>	<i>Ticker Symbol</i>	<i>PBV</i>	<i>ROE</i>
Crown Cent. Petr.'A'	CNPA	0.29	-14.60%
Giant Industries	GI	0.54	7.47%
Harken Energy Corp.	HEC	0.64	-5.83%
Getty Petroleum Mktg.	GPM	0.95	6.26%
Pennzoil-Quaker State	PZL	0.95	3.99%
Ashland Inc.	ASH	1.13	10.27%
Shell Transport	SC	1.45	13.41%
USX-Marathon Group	MRO	1.59	13.42%
Lakehead Pipe Line	LHP	1.72	13.28%
Amerada Hess	AHC	1.77	16.69%
Tosco Corp.	TOS	1.95	15.44%
Occidental Petroleum	OXY	2.15	16.68%
Royal Dutch Petr.	RD	2.33	13.41%
Murphy Oil Corp.	MUR	2.40	14.49%
Texaco Inc.	TX	2.44	13.77%
Phillips Petroleum	P	2.64	17.92%
Chevron Corp.	CHV	3.03	15.69%
Repsol-YPF ADR	REP	3.24	13.43%
Unocal Corp.	UCL	3.53	10.67%
Kerr-McGee Corp.	KMG	3.59	28.88%
Exxon Mobil Corp.	XOM	4.22	11.20%
BP Amoco ADR	BPA	4.66	14.34%
Clayton Williams Energy	CWEI	5.57	31.02%
Average		2.30	12.23%

PBV versus ROE regression

- Regressing PBV ratios against ROE for oil companies yields the following regression:

$$\text{PBV} = 1.04 + 10.24 (\text{ROE}) \quad R^2 = 49\%$$

- For every 1% increase in ROE, the PBV ratio should increase by 0.1024.

Valuing Pemex

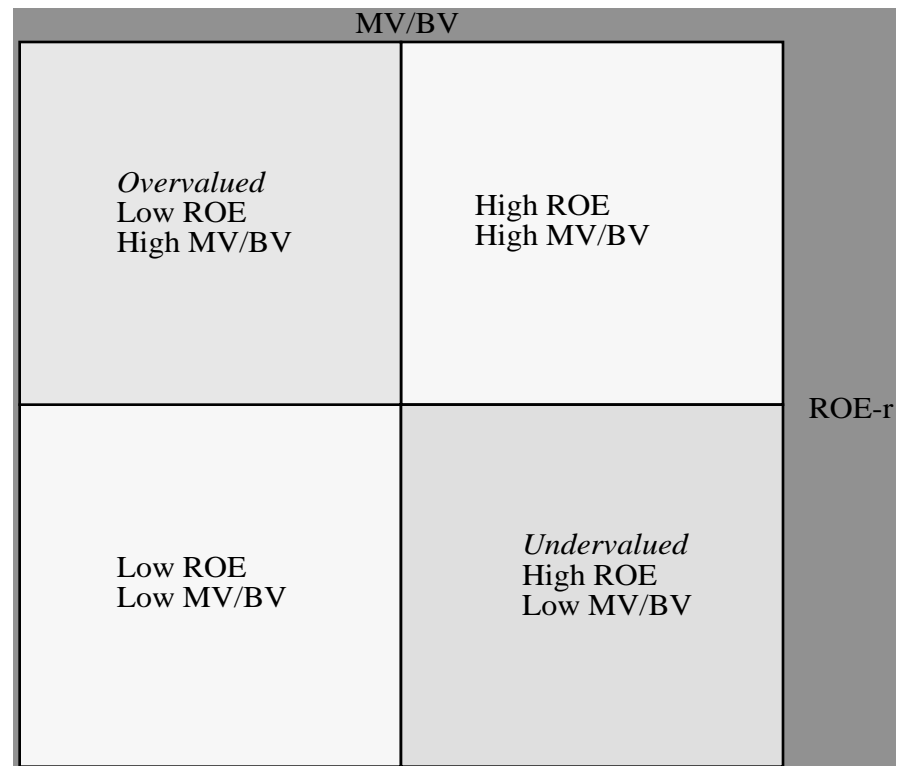
- Assume that you have been asked to value a PEMEX for the Mexican Government; All you know is that it has earned a return on equity of 10% last year. The appropriate P/BV ratio can be estimated

$$\text{P/BV Ratio (based upon regression)} = 1.04 + 10.24 * 0.1 = 2.06$$

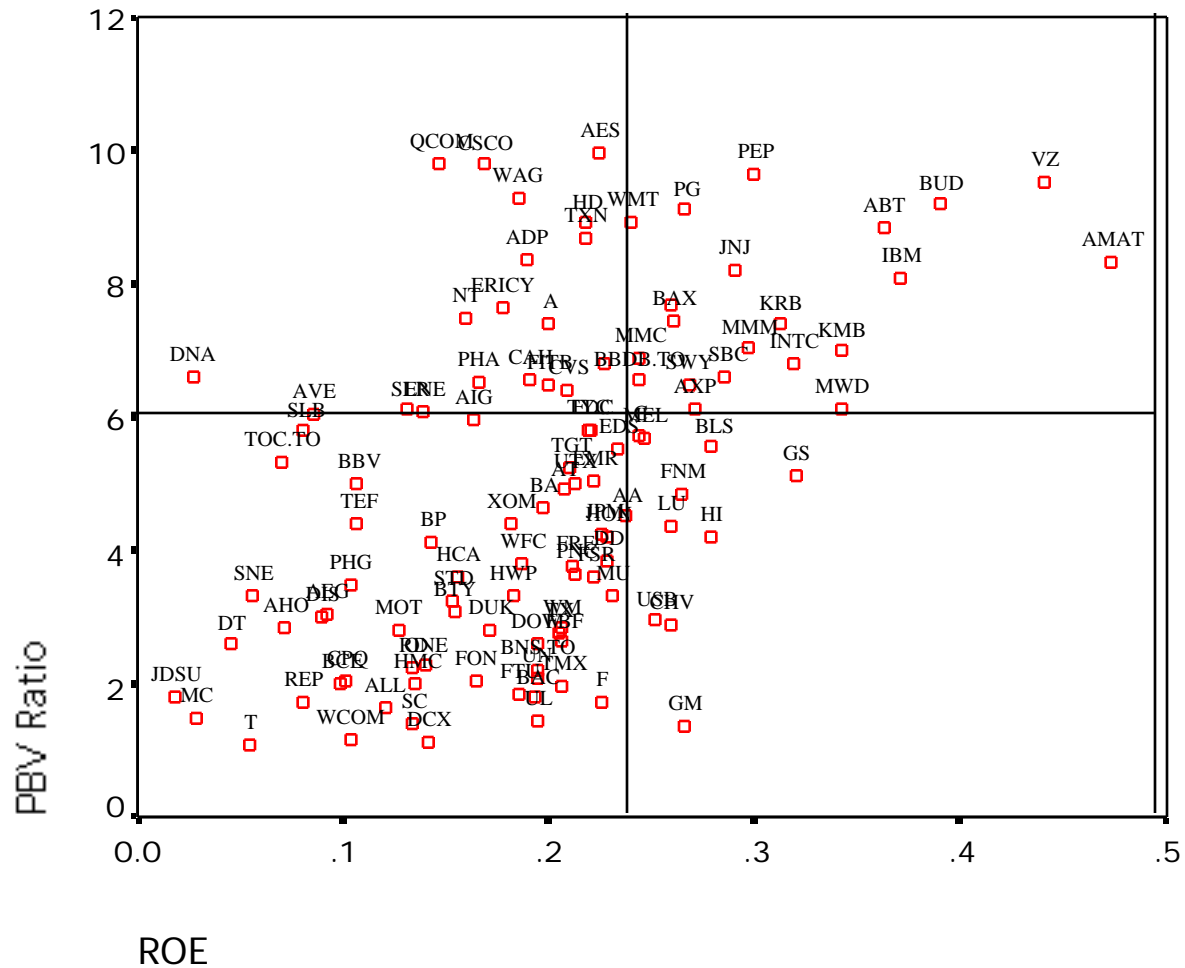
Looking for undervalued securities - P/BV Ratios and ROE

- Given the relationship between price-book value ratios and returns on equity, it is not surprising to see firms which have high returns on equity selling for well above book value and firms which have low returns on equity selling at or below book value.
- The firms which should draw attention from investors are those which provide mismatches of price-book value ratios and returns on equity - low P/BV ratios and high ROE or high P/BV ratios and low ROE.

The Valuation Matrix



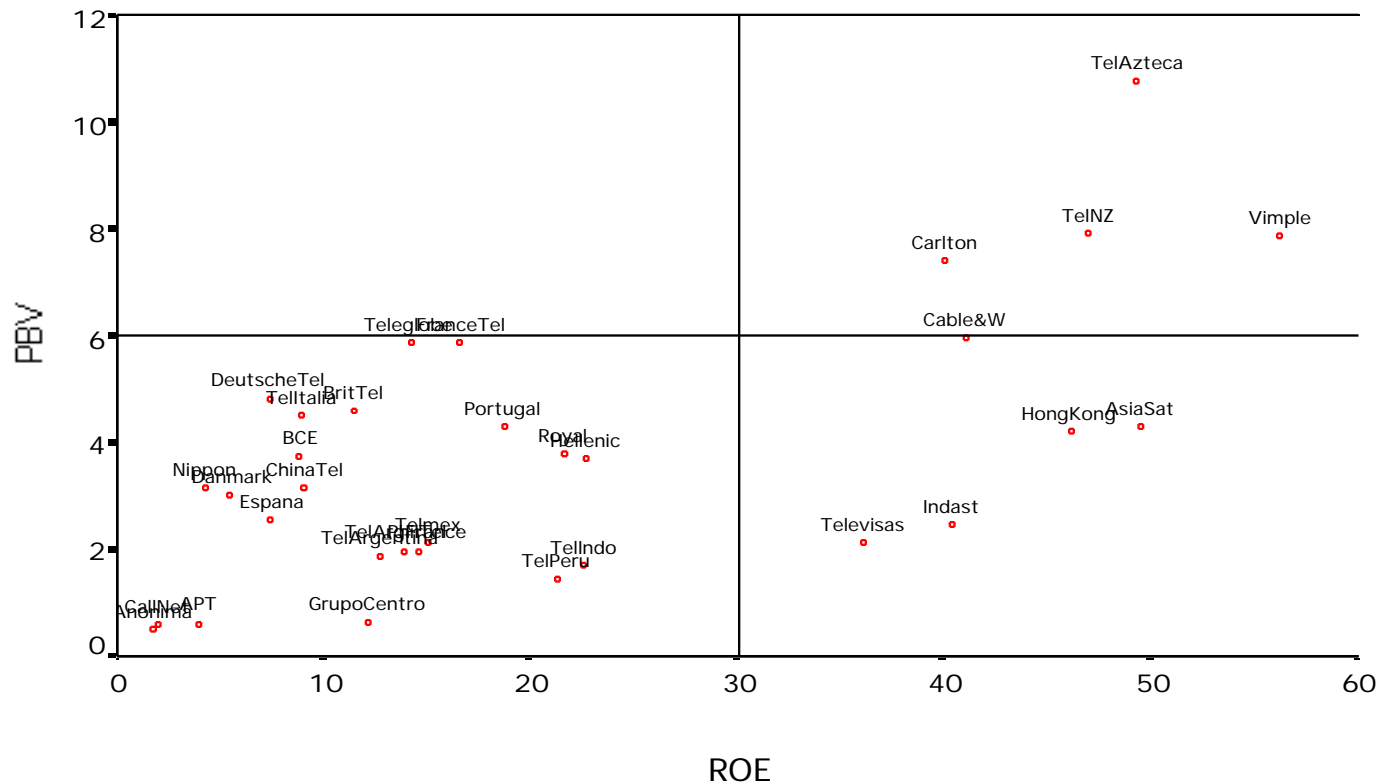
Large Market Cap Firms: PBV vs ROE: January 2001



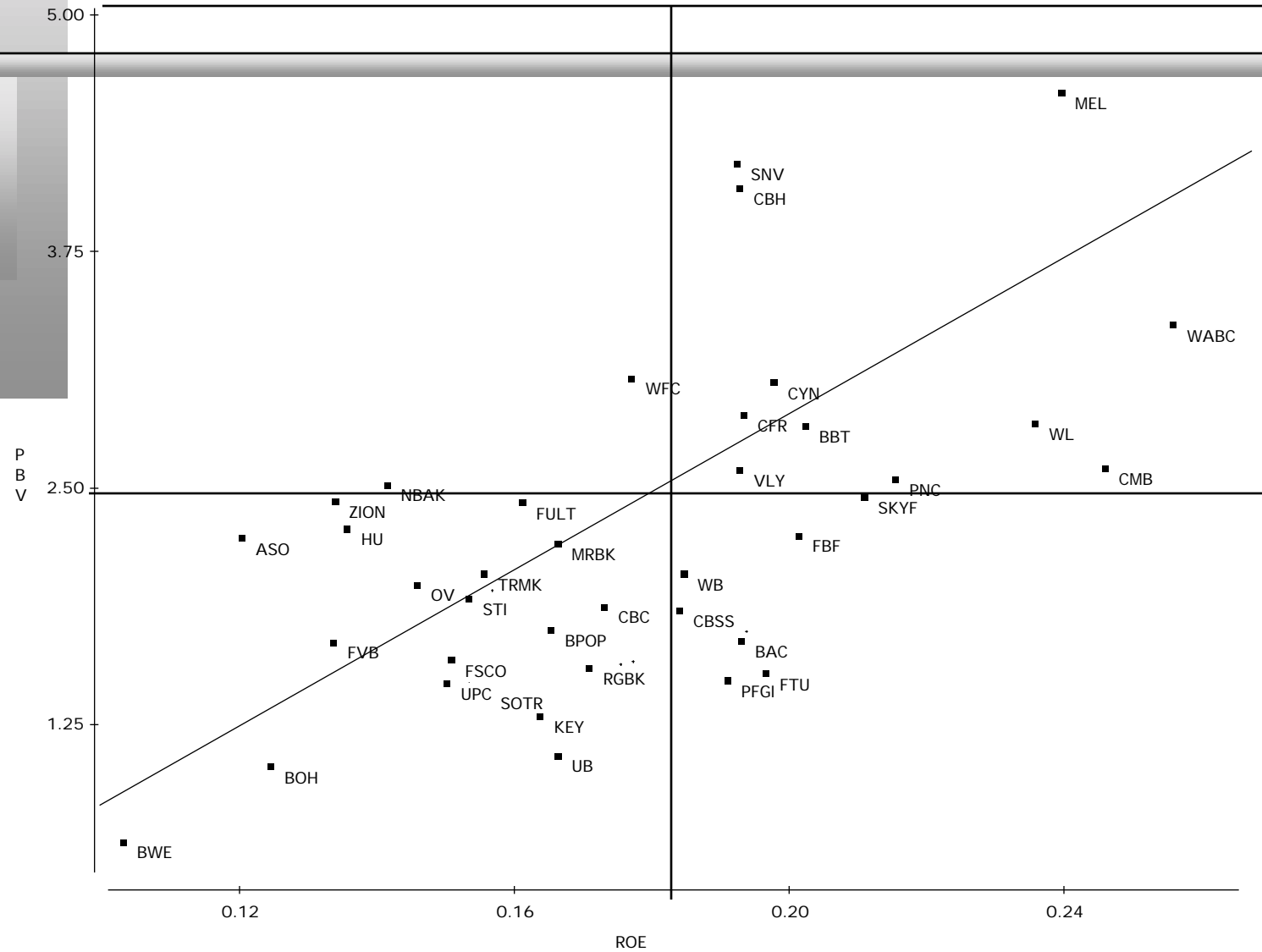
Company Symbols

<i>Company Name</i>	<i>Ticker</i>	<i>Symbol</i>	<i>Company Name</i>	<i>Ticker</i>	<i>Symbol</i>	<i>Company Name</i>	<i>Ticker</i>	<i>Symbol</i>	<i>Company Name</i>	<i>Ticker</i>	<i>Symbol</i>
Matsushita Elec. ADR	MC		British Telecom ADR	BTY		Merrill Lynch & Co.	MER		Int'l Business Mach.	IBM	
Compaq Computer	CPQ		Amer. Int'l Group	AIG		Fannie Mae	FNM		Abbott Labs.	ABT	
News Corp. Ltd. ADR	NWS		Chevron Corp.	CHV		Tyco Int'l Ltd.	TYC		Morgan S. Dean Witter	MWD	
AT&T Corp.	T		AEGON Ins. Group	AEG		Amer. Express	AXP		Amgen	AMGN	
Schlumberger Ltd.	SLB		Sprint Corp.	FON		Corning Inc.	GLW		Dell Computer	DELL	
Disney (Walt)	DIS		Boeing	BA		EMC Corp.	EMC		Amer. Home Products	AHP	
Koninklijke Philips NV	PHG		Hewlett-Packard	HWP		Gen'l Electric	GE		Procter & Gamble	PG	
Time Warner	TWX		Banco Bilbao Vis. ADR	BBV		Intel Corp.	INTC		Pfizer, Inc.	PFE	
Deutsche Telekom ADR	DT		Wells Fargo	WFC		Ford Motor	F		Schering-Plough	SGP	
WorldCom Inc.	WCOM		Ericsson ADR	ERICY		BellSouth Corp.	BLS		Merck & Co.	MRK	
Motorola, Inc.	MOT		Texas Instruments	TXN		Johnson & Johnson	JNJ		Bristol-Myers Squibb	BMY	
Telefonica SA ADR	TEF		Micron Technology	MU		Lucent Technologies	LU		Philip Morris	MO	
Banco Santander ADR	STD		Bank of America	BAC		PepsiCo, Inc.	PEP		Lilly (Eli)	LLY	
Sony Corp. ADR	SNE		Home Depot	HD		Cisco Systems	CSCO		Oracle Corp.	ORCL	
Exxon Mobil Corp.	XOM		McDonald's Corp.	MCD		Goldman Sachs	GS				
Aventis ADR	AVE		SBC Communications	SBC		Medtronic, Inc.	MDT				
Enron Corp.	ENE		Wal-Mart Stores	WMT		Sun Microsystems	SUNW				
Pharmacia Corp.	PHA		Du Pont	DD		Applied Materials	AMAT				
Shell Transport	SC		Citigroup Inc.	C		Schwab (Charles)	SCH				
Royal Dutch Petr.	RD		Qualcomm Inc.	QCOM		Microsoft Corp.	MSFT				
DaimlerChrysler AG	DCX		SmithKline Beecham	SBH		Nokia Corp. ADR	NOK				
BP Amoco ADR	BPA		Chase Manhattan Corp.	CMB		Coca-Cola	KO				

PBV Matrix: Telecom Companies

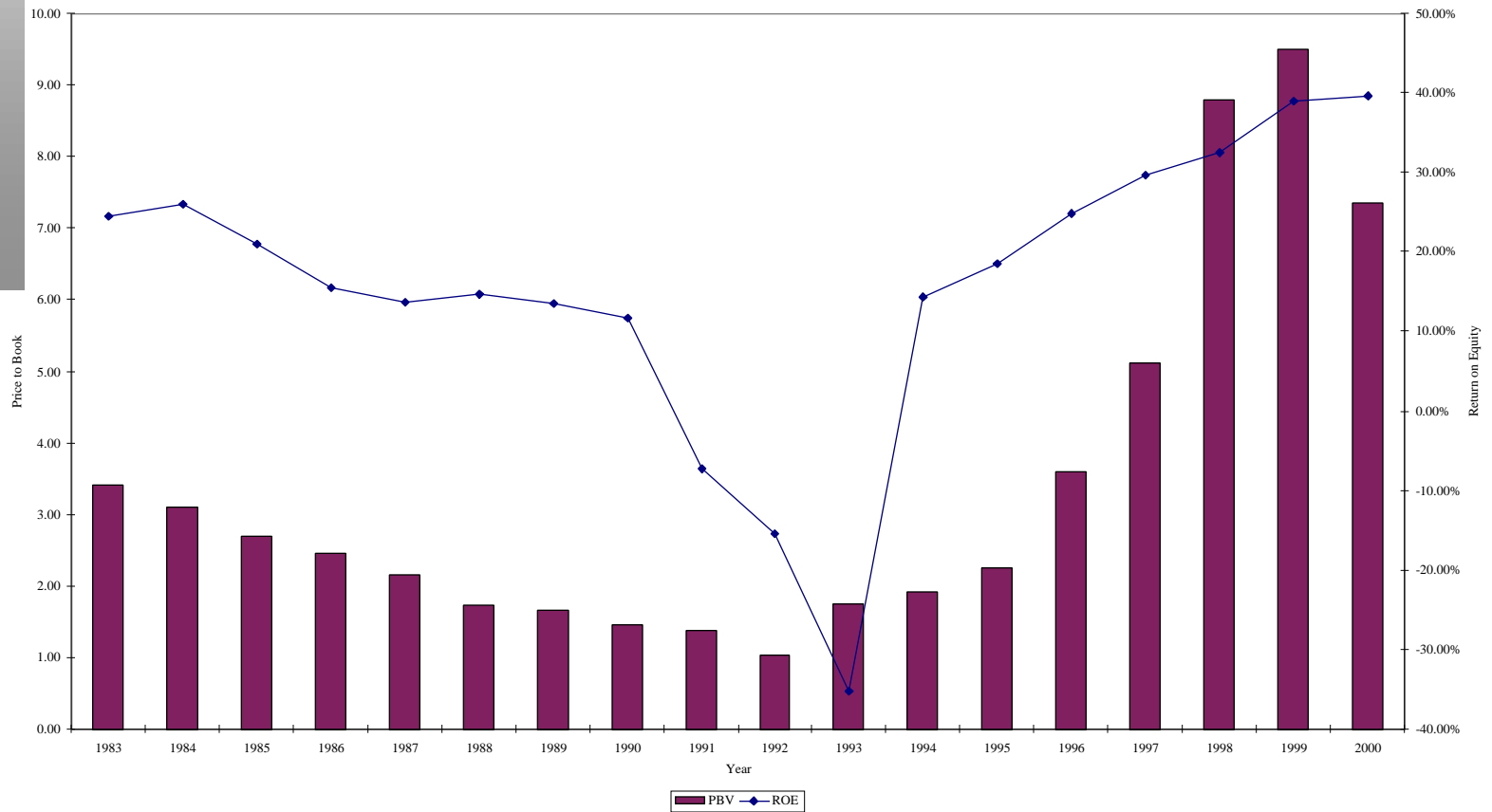


U.S. Banks: Market Cap > \$ 1 billion



<i>Company Name</i>	<i>Ticker Symbol</i>	<i>Company Name</i>	<i>Ticker Symbol</i>	<i>Company Name</i>	<i>Ticker Symbol</i>
Westamerica Bancorp	WABC	Fulton Fin'l	FULT	Regions Financial	RGBK
Keystone Fin'l	KSTN	First Va. Banks	FVB	Synovus Financial	SNV
Colonial BncGrp. 'A'	CNB	City National Corp.	CYN	AmSouth Bancorp.	ASO
One Valley Bancorp	OV	Hibernia Corp. `A'	HIB	KeyCorp	KEY
National BanCorp. of Alaska,In	NBAK	Silicon Valley Bncsh	SIVB	BB&T Corp.	BBT
BancWest Corp.	BWE	Mercantile Bankshares	MRBK	Wachovia Corp.	WB
Hudson United Bancorp	HU	Compass Bancshares	CBSS	PNC Financial Serv.	PNC
Provident Finl Group	PFGI	Popular Inc	BPOP	SunTrust Banks	STI
Pacific Century Fin'l	BOH	First Security	FSCO	State Street Corp.	STT
Centura Banks	CBC	No. Fork Bancorp	NFB	Mellon Financial Corp.	MEL
Trustmark Corp.	TRMK	Natl Commerce Bancrp	NCBC	Morgan (J.P.) & Co	JPM
Sky Finl Group Inc	SKYF	UnionBancal Corp	UB	First Union Corp.	FTU
Wilmington Trust	WL	M&T Bank Corp.	MTB	FleetBoston Fin'l	FBF
Valley Natl Bancp NJ	VLY	Zions Bancorp.	ZION	Bank of New York	BK
Commerce Bancorp NJ	CBH	Union Planters	UPC	Chase Manhattan Corp.	CMB
Cullen/Frost Bankers	CFR	SouthTrust Corp.	SOTR	Wells Fargo	WFC
		Summit Bancorp	SUB	Bank of America	BAC

IBM: The Rise and Fall and Rise Again



PBV Ratio Regression

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.686 ^a	.470	.469	167.8482

a. Predictors: (Constant), Beta, ROE1, Expected Growth in EPS: next 5 y

Coefficients^{a,b}

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	2.719	.199		13.678	.000
	Expected Growth in EPS: next 5 y	6.325E-02	.008	.159	8.302	.000
	ROE1	9.656	.253	.667	38.183	.000
	Beta	-1.438	.183	-.150	-7.862	.000

a. Dependent Variable: PBV Ratio

b. Weighted Least Squares Regression - Weighted by Market Cap

PBV Ratio Regression: Brazil - September 2000

- Regressing PBV against ROE for 177 Brazilian firms (The betas are missing for a lot of firms and meaningless for the rest, and there are no expected growth rate estimates over the long term)

$$\text{PBV} = 0.77 + 3.78 (\text{ROE})$$

$$\text{R squared} = 17.3\%$$

- To run this regression, we used
 - Only firms with positive returns on equity
 - Only firms with positive book values of equity

Cross Sectional Regression for Greece: May 2001

R squared = 22%

Number of firms in sample = 272

Coefficients ^a

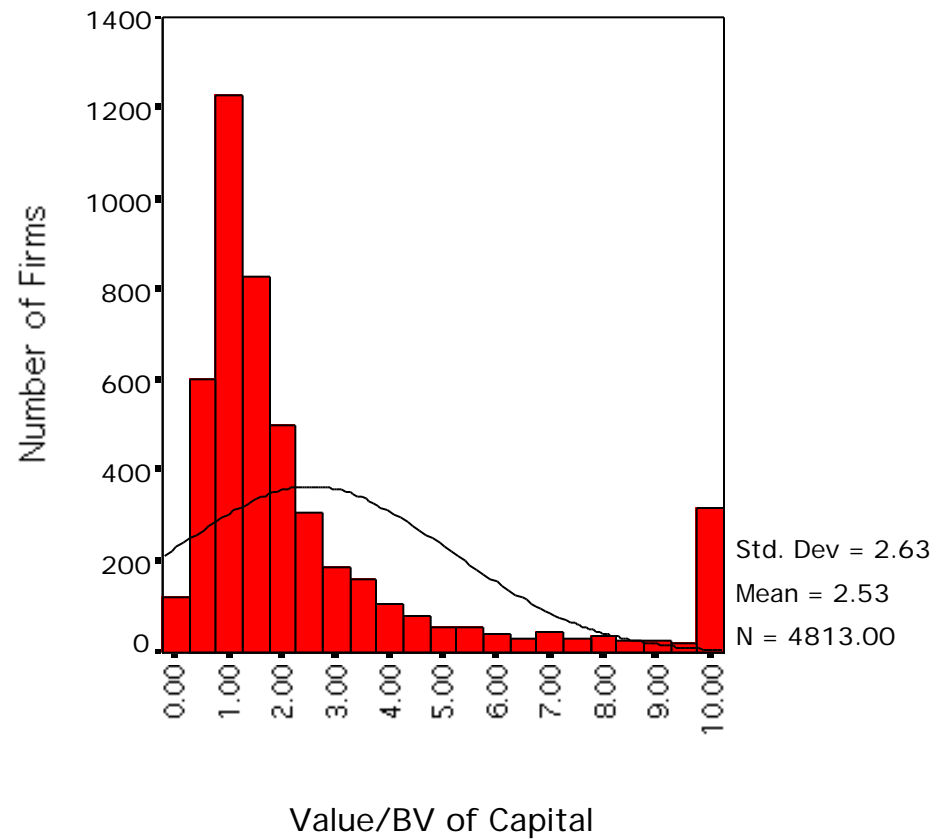
Model		Unstandardized Coefficients		Standar dized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	2.106	.280		7.531	.000
	ROE	11.631	1.535	.418	7.579	.000

a. Dependent Variable: PBV

Value/Book Value Ratio: Definition

- While the price to book ratio is a equity multiple, both the market value and the book value can be stated in terms of the firm.
- Value/Book Value = $\frac{\text{Market Value of Equity} + \text{Market Value of Debt}}{\text{Book Value of Equity} + \text{Book Value of Debt}}$

Value/Book Ratio: Description



Determinants of Value/Book Ratios

- To see the determinants of the value/book ratio, consider the simple free cash flow to the firm model:

$$V_0 = \frac{\text{FCFF}_1}{\text{WACC} - g}$$

- Dividing both sides by the book value, we get:

$$\frac{V_0}{\text{BV}} = \frac{\text{FCFF}_1/\text{BV}}{\text{WACC} - g}$$

- If we replace, $\text{FCFF} = \text{EBIT}(1-t) - (g/\text{ROC}) \text{EBIT}(1-t)$, we get

$$\frac{V_0}{\text{BV}} = \frac{\text{ROC} - g}{\text{WACC} - g}$$

Value/Book Ratio: An Example

- Consider a stable growth firm with the following characteristics:
 - Return on Capital = 12%
 - Cost of Capital = 10%
 - Expected Growth = 5%
- The value/BV ratio for this firm can be estimated as follows:
$$\text{Value/BV} = (.12 - .05)/(.10 - .05) = 1.40$$
- The effects of ROC on growth will increase if the firm has a high growth phase, but the basic determinants will remain unchanged.

Value/Book and the Return Spread

Value/BV Ratios and Return Spreads

