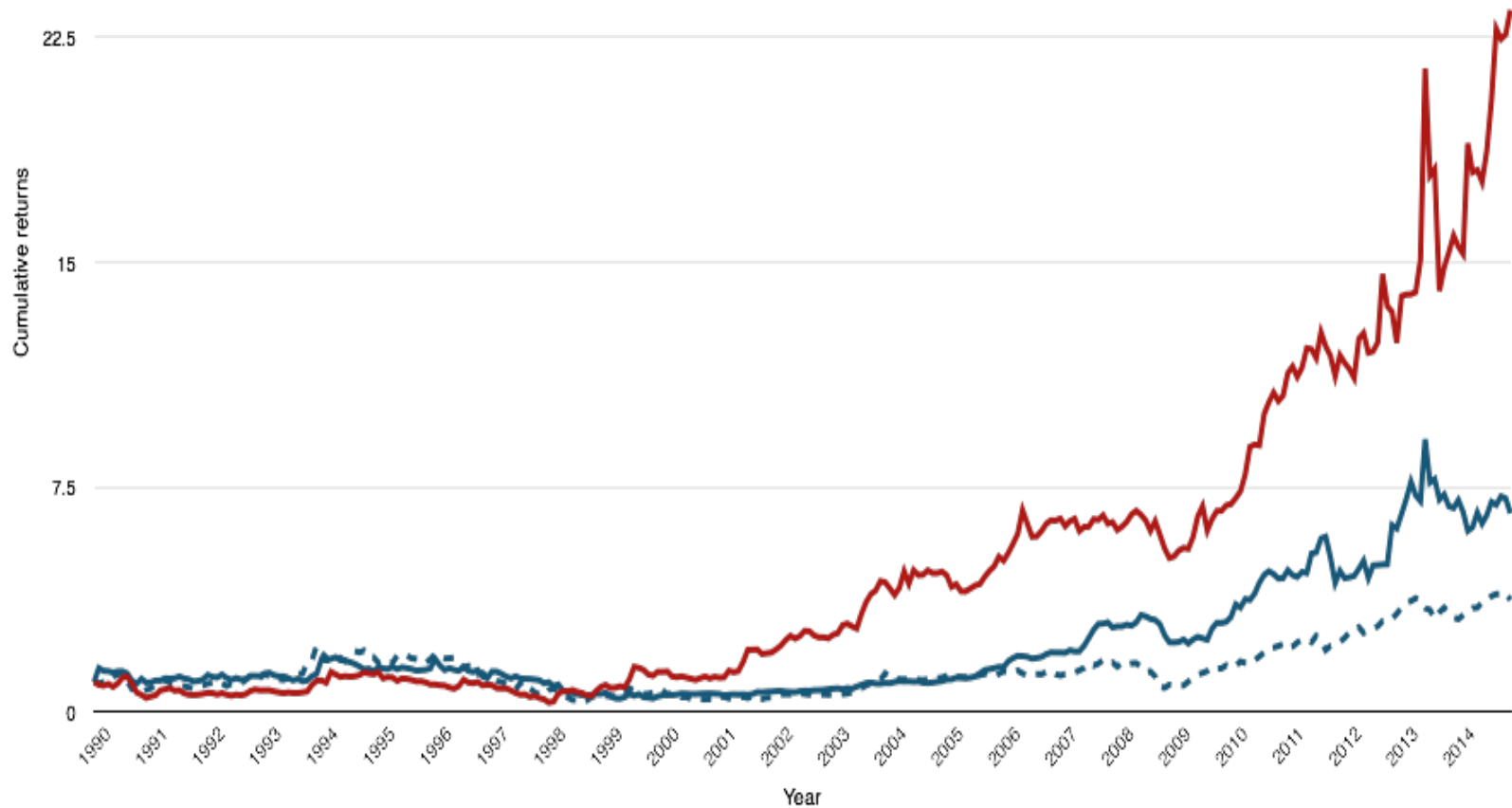




Constructing a Value Portfolio Using PE Ratios

A Recommendation for Return Performance



Sampan Nettayanun, PhD

Today's Schedule

- Introduction to Value Investing
- Constructing a Value Portfolio Using PE
- R Programming Examples

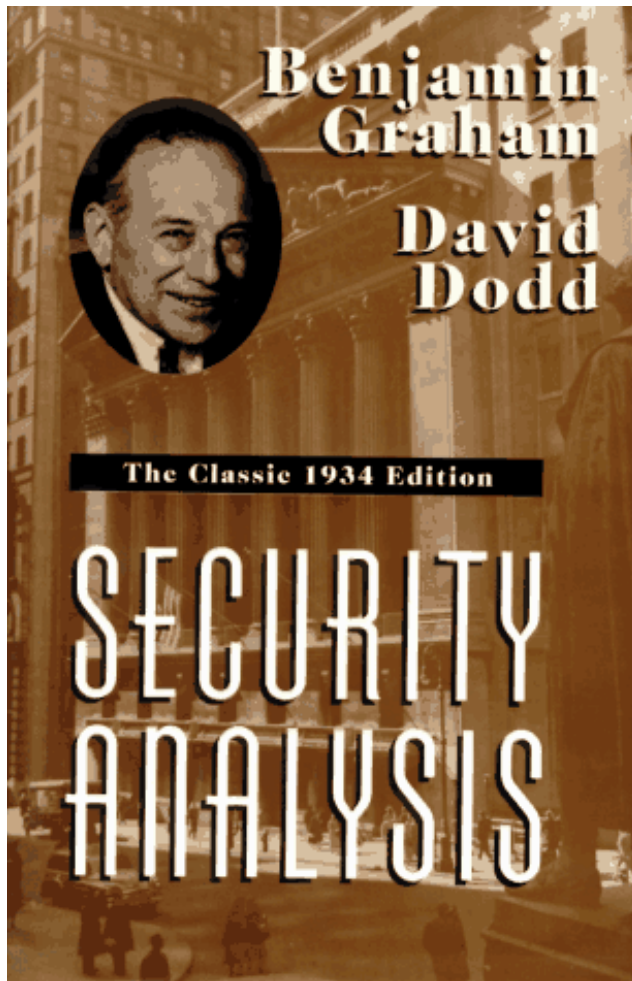
What is **Value Investing** ?

The Father of Value Investing

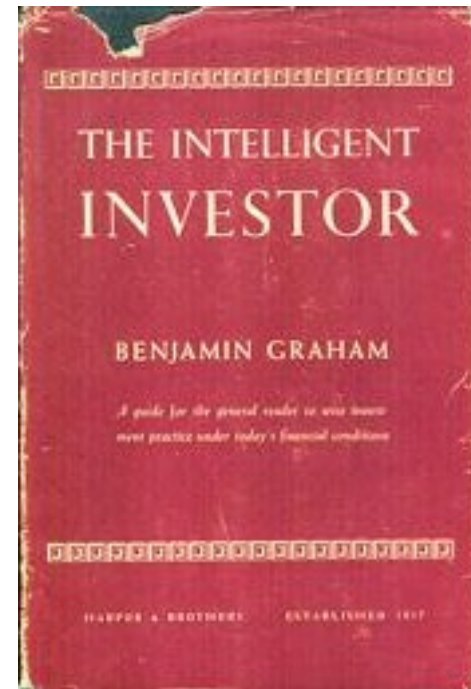


Benjamin Graham (1894-1976)

The Father of Value Investing



1934



1949

The Superinvestors of Graham-and-Doddsville

By Warren E. Buffett

Table 1 • Walter J. Schloss

Year	S&P Overall Gain, Including Dividends (%)	WJS Ltd Partners Overall Gain per year (%)	WJS Partnership Overall Gain per year (%)
1956	7.5	5.1	6.8
1957	-10.5	- 4.7	- 4.7
1958	42.1	42.1	54.6
1959	12.7	17.5	23.3
1960	- 1.6	7.0	9.3
1961	26.4	21.6	28.8
1962	-10.2	8.3	11.1
1963	23.3	15.1	20.1
1964	16.5	17.1	22.8
1965	13.1	26.8	35.7
1966	-10.4	0.5	0.7
1967	26.8	25.8	34.4
1968	10.6	26.6	35.5
1969	- 7.5	-9.0	-9.0
1970	2.4	- 8.2	- 8.2
1971	14.9	25.5	28.3
1972	19.8	11.6	15.5
1973	-14.8	- 8.0	- 8.0
1974	-26.6	- 6.2	- 6.2
1975	36.9	42.7	52.2
1976	22.4	29.4	39.2
1977	- 8.6	25.8	34.4
1978	7.0	36.6	48.8
1979	17.6	29.8	39.7
1980	32.1	23.3	31.1
1981	- 6.7	18.4	24.5
1982	20.2	24.1	32.1
1983	22.8	38.4	51.2
1984 1st Qtr.	- 2.3	0.8	1.1

Standard & Poor's 28 1/4 year compounded gain	887.2%
---	--------

WJS Limited Partners 28 1/4 year compounded gain	6,678.8%
--	----------

WJS Partnership 28 1/4 year compounded gain	23,104.7%
---	-----------

Standard & Poor's 28 1/4 year annual compounded rate	8.4%
--	------

WJS Limited Partners 28 1/4 year annual compounded rate	16.1%
---	-------

WJS Partnership 28 1/4 year annual compounded rate	21.3%
--	-------

During the history of the Partnership it has owned over 800 issues and, at most times, has had at least 100 positions. Present assets under management approximate \$45 million.

Table 2 • Tweedy, Browne Inc.

Period Ended (September 30)	Dow Jones* (%)	S & P 500* (%)	TBK Overall (%)	TBK Limited Partners (%)
1968 (9 mos.)	6.0	8.8	27.6	22.0
1969	- 9.5	- 6.2	12.7	10.0
1970	- 2.5	- 6.1	- 1.3	- 1.9
1971	20.7	20.4	20.9	16.1
1972	11.0	15.5	14.6	11.8
1973	2.9	1.0	8.3	7.5
1974	-31.8	-38.1	1.5	1.5
1975	36.9	37.8	28.8	22.0
1976	29.6	30.1	40.2	32.8
1977	- 9.9	-4.0	23.4	18.7
1978	8.3	11.9	41.0	32.1
1979	7.9	12.7	25.5	20.5
1980	13.0	21.1	21.4	17.3
1981	- 3.3	- 2.7	14.4	11.6
1982	12.5	10.1	10.2	8.2
1983	44.5	44.3	35.0	28.2
Total Return				
15 3/4 years	191.8%	238.5%	1,661.2%	936.4%
Standard & Poor's 15 3/4 year annual compounded rate				7.0%
TBK Limited Partners 15 3/4 year annual compounded rate				16.0%
TBK Overall 15 3/4 year annual compounded rate				20.0%

*Includes dividends paid for both Standard & Poor's 500 Composite Index and Dow Jones Industrial Average.

Table 3 • Buffett Partnership, Ltd.

Year	Overall Results From Dow (%)	Partnership Results (%)	Limited Partners' Results (%)
1957	- 8.4	10.4	9.3
1958	38.5	40.9	32.2
1959	20.0	25.9	20.9
1960	- 6.2	22.8	18.6
1961	22.4	45.9	35.9
1962	- 7.6	13.9	11.9
1963	20.6	38.7	30.5
1964	18.7	27.8	22.3
1965	14.2	47.2	36.9
1966	-15.6	20.4	16.8
1967	19.0	35.9	28.4
1968	7.7	58.8	45.6
1969	-11.6	6.8	6.6
On a cumulative or compounded basis, the results are:			
1957	- 8.4	10.4	9.3
1957-58	26.9	55.6	44.5
1957-59	52.3	95.9	74.7
1957-60	42.9	140.6	107.2
1957-61	74.9	251.0	181.6
1957-62	61.6	299.8	215.1
1957-63	94.9	454.5	311.2
1957-64	131.3	608.7	402.9
1957-65	164.1	943.2	588.5
1957-66	122.9	1156.0	704.2
1957-67	165.3	1606.9	932.6
1957-68	185.7	2610.6	1403.5
1957-69	152.6	2794.9	1502.7
Annual Compounded Rate	7.4	29.5	23.8

Table 5 • Charles Munger

Year	Mass. Inv. Trust (%)	Investors Stock (%)	Lehman (%)	Tri-Cont. (%)	Dow (%)	Over-all Partnership (%)	Limited Partners (%)
Yearly Results (1)							
1962	- 9.8	-13.4	-14.4	- 12.2	- 7.6	30.1	20.1
1963	20.0	16.5	23.8	20.3	20.6	71.7	47.8
1964	15.9	14.3	13.6	13.3	18.7	49.7	33.1
1965	10.2	9.8	19.0	10.7	14.2	8.4	6.0
1966	- 7.7	- 9.9	- 2.6	- 6.9	- 15.7	12.4	8.3
1967	20.0	22.8	28.0	25.4	19.0	56.2	37.5
1968	10.3	8.1	6.7	6.8	7.7	40.4	27.0
1969	- 4.8	- 7.9	- 1.9	0.1	- 11.6	28.3	21.3
1970	0.6	- 4.1	- 7.2	- 1.0	8.7	- 0.1	- 0.1
1971	9.0	16.8	26.6	22.4	9.8	25.4	20.6
1972	11.0	15.2	23.7	21.4	18.2	8.3	7.3
1973	-12.5	-17.6	-14.3	- 21.3	- 13.1	- 31.9	- 31.9
1974	-25.5	-25.6	-30.3	- 27.6	- 23.1	- 31.5	- 31.5
1975	32.9	33.3	30.8	35.4	44.4	73.2	73.2
Compound Results (2)							
1962	- 9.8	-13.4	- 14.4	- 12.2	- 7.6	30.1	20.1
1962-3	8.2	0.9	6.0	5.6	11.5	123.4	77.5
1962-4	25.4	15.3	20.4	19.6	32.4	234.4	136.3
1962-5	38.2	26.6	43.3	32.4	51.2	262.5	150.5
1962-6	27.5	14.1	39.5	23.2	27.5	307.5	171.3
1962-7	53.0	40.1	78.5	54.5	51.8	536.5	273.0
1962-8	68.8	51.4	90.5	65.0	63.5	793.6	373.7
1962-9	60.7	39.4	86.9	65.2	44.5	1046.5	474.6
1962-70	61.7	33.7	73.4	63.5	57.1	1045.4	474.0
1962-71	76.3	56.2	119.5	100.1	72.5	1336.3	592.2
1962-72	95.7	79.9	171.5	142.9	103.9	1455.5	642.7
1962-73	71.2	48.2	132.7	91.2	77.2	959.3	405.8
1962-74	27.5	10.3	62.2	38.4	36.3	625.6	246.5
1962-75	69.4	47.0	112.2	87.4	96.8	1156.7	500.1
Average Annual Compounded Rate	3.8	2.8	5.5	4.6	5.0	19.8	13.7

Berkshire's Performance vs. the S&P 500

Year	Annual Percentage Change		
	in Per-Share Book Value of Berkshire	in Per-Share Market Value of Berkshire	in S&P 500 with Dividends Included
1965	23.8	49.5	10.0
1966	20.3	(3.4)	(11.7)
1967	11.0	13.3	30.9
1968	19.0	77.8	11.0
1969	16.2	19.4	(8.4)
1970	12.0	(4.6)	3.9
1971	16.4	80.5	14.6
1972	21.7	8.1	18.9
1973	4.7	(2.5)	(14.8)
1974	5.5	(48.7)	(26.4)
1975	21.9	2.5	37.2
1976	59.3	129.3	23.6
1977	31.9	46.8	(7.4)
1978	24.0	14.5	6.4
1979	35.7	102.5	18.2
1980	19.3	32.8	32.3
1981	31.4	31.8	(5.0)
1982	40.0	38.4	21.4
1983	32.3	69.0	22.4
1984	13.6	(2.7)	6.1
1985	48.2	93.7	31.6
1986	26.1	14.2	18.6
1987	19.5	4.6	5.1
1988	20.1	59.3	16.6
1989	44.4	84.6	31.7
1990	7.4	(23.1)	(3.1)
1991	39.6	35.6	30.5
1992	20.3	29.8	7.6
1993	14.3	38.9	10.1
1994	13.9	25.0	1.3
1995	43.1	57.4	37.6
1996	31.8	6.2	23.0
1997	34.1	34.9	33.4
1998	48.3	52.2	28.6
1999	0.5	(19.9)	21.0
2000	6.5	26.6	(9.1)
2001	(6.2)	6.5	(11.9)
2002	10.0	(3.8)	(22.1)
2003	21.0	15.8	28.7
2004	10.5	4.3	10.9
2005	6.4	0.8	4.9
2006	18.4	24.1	15.8
2007	11.0	28.7	5.5
2008	(9.6)	(31.8)	(37.0)
2009	19.8	2.7	26.5
2010	13.0	21.4	15.1
2011	4.6	(4.7)	2.1
2012	14.4	16.8	16.0
2013	18.2	32.7	32.4
2014	8.3	27.0	13.7
Compounded Annual Gain – 1965-2014	19.4%	21.6%	9.9%
Overall Gain – 1964-2014	751,113%	1,826,163%	11,196%

PERFORMANCE MEASURES & RELATED SUMMARY STATISTICS
(April 1957–March 1971)

Performance Measure/ Summary Statistic	CAPM defined with	P/E Portfolios ¹						Market Portfolios ¹	
		<i>A</i>	<i>A</i> *	<i>B</i>	<i>C</i>	<i>D</i>	<i>E</i>	<i>S</i>	<i>F</i>
Median P/E ratio and inter-quartile range ²	—	35.8 (41.8)	30.5 (21.0)	19.1 (6.7)	15.0 (3.2)	12.8 (2.6)	9.8 (2.9)	15.1 (9.6)	
Average annual rate of return ($\bar{r}_p$) ³	—	0.0934	0.0955	0.0928	0.1165	0.1355	0.1630	0.1211	0.1174
Average annual excess return ($\bar{r}'_p$) ⁴	r_f	0.0565	0.0585	0.0558	0.0796	0.0985	0.1260	0.0841	0.0804
	r_z	0.0194	0.0214	0.0187	0.0425	0.0613	0.0889	0.0470	0.0433
Systematic risk ($\hat{\beta}_p$)	r_f	1.1121	1.0579	1.0387	0.9678	0.9401	0.9866	1.0085	1.0000
	r_z	1.1463	1.0919	1.0224	0.9485	0.9575	1.0413	1.0225	1.0000
Jensen's differential return ($\hat{\delta}_p$) and <i>t</i> -value in parenthesis	r_f	−0.0330 (−2.62)	−0.0265 (−2.01)	−0.0277 (−2.85)	0.0017 (0.18)	0.0228 (2.73)	0.0467 (3.98)	0.0030 (0.62)	
	r_z	−0.0303 (−2.59)	−0.0258 (−2.04)	−0.0256 (−2.63)	0.0014 (0.15)	0.0198 (2.34)	0.0438 (3.80)	0.0027 (0.57)	
Treynor's reward-to- volatility measure: ⁵	r_f	0.0508	0.0553	0.0537	0.0822	0.1047	0.1237	0.0834	0.0804
$\bar{r}'_p / \hat{\beta}_p$	r_z	0.0169	0.0196	0.0183	0.0448	0.0640	0.0854	0.0460	0.0433
Sharpe's reward-to- variability measure: ⁶	r_f	0.0903	0.0978	0.0967	0.1475	0.1886	0.2264	0.1526	0.1481
$\bar{r}'_p / \sigma(\bar{r}'_p)$	r_z	0.0287	0.0331	0.0312	0.0762	0.1095	0.1444	0.0797	0.0755
Coefficient of correla- tion: $\rho(\bar{r}'_p, \bar{r}'_m)$	r_f	0.9662	0.9594	0.9767	0.9742	0.9788	0.9630	0.9936	
	r_z	0.9748	0.9676	0.9780	0.9767	0.9809	0.9705	0.9946	
Coefficient of serial correlation: $\rho(\tilde{e}_{t+1}, \tilde{e}_t)$	r_f	0.0455	0.0845	0.0285	−0.1234	0.0065	0.1623	0.1050	
	r_z	0.0048	0.0681	0.0163	−0.1447	0.0408	0.1485	0.0763	
<i>F</i> -Statistics for Test on Homogeneity of Asset- Pricing Relationships (Chow-test) ⁷	r_f	2.3988	2.2527	0.4497	1.2249	1.1988	0.2892	0.0496	
	r_z	0.8918	0.2490	0.9767	0.3575	0.6987	0.4761	0.2826	

Basu (1977)

Value and Momentum Everywhere

CLIFFORD S. ASNESS, TOBIAS J. MOSKOWITZ, and LASSE HEJE PEDERSEN*

ABSTRACT

We find consistent value and momentum return premia across eight diverse markets and asset classes, and a strong common factor structure among their returns. Value and momentum returns correlate more strongly across asset classes than passive exposures to the asset classes, but value and momentum are negatively correlated with each other, both within and across asset classes. Our results indicate the presence of common global risks that we characterize with a three-factor model. Global funding liquidity risk is a partial source of these patterns, which are identifiable only when examining value and momentum jointly across markets. Our findings present a challenge to existing behavioral, institutional, and rational asset pricing theories that largely focus on U.S. equities.

Based on PE Ratio

Year	Portfolio Return (Value)	Portfolio Return (Growth)	Difference	t-value
1996	8.23%	-14.79%	23.02%	1.8261*
1997	6.53%	-28.26%	34.79%	1.5676
1998	68.65%	24.71%	43.94%	1.5507
1999	80.30%	42.84%	37.45%	1.5755
2000	86.62%	11.22%	75.40%	2.5835*
2001	66.07%	61.72%	4.35%	0.3017
2002	78.19%	60.19%	18.00%	0.4356
2003	143.95%	71.83%	72.12%	2.0749*
2004	68.20%	6.71%	61.50%	1.6750
2005	4.48%	4.55%	-0.07%	-0.0083
2006	143.07%	29.26%	113.80%	1.0110
2007	15.43%	21.01%	-5.58%	-0.4571
2008	-18.13%	-11.23%	-6.91%	-0.8940
2009	129.27%	56.32%	72.95%	4.4029*
2010	103.09%%	38.93%	64.15%	1.9830*
Geometric Mean	57.24%	21.31%	35.92%	

*significant at the 95% level



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The other side of value: The gross profitability premium[☆]



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ABSTRACT

Profitability, measured by gross profits-to-assets, has roughly the same power as book-to-market predicting the cross section of average returns. Profitable firms generate significantly higher returns than unprofitable firms, despite having significantly higher valuation ratios. Controlling for profitability also dramatically increases the performance of value strategies, especially among the largest, most liquid stocks. These results are difficult to reconcile with popular explanations of the value premium, as profitable firms are less prone to distress, have longer cash flow durations, and have lower levels of operating leverage. Controlling for gross profitability explains most earnings related anomalies and a wide range of seemingly unrelated profitable trading strategies.

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A five-factor asset pricing model[☆]

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ABSTRACT

A five-factor model directed at capturing the size, value, profitability, and investment patterns in average stock returns performs better than the three-factor model of Fama and French (FF, 1993). The five-factor model's main problem is its failure to capture the low average returns on small stocks whose returns behave like those of firms that invest a lot despite low profitability. The model's performance is not sensitive to the way its factors are defined. With the addition of profitability and investment factors, the value factor of the FF three-factor model becomes redundant for describing average returns in the sample we examine.

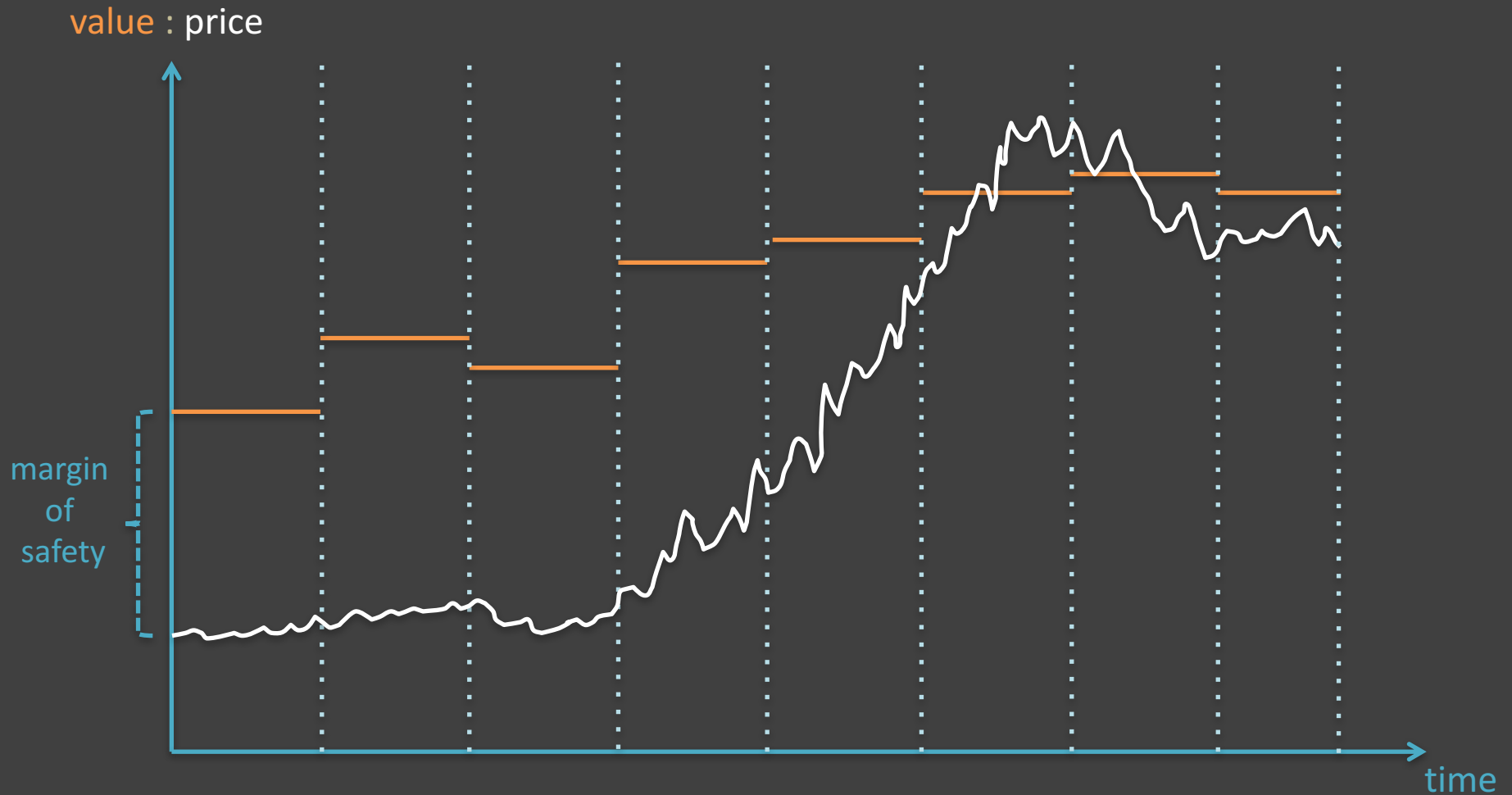
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$$R_{it}-R_{Ft} = a_i + b_i(R_{Mt}-R_{Ft}) + s_iSMB_t + h_iHML_t + r_iRMW_t + c_iCMA_t + e_{it}.$$

Important Variables

- P/E = price / earning per share (eps_{TTM})
- CAPE_k = price / ($\text{eps}_{-1} + \text{eps}_{-2} + \dots + \text{eps}_{-k}$)
- P/B = price / book value
- ROE = eps / book value

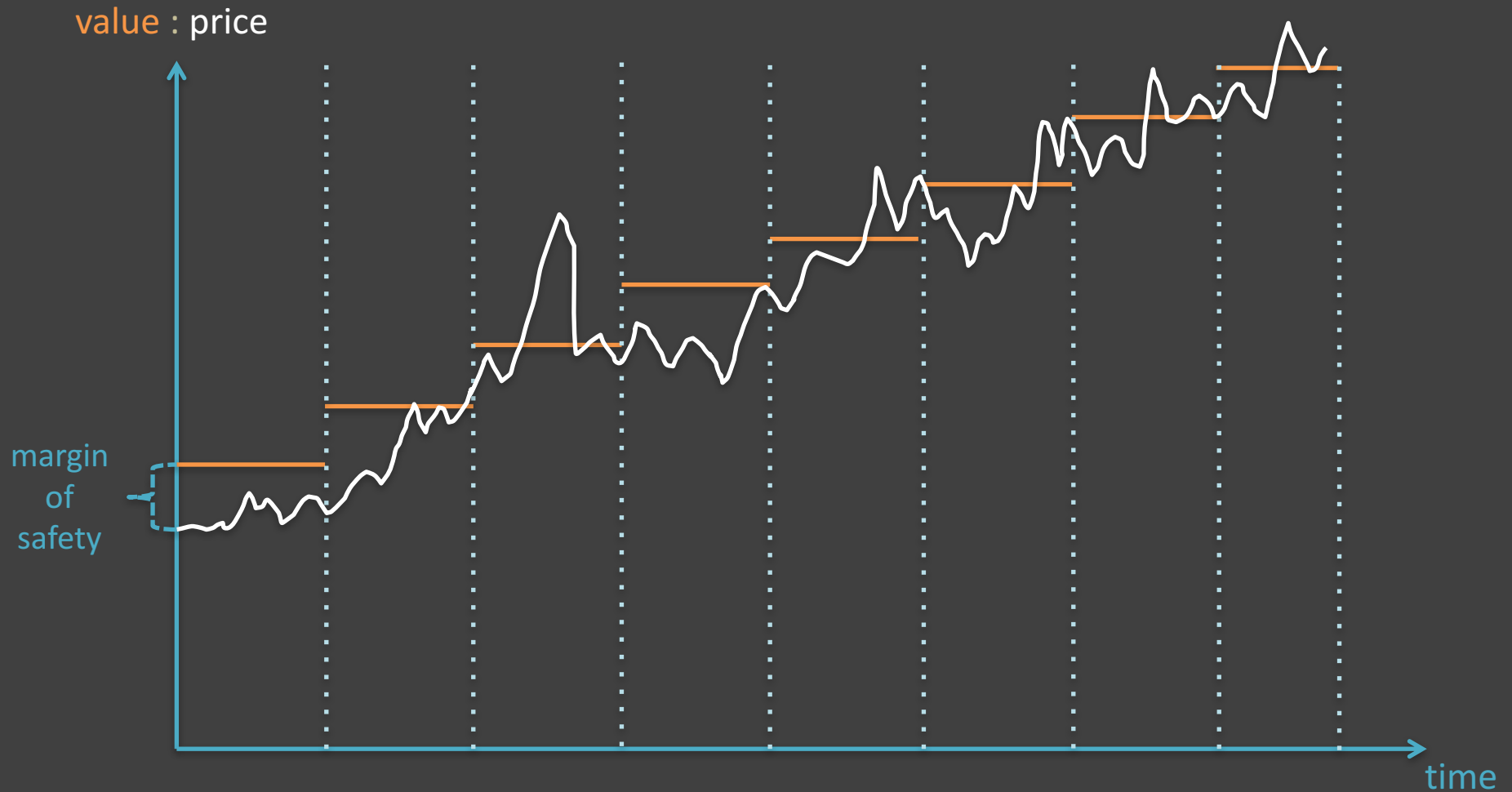
Value Investing



* stock without dividend

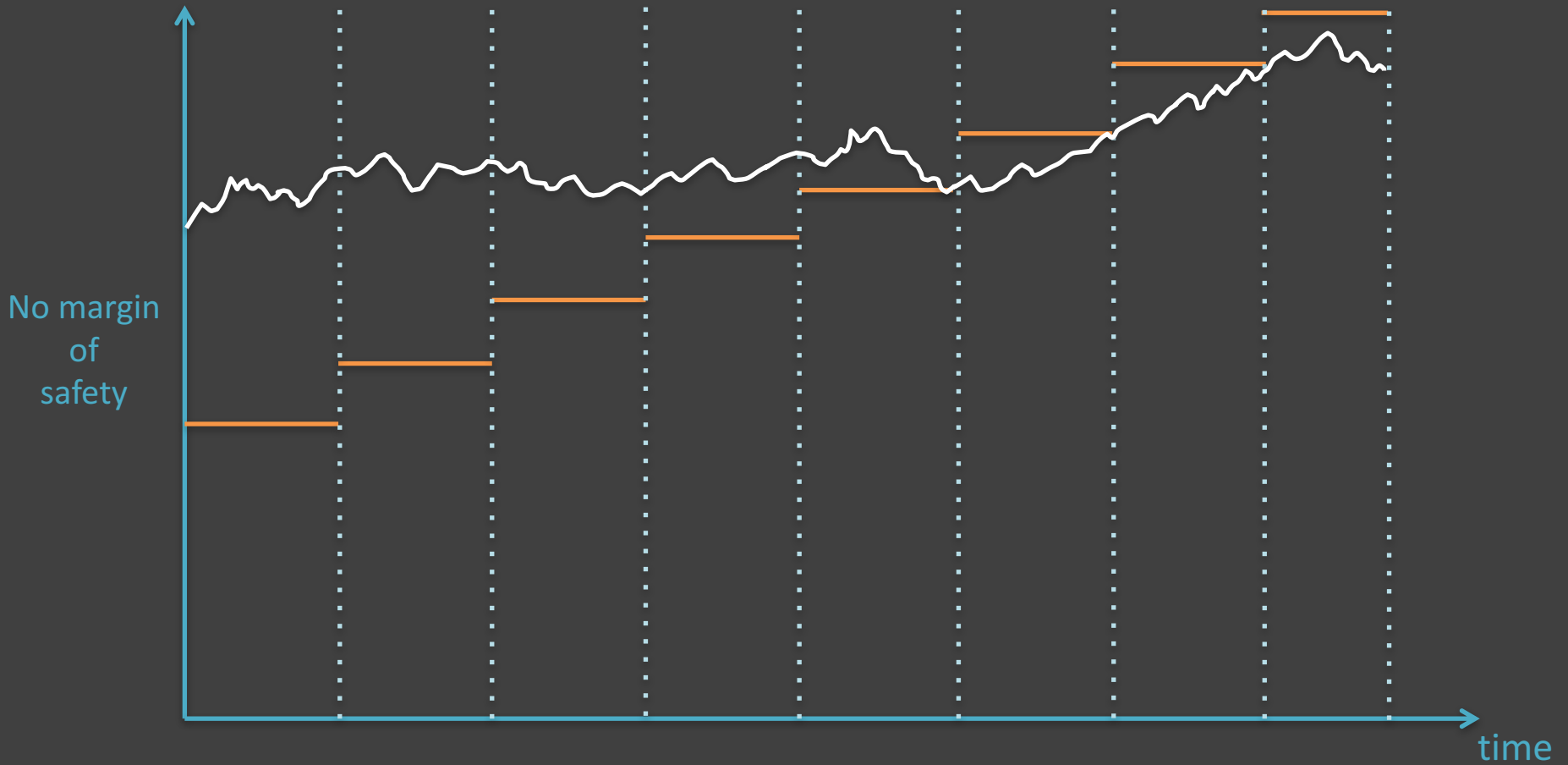
Value Investing

"It's far better to buy a wonderful company at a fair price than a fair company at a wonderful price."
– Warren E. Buffett

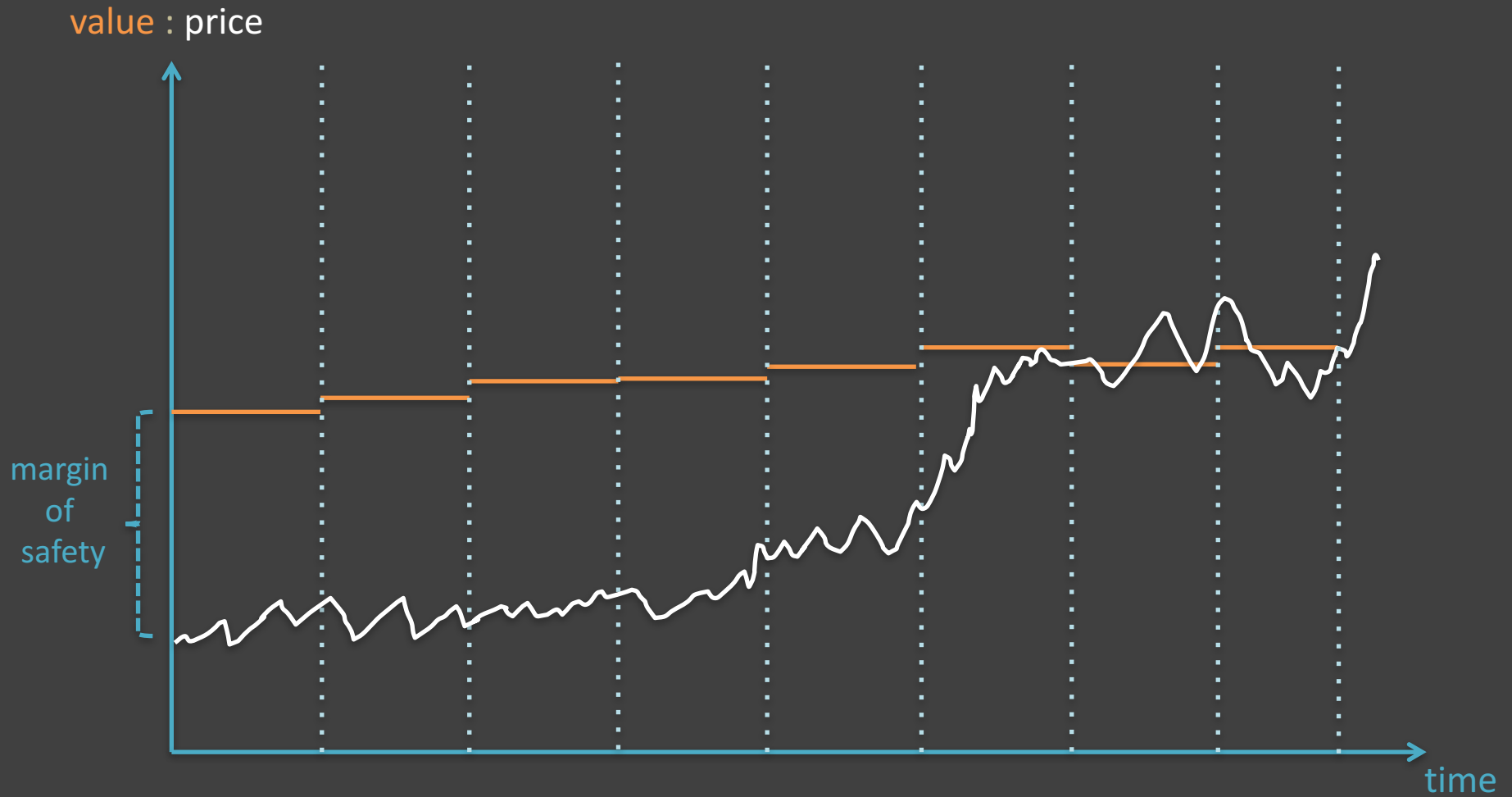


Value Investing

value : price

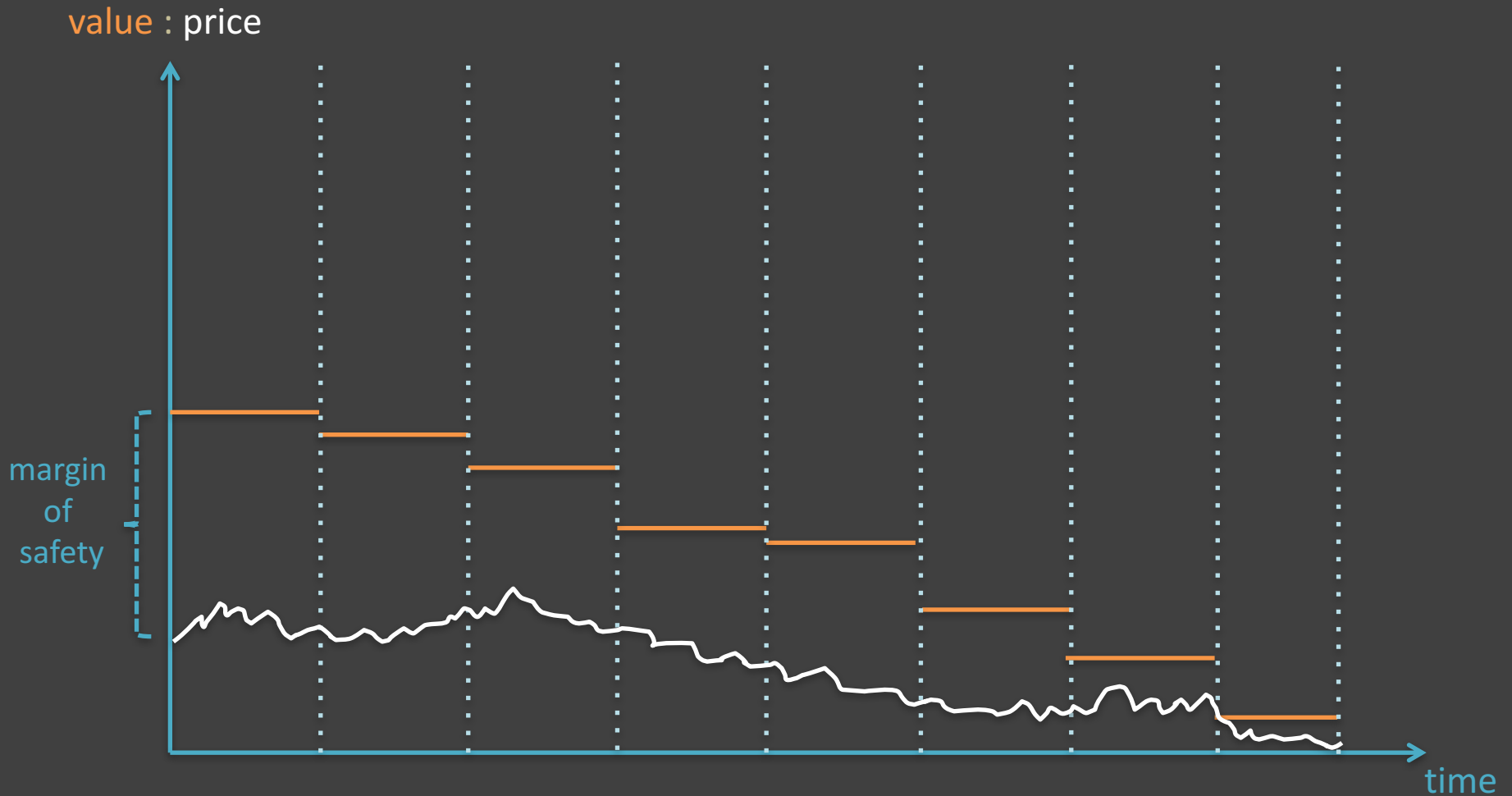


Value Investing

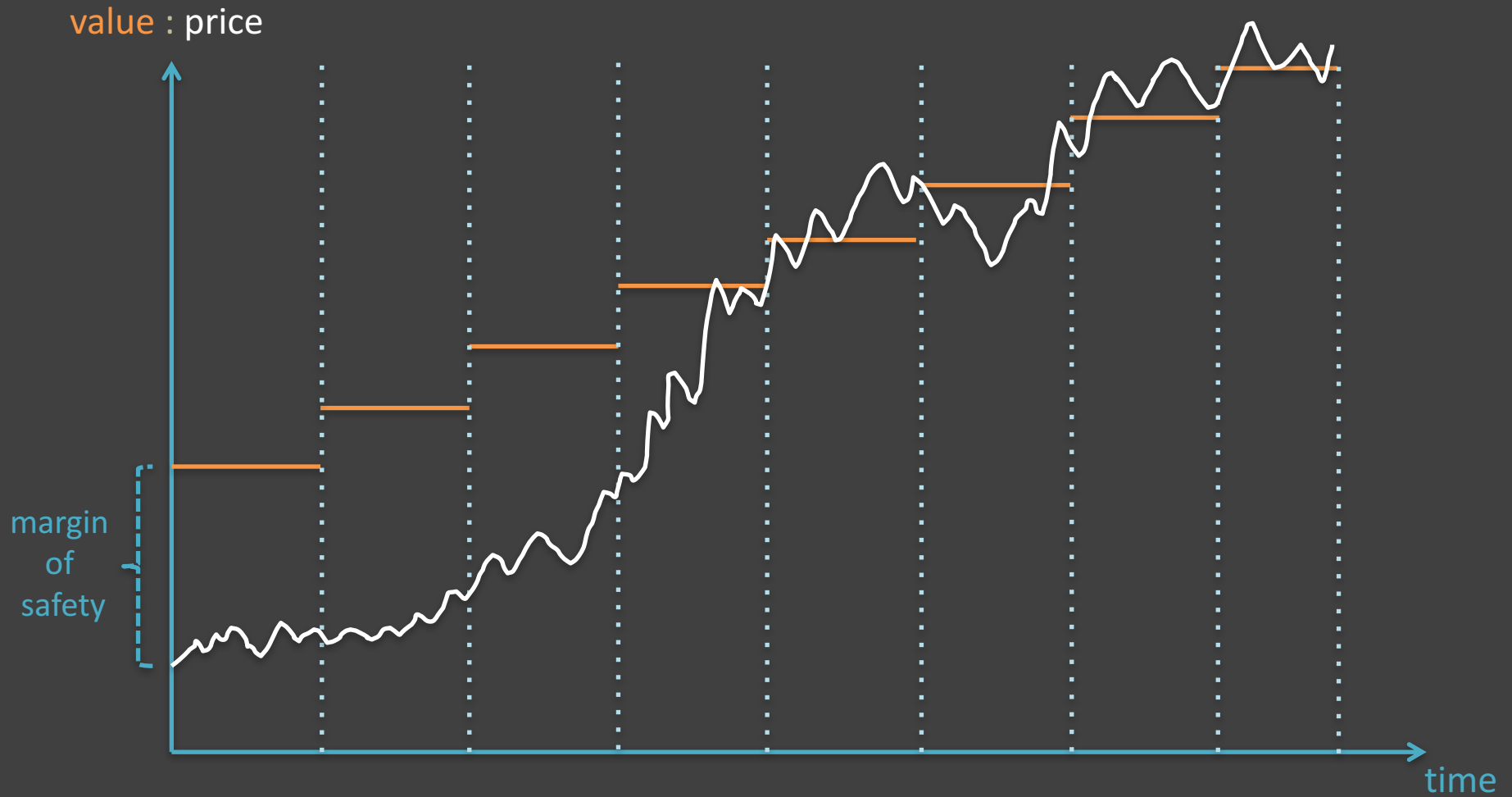


Value Investing

"I would never spend a lot of time valuing declining businesses. The same amount of energy and intelligence brought to other businesses is just going to work out better." – Warren E. Buffett



Perfect VI



* stock without dividend

“In other words, the market is not a weighing machine, on which the value of each issue is recorded by an exact and impersonal mechanism, in accordance with its specific qualities. Rather should we say that the market is a voting machine, whereon countless individuals register choices which are the product partly of reason and partly of emotion.”

Graham and Dodd (1951)

Where Does Value Come From?

- High risk - high return (CAPM) ความเสี่ยงมาก ผลตอบแทนคาดหวังก็มากตาม
- Overreaction การแตกตื่นจนเกินควรของนักลงทุน
- Loss aversion ความรู้สึกแยเวลาขาดทุน
- Overconfidence in growth stock ความมั่นใจในหุ้นโตเร็วจนเกินไป
- Few analyst coverage (small stock) มีนักวิเคราะห์ในหุ้นน้อยเกินไป
- Recapitalization การปรับเปลี่ยนโครงสร้างทางการเงิน
- Spinoff การแยกบริษัท
- Bankruptcy การล้มละลาย
- Hidden value within company (sum of parts)
- Boring business บริษัทที่น่าเบื่อ ไม่หวือหวา
- 70% computer trading การเทรดในปัจจุบัน ใช้แบบ quantitative
- Economic crisis วิกฤติเศรษฐกิจ
- Liquidity ขาดสภาพคล่อง
- Fund flow การเคลื่อนไหวของเม็ดเงิน



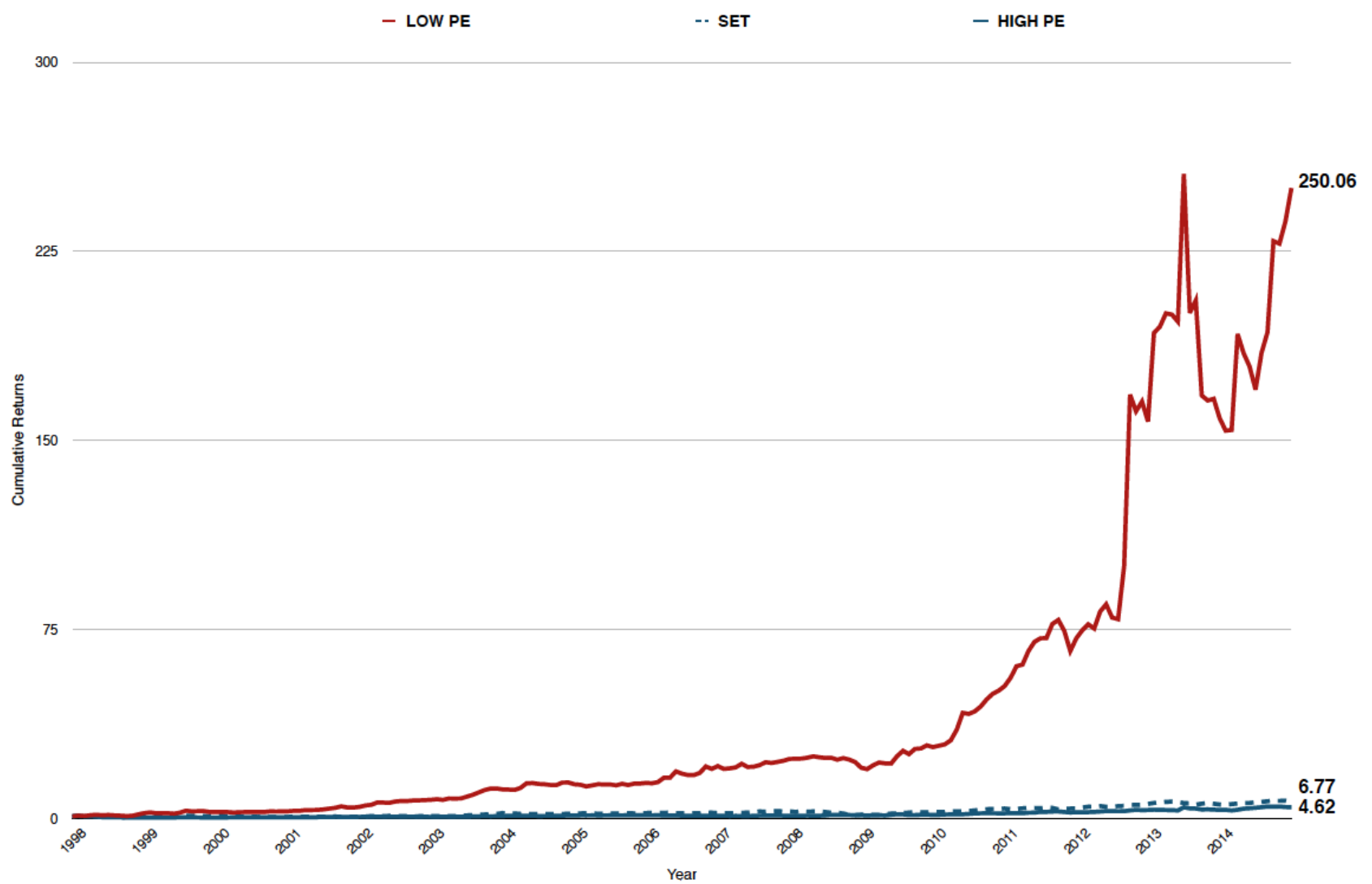
- In 1951, Warren Buffett made his first purchase of GEICO stock after knowing that **Benjamin Graham was a chairman**, met Lorimer Davidson (later became CEO) in Washington, D.C.
- Selling by phone, mail and (internet): "**low cost**" insurer with the lowest expense ratio.
- In 1976, GEICO had been selling its policies lower than the expected payment. GEICO didn't have enough reserve !
- **\$190 million loss** from underwriting profit and cut dividends
- Stock tumbled from \$61 to \$2
- Buffett bought as much as possible stocks and injected capital to GEICO via **convertible preferred**



- Buffett had waited for years (more than 20 years) to buy GEICO at the right price
- Went to see regulators to extend deadline for capital injection /capital restructure/reinsurance
- **Jack Byrne** from Travelers, increased the premium from states
- Injected capital via convertible preferred (\$19.4m ~ \$9.86 per share) and bought common stock at (\$4.12m ~ \$3.18 per share)
- Stock jumped from \$2 to \$8 after cash injection
- In 3 years, 28.29m -> 68m ~ **34% CAGR** not including dividends (bought more shares later after first purchase)
- Did similar deals with DOW, GE, GS, BAC

Motivations & Contributions

	Basu (1977)	Fama and French (1992, 1993, 1996, 1998, 2006)	Novy-Marx (2013,2015)	This Study
Measure of Value	PE	PE + PB	PE + PB	PE + PB + CAPE
Data	USA	USA	USA	Thailand
Particular Industry?	NO	NO	NO	YES (Insurance)
Finding Value Premium?	✓	✓	✓	✓



Portfolio 2



Algorithms

- I construct two portfolios by ordering the PE of each insurer
- "LOW PE" (value portfolio) vs. "HIGH PE" (growth portfolio)
- SET index portfolio

Portfolio 3

$$CAPE = \frac{price_{current}}{(eps_{t-1}^* + eps_{t-2}^* + \cdots + eps_{t-10}^*)/10}$$

Portfolio 3



Algorithms

- I construct two portfolios by ordering the CAPE3 of each insurer
- "LOW CAPE3" (value portfolio) vs. "HIGH CAPE3" (growth portfolio)
- SET index portfolio

Portfolio 4



Algorithms

- I construct two portfolios by ordering the CAPE5 of each insurer
- "LOW CAPE5" (value portfolio) vs. "HIGH CAPE5" (growth portfolio)
- SET index portfolio

Summary of the Data

- Property and Liability + Life Insurance Industry
- Public insurers only
- SETSMART from 1990 to 2014
- Individual level company
- From 4 to 18 companies in 2014

Table 1: Thai Insurance Industry Information from 1990-2014

Year	Life NPW (in M Baht)	Life Assets (in M Baht)	# of Life	P&C NPW (in M Baht)	P&C Assets (in M Baht)	# of P&C	# of Stocks	# in Port
1990	19,415	46,008	12	12,080	24,353	67	9	2
1991	23,381	58,935	12	14,170	33,275	67	12	3
1992	28,516	73,086	12	18,487	42,855	67	17	4
1993	33,683	102,514	12	28,167	64,587	67	18	4
1994	39,883	119,522	12	34,597	73,719	67	20	5
1995	46,991	138,072	13	41,838	87,892	67	20	5
1996	46,077	145,825	13	48,316	89,212	67	21	5
1997	57,213	164,560	25	44,217	83,152	80	22	5
1998	54,813	185,342	25	37,644	83,898	80	22	5
1999	60,752	192,961	25	35,316	84,388	79	22	5
2000	73,352	217,892	25	37,277	83,891	78	22	5
2001	91,626	290,008	25	39,048	89,258	77	22	5
2002	112,101	351,484	25	42,482	97,317	77	22	5
2003	129,977	417,689	25	49,683	112,825	77	21	5
2004	147,198	491,467	24	57,336	115,823	76	21	5
2005	163,137	620,370	24	63,257	121,027	76	20	5
2006	169,360	703,639	24	72,002	132,693	74	19	4
2007	197,623	775,562	24	77,012	137,156	73	18	4
2008	217,221	846,105	24	80,963	139,448	73	18	4
2009	254,130	995,050	24	84,391	155,344	71	16	4
2010	291,416	1,181,850	24	95,986	195,012	69	17	4
2011	323,755	1,488,142	24	105,506	784,408	69	17	4
2012	384,214	1,716,196	24	131,932	593,801	64	17	4
2013	434,486	1,902,901	24	147,181	474,699	64	17	4
2014	493,567	2,301,198	24	149,212	456,889	64	18	4

Table 2: Portfolios Constructed from Price-to-Earning Ratio

	LOW PE	SET	HIGH PE
Min (per month)	−21.51%	−29.59%	−20.77%
Max (per month)	68.11%	33.23%	38.18%
Arithmetic Average (per month)	3.15%	1.29%	0.96%
Geometric Average (per year)	41.21%	12.70%	10.03%
Volatility (per month)	9.73%	8.38%	6.51%
$Var_{95\%}$ (per month)	−4.96%	−8.19%	−6.34%
Average ($R_i - R_f$) (per month)	3.04%	1.18%	0.84%
Sharpe Ratio (per month)	31.26%	14.06%	12.97%
β to SET	5.43%		1.73%
Cumulative Return of 1 Baht	250.06	6.77	4.62

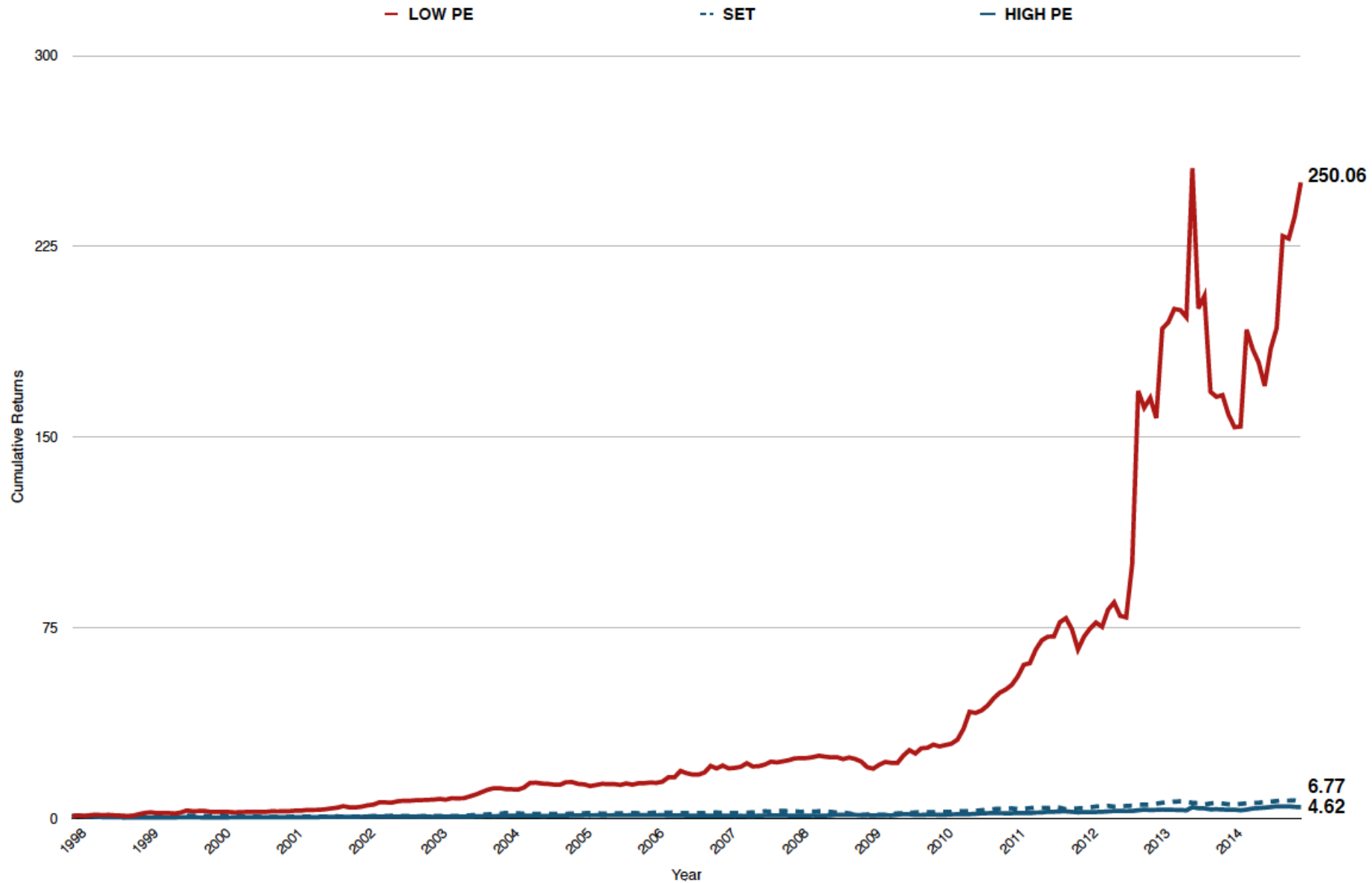


Table 3: Portfolios Constructed from Three Year Cyclically Adjusted Price-to-Earnings Ratio

	LOW CAPE3	SET	HIGH CAPE3
Min (per month)	−34.14%	−29.59%	−22.96%
Max (per month)	59.64%	23.74%	33.68%
Arithmetic Average (per month)	2.31%	1.15%	1.42%
Geometric Average (per year)	28.31%	12.30%	16.83%
Volatility (per month)	8.90%	6.96%	6.50%
$Var_{95\%}$ (per month)	−4.55%	−7.49%	−5.18%
Average ($R_i - R_f$) (per month)	2.23%	1.07%	1.34%
Sharpe Ratio (per month)	25.01%	15.43%	20.61%
β to SET	−1.71%		3.25%
Cumulative Return of 1 Baht	32.78	5.07	8.82

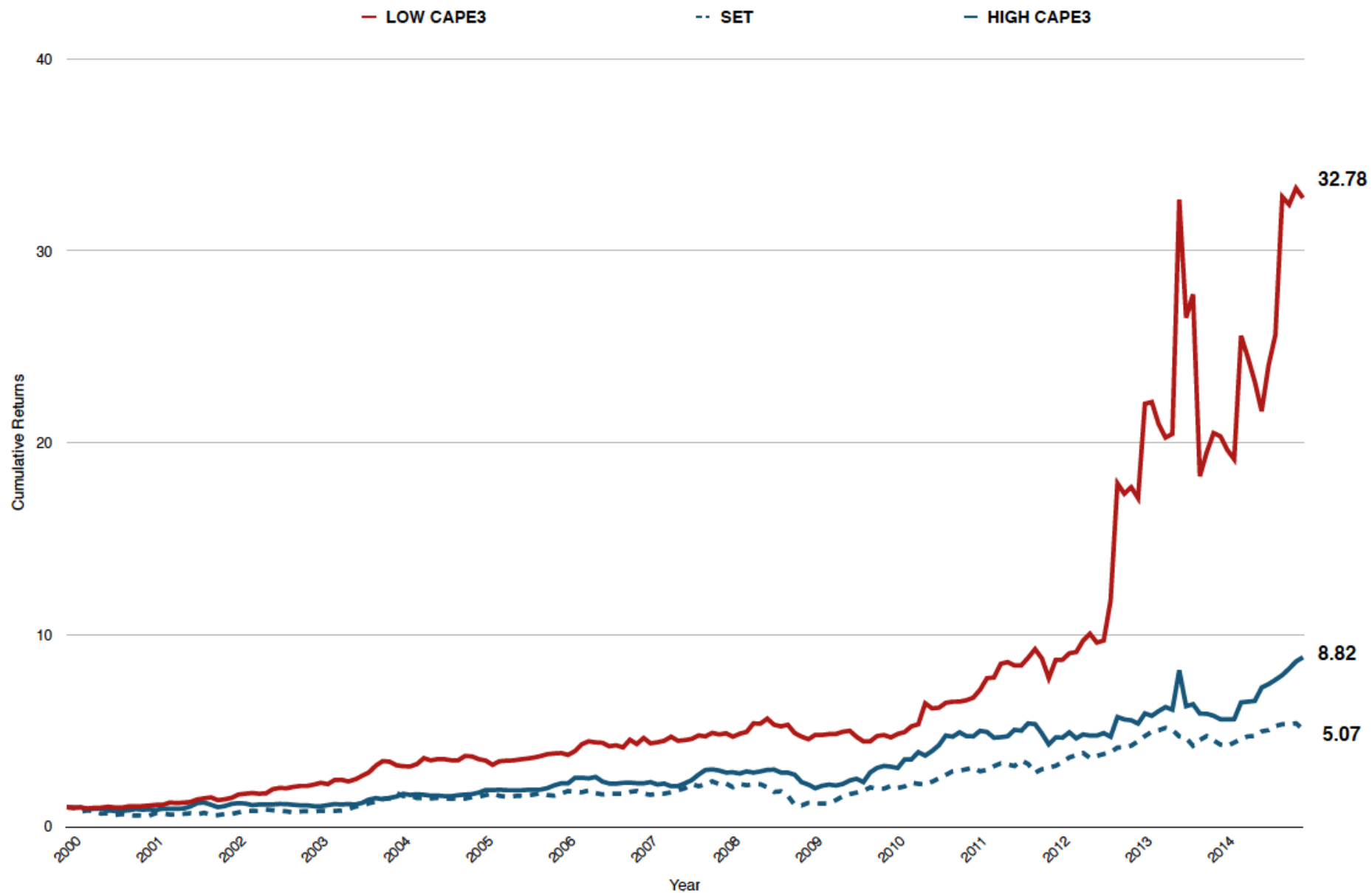
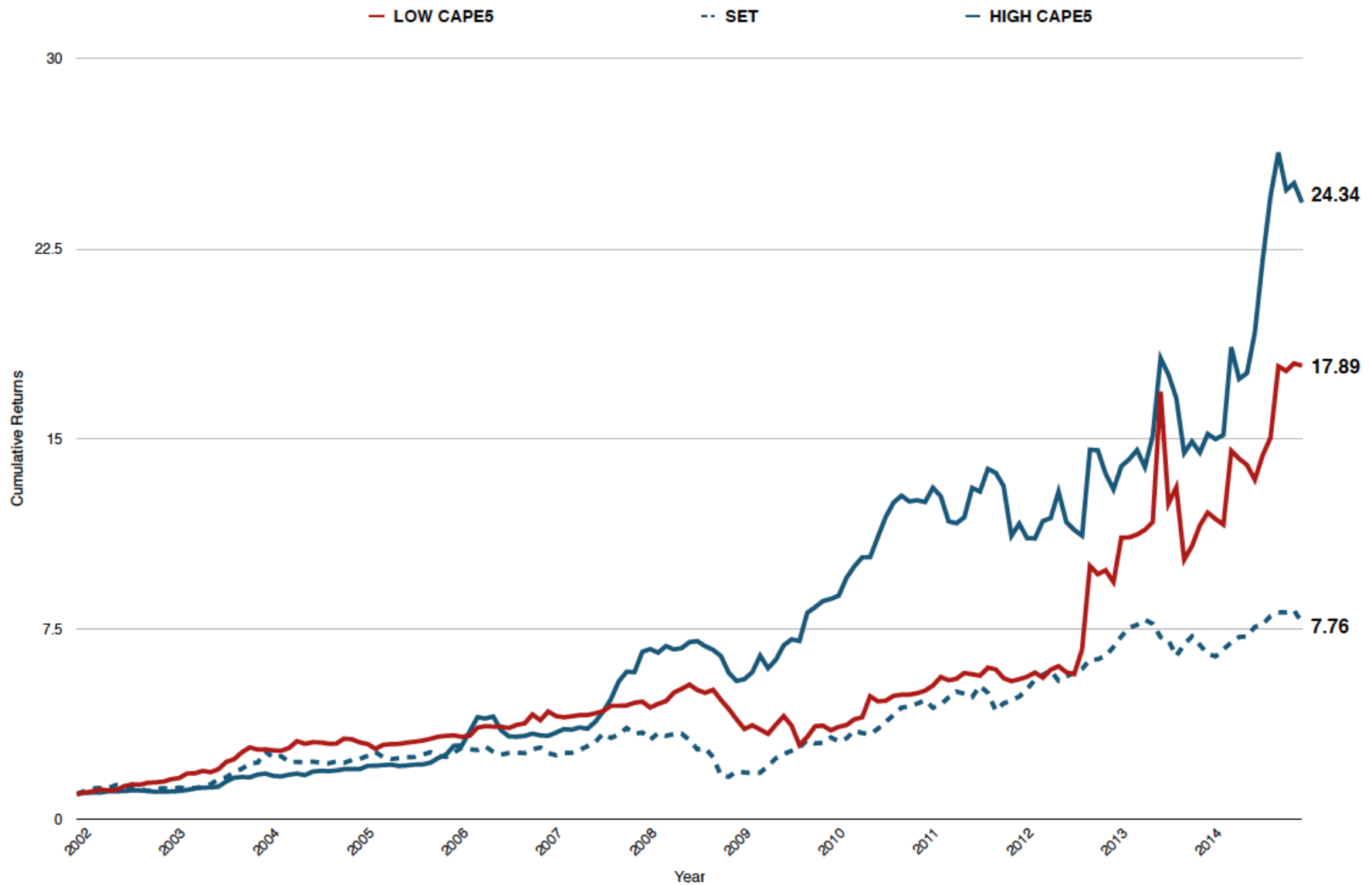
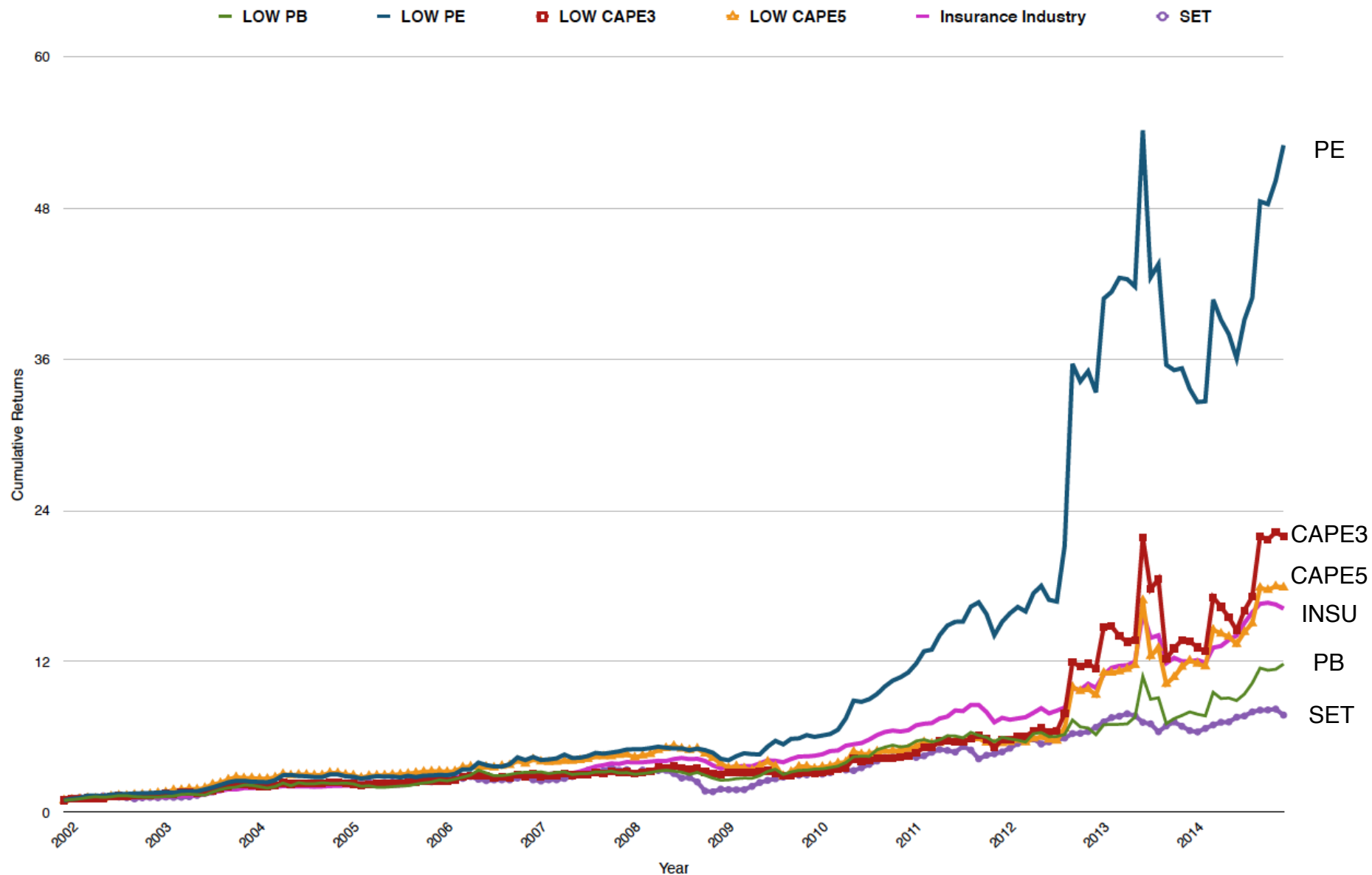


Table 4: Portfolios Constructed from Five Year Cyclically Adjusted Price-to-Earnings Ratio

	LOW CAPE5	SET	HIGH CAPE5
Min (per month)	−26.21%	−29.59%	−14.97%
Max (per month)	49.11%	19.68%	30.32%
Arithmetic Average (per month)	2.18%	1.52%	2.27%
Geometric Average (per year)	27.17%	18.62%	30.47%
Volatility (per month)	8.27%	6.26%	6.51%
$Var_{95\%}$ (per month)	−4.37%	−6.40%	−4.56%
Average ($R_i - R_f$) (per month)	2.12%	1.46%	2.20%
Sharpe Ratio (per month)	25.57%	23.32%	33.83%
β to SET	−0.01%		7.46%
Cumulative Return of 1 Baht	17.89	7.76	24.34





Can Value Premium Be Explained by CAPM?

$$R_p(t) - R_f(t) = \alpha + \beta_M[R_{SET}(t) - R_f(t)] + \epsilon(t)$$

Table 5: CAPM Using SET Index

Portfolio	α	β_{SET}	R^2	F-Stat	P-Val	Obs	Year
LOW PB	1.32 ** [2.24]	-0.04 [-0.63]	0.0013	0.3904	0.5326	298	1990-2014
HIGH PB	0.65 [1.47]	0.05 [0.94]	0.0030	0.8878	0.3468	298	1990-2014
LOW PE	2.98 *** [4.33]	0.05 [0.66]	0.0022	0.4388	0.5085	203	1998-2014
HIGH PE	0.82 * [1.78]	0.02 [0.36]	0.0006	0.1270	0.7220	203	1998-2014
LOW CAPE3	2.24 *** [3.33]	-0.02 [-0.16]	0.0002	0.0269	0.8700	179	2000-2014
HIGH CAPE3	1.30 *** [0.49]	0.03 [0.07]	0.2459	0.2459	0.6206	179	2000-2014

Can Value Premium Be Explained by CAPM?

Table 6: CAPM Using Asia Market Index

Portfolio	α	β_{Asia}	R^2	F-Stat	P-Val	Obs	Year
LOW PB	1.36 **	−0.06	0.0012	0.3540	0.5523	293	1990-2014
	2.27	−0.60					
HIGH PB	0.52	0.04	0.0009	0.2732	0.6016	293	1990-2014
	1.23	0.52					
LOW PE	3.06 ***	−0.11	0.0049	0.9901	0.3209	203	1998-2014
	4.45	−1.00					
HIGH PE	0.81 *	−0.05	0.0019	0.3934	0.5312	203	1998-2014
	1.76	−0.63					
LOW CAPE3	2.26 ***	−0.15	0.0108	1.9360	0.1658	179	2000-2014
	3.39	−1.39					
HIGH CAPE3	1.22 ***	0.06	0.0031	0.5458	0.4610	179	2000-2014
	2.50	0.74					

Can Value Premium Be Explained by CAPM?

Table 7: CAPM Using Global Market Index

Portfolio	α	β_{Global}	R^2	F-Stat	P-Val	Obs	Year
LOW PB	1.36 **	0.10	0.0021	0.602	0.4384	292	1990-2014
	2.28	-0.78					
HIGH PB	0.56	-0.02	0.0001	0.02807	0.8671	292	1990-2014
	1.31	-0.17					
LOW PE	2.97 ***	0.01	0.0000	0.002772	0.9581	203	1998-2014
	4.32	0.05					
HIGH PE	0.84 *	-0.13	0.0092	1.867	0.1733	203	1998-2014
	1.83	-1.37					
LOW CAPE3	2.21 ***	-0.18	0.0091	1.642	0.2018	203	2000-2014
	3.33	-1.28					
HIGH CAPE3	1.27 **	0.01	0.0000	0.002312	0.9617	203	2000-2014
	2.60	0.05					

How about Fama-French 3 Factor Model?

$$R_p(t) - R_f(t) = \alpha + \beta_M[R_{Market}(t) - R_f(t)] + \beta_S * R_{SML}(t) + \beta_H * R_{HML}(t) + \epsilon(t)$$

Table 8: Asia Market Fama-French 3-Factor Model

Portfolio	α	β_{Asia}	β_{SMB}	β_{HML}	R^2	F-Stat	P-Val	Obs	Year
LOW PB	1.09 *	-0.09	0.28	0.60	0.0393	3.9540	0.0087	298	1990-2014
	1.82	-0.93	1.41	3.15					
HIGH PB	0.47	0.03	0.18	0.18	0.0393	3.9540	0.0087	298	1990-2014
	1.08	0.38	1.26	1.33					
LOW PE	2.95 ***	-0.11	0.00	0.16	0.0080	0.5373	0.6572	203	1998-2014
	4.19	-1.04	0.01	0.79					
HIGH PE	0.77	-0.07	0.25	0.16	0.0196	1.3290	0.2659	203	1998-2014
	1.64	-0.95	1.60	1.16					
LOW CAPE3	2.13 ***	-0.15	0.17	0.26	0.0187	1.1190	0.3428	179	2000-2014
	3.06	-1.29	0.71	1.02					
HIGH CAPE3	0.94 *	0.10	-0.03	0.39 **	0.0277	1.6710	0.1750	179	2000-2014
	1.86	1.16	-0.17	2.09					

How about Fama-French 3 Factor Model?

$$R_p(t) - R_f(t) = \alpha + \beta_M[R_{Market}(t) - R_f(t)] + \beta_S * R_{SML}(t) + \beta_H * R_{HML}(t) + \epsilon(t)$$

Table 9: Global Fama-French 3-Factor Model

Portfolio	α	β_{Global}	β_{SMB}	β_{HML}	R^2	F-Stat	P-Val	Obs	Year
LOW PB	1.20 **	−0.07	0.67 **	0.36	0.0244	2.4140	0.0668	298	1990-2014
	2.00	−0.48	2.37	1.37					
HIGH PB	0.54	−0.01	0.38 *	0.01	0.0120	1.1750	0.3196	298	1990-2014
	1.25	−0.08	1.86	0.07					
LOW PE	2.93 ***	0.01	0.12	0.07	0.0008	0.0527	0.9840	203	1998-2014
	4.18	0.07	0.35	0.25					
HIGH PE	0.73	−0.13	0.41 *	0.16	0.0274	1.8760	0.1349	203	1998-2014
	1.57	−1.32	1.86	0.92					
LOW CAPE3	2.18 ***	−0.18	0.08	0.03	0.0095	0.5630	0.6401	179	2000-2014
	3.14	−1.27	0.25	0.11					
HIGH CAPE3	1.13 **	0.01	0.22	0.17	0.0068	0.4027	0.7512	179	2000-2014
	2.23	0.08	0.91	0.84					

BackTesting

R Programming Example