Shareholder Valuation

➢ The following presentation on shareholder value applies to any type of company although our principle examples are of insurance and financial service companies

➢ The principal difference in valuing financial service concerns versus that of non financial concerns is the issue of capital. In financial service companies capital is invested primarily in financial assets. In non financial service companies capital is invested primarily in non financial (fixed) assets.

➢ The implication of this is that the allocation of capital in non financial service companies is relatively straight forward. The capital is allocated to what ever business segment where the asset is reported and the relationship between assets and liabilities is explicitly observed in the financial report.

➢ The issue of capital allocation is quite different for financial service companies since financial risk (liabilities) cannot be explicitly inferred from reported financial reserves. Risk has to be modeled by any interested counterparty. This lack of explicitness creates uncertainty for the counterparties, policyholders and investors in financial service companies.

➢ Predyct Analytics has created a framework for assessing the real risk and return of financial service companies that decisively responds to the challenge cited above.
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PREDYCT ANALYTICS

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PREDYCT ANALYTICS

All economic constructs for measuring financial performance are derived from the shareholder value (SV) model:

$$SV = \text{Market-to-Book} = \frac{\text{Net Income / Allocated Capital}}{\text{Req Return - Earnings Growth}}$$

- Net Income – End of year income
- Allocated Capital – Capital required to support income
- Required Return – Cost of equity capital
- Earnings growth – Long term growth as implied by market value of company

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PREDYCT ANALYTICS

We probably all agree that the market should be used as the ultimate judge of a company's performance. But many adjustments have to be made before suitable comparisons can be observed

| Event	Explanations
• Stock price rises 30% this year	• Market went up 40%
• M/B doubles this year	• Stock repurchase reduces capital • Firm has not revalued its book in several years • Firm adopts more aggressive depreciation
• Profit doubles	• Firm takes on more risk • Firm adopts a less aggressive reserving strategy
• P/E doubles	• Reduced earnings

PREDYCT ANALYTICS

But even if you benchmark your company's stock performance to a suitable peer group, this will not identify which parts of the company are performing
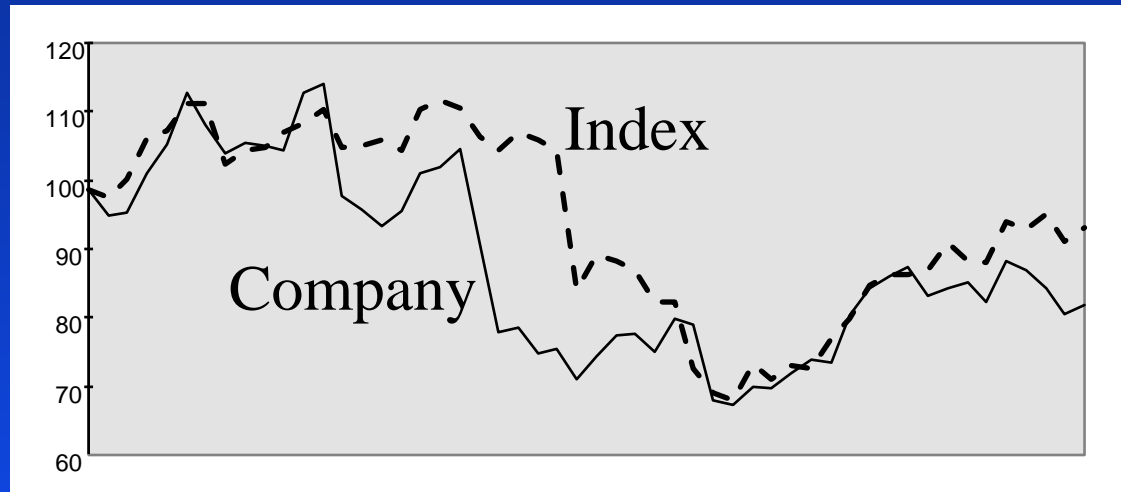
Which segments are helping / hurting?

Business Segments	1	2	3	4
Value	?	?	?	?

PREDYCT ANALYTICS

For this reason, Predyct Analytic's analysis reveals that most companies create all their value with a few of their businesses
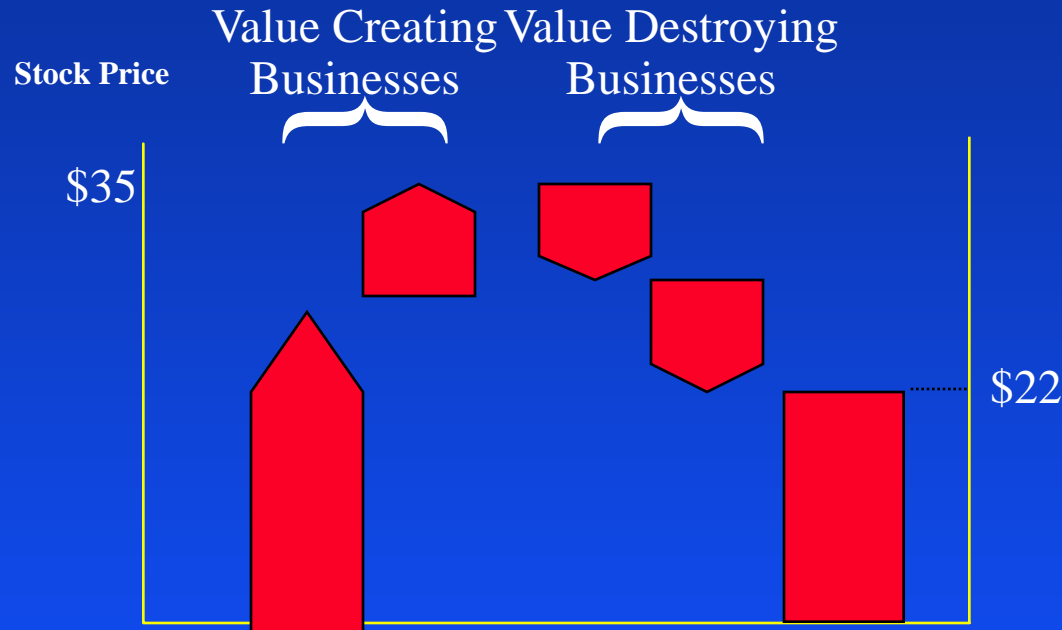
But application of SV metrics can help management to assess each segments value contribution and make value and performance enhancing decisions

PREDYCT ANALYTICS

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PREDYCT ANALYTICS

While the rating agencies have been requiring insurance companies to increase capital, more capital does not guarantee a higher rating

Agencies' ratings have little relationship with their own capital adequacy indicators

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PREDYCT ANALYTICS

A more interesting finding is that companies with higher market-to-book ratios tend to have higher ratings.
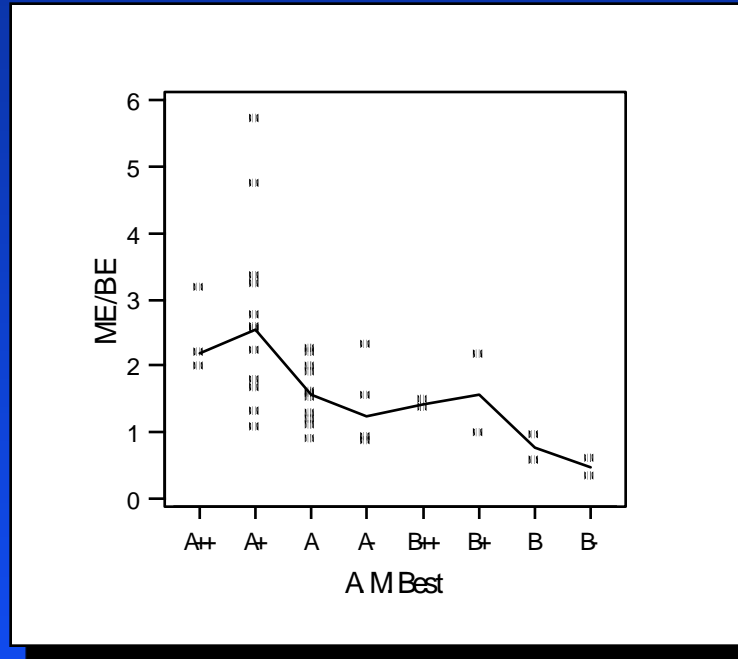
Research indicates that ratings are a lagging indicator of market-to-book. That is, if a company obtains a higher market-to-book, higher ratings will follow.

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PREDYCT ANALYTICS

Empirical Results for the U.S. Life/Health Industry

Policyholders' value is virtually flat after the capital ratio* exceeds 10%.
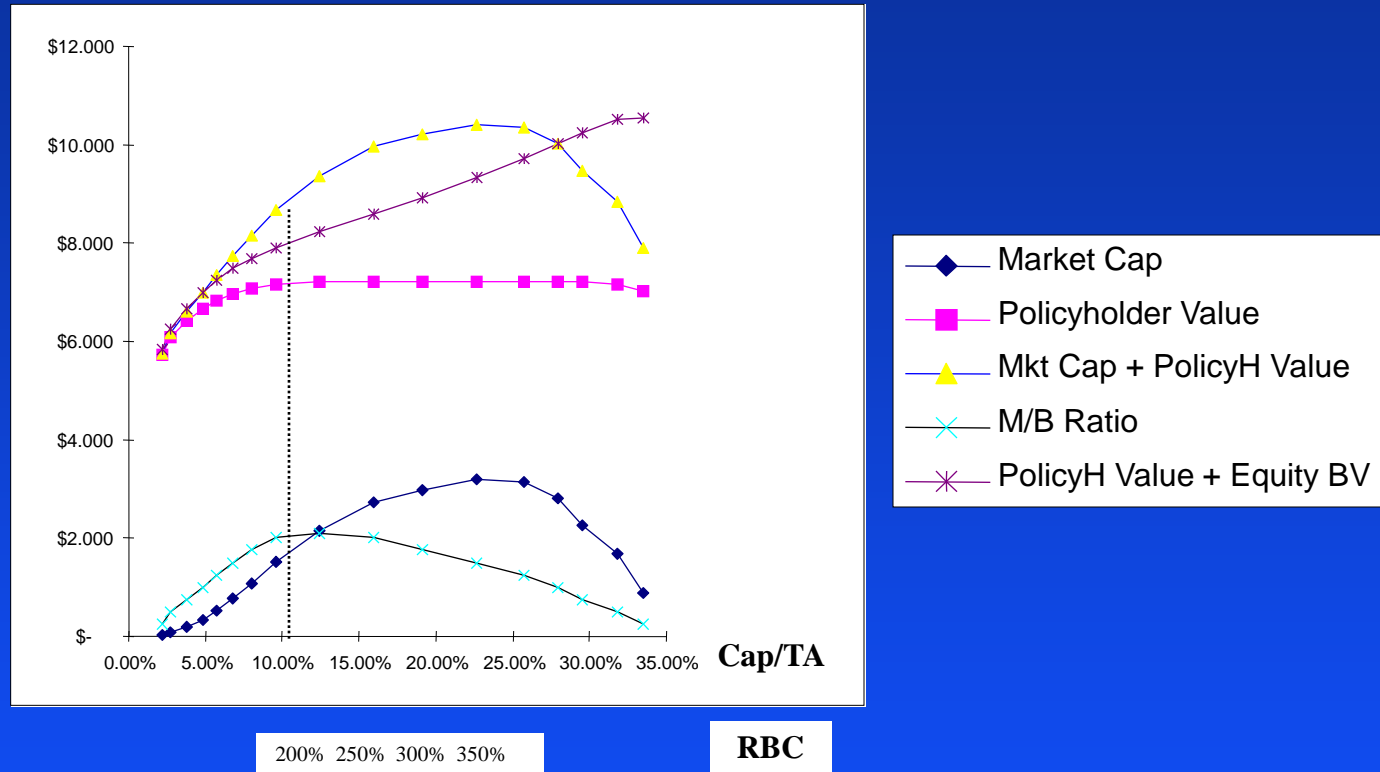
If Life insurance companies are required to hold more than 12% in capital, the supply of new equity capital will be materially reduced**.

*   GAAP. Equity/(Total Asset-Sep Account)

** Values calculated by Option Pricing Formula specified in the Merton Model. Empirical relationship between M/B and capital ratio is estimated from all public life insurance companies' 1996 year end data. Optimum capital ratio is expressed in terms of the industry's current business mix.

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PREDYCT ANALYTICS

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PREDYCT ANALYTICS

Most of the truly significant decisions in corporate management are driven by capital allocation among businesses

Pricing

Corporations price their products and services to earn a return on capital that is acceptable. If the company or line of business is inadequately capitalized, profits will appear larger than justified. Overcapitalization may cause price to be uncompetitive.

Performance Measurement

Management generally assesses ROE on its face value rather than its risk-adjusted value. Inadequate capital drives ROE higher than justified

Resource Allocation

Business activities generally qualify for resources based on their ROE and growth. But what if ROE is being driven by inadequate capital and product growth is driven by inadequate pricing?

Risk Management

Chief among the factors determining a corporation's risk is how management elects to manage and/or capitalize its business risks.

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PREDYCT ANALYTICS

What do most firms use to assess financial performance?

Some combination of:

- ROE
- Sales Growth
- Growth of Operating Earnings
- EPS

And all of these combined

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PREDYCT ANALYTICS

But these conventional measures of financial performance provide very little information about companies' shareholder value

% of Enterprise Value Explained

Category	Value
Sale Growth	1%
EPS Growth	10.0%
Cash Flow Growth	21%
ROE	35.0%
All Combined	43.0%
EVA	25%

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PREDYCT ANALYTICS
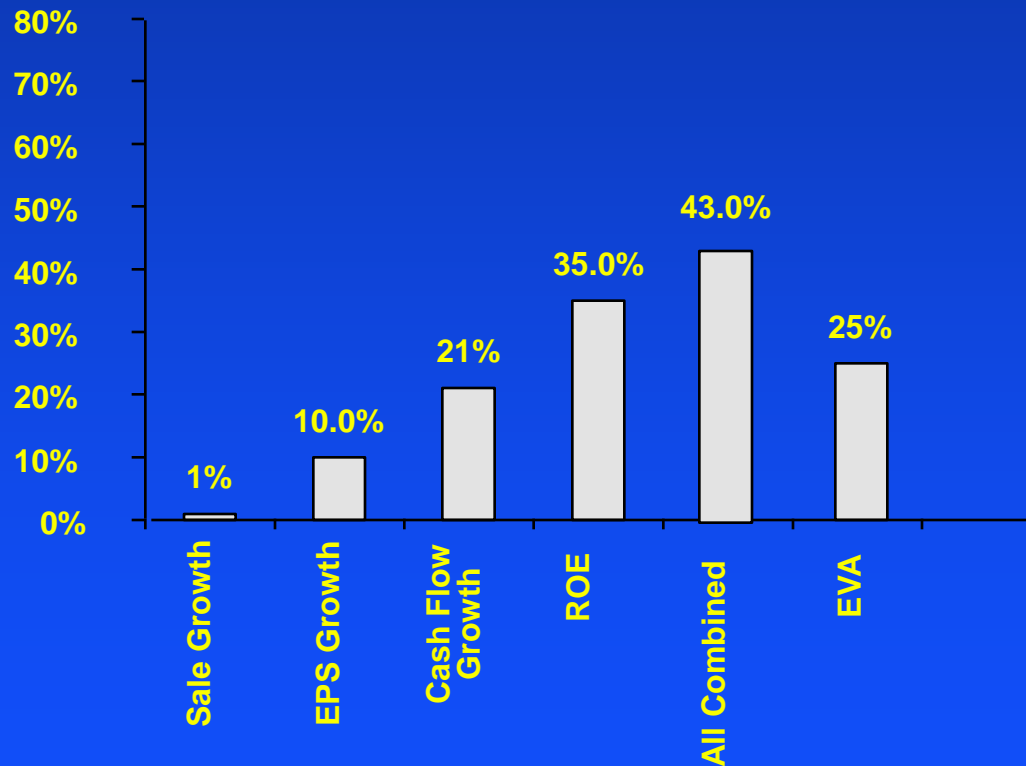
These measures do not work well because they do not adjust cash flows for risk and market implied growth.

$$M/B = \frac{ROE}{RR - G}$$

% of Enterprise Value Explained

M/B

$R^2 = .94$

DCF/Book Value (Using Value Line Forecasts)

Bar chart values:
- Sale Growth: 1%
- EPS Growth: 10.0%
- Cash Flow Growth: 21%
- ROE: 35.0%
- All Combined: 43.0%
- EVA: 25%
- Share Value Contribution: 90%+
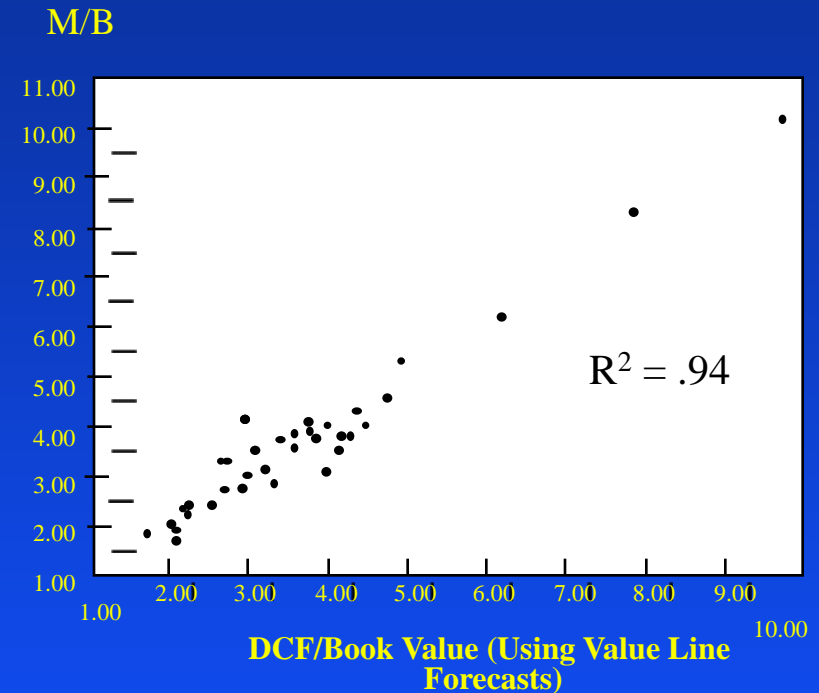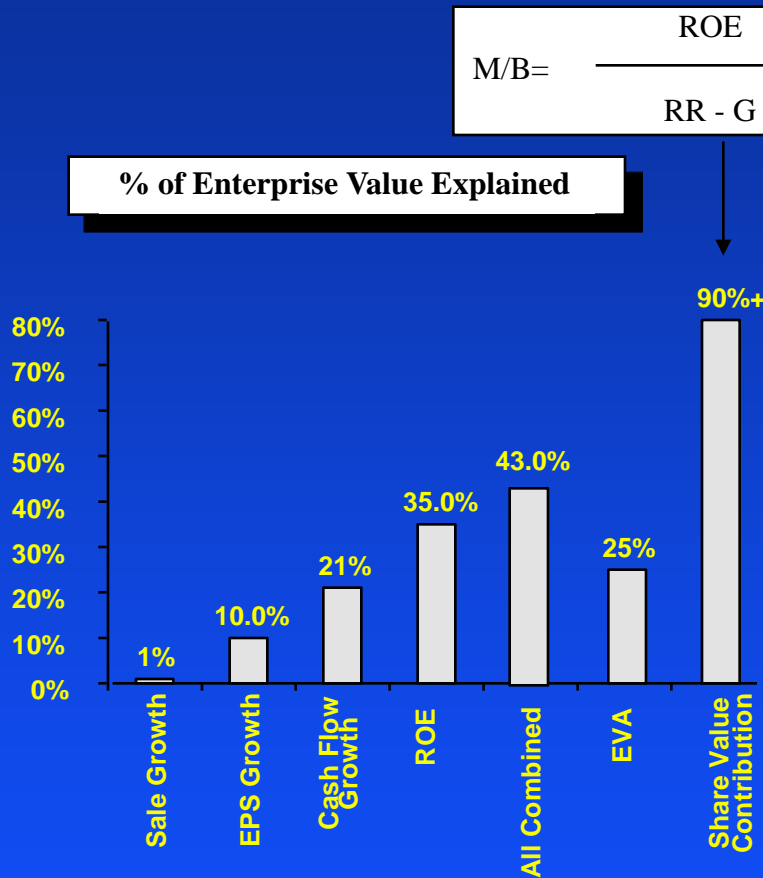
However, if a company's future cash flows are discounted by its market discount (RR) and expected growth is derived from its market value, a far better estimate of market value is achieved – over 90% compared to 43% using conventional metrics.

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PREDYCT ANALYTICS

Divisions with identical ROE may contribute very different shareholder value, in terms of market-to-book
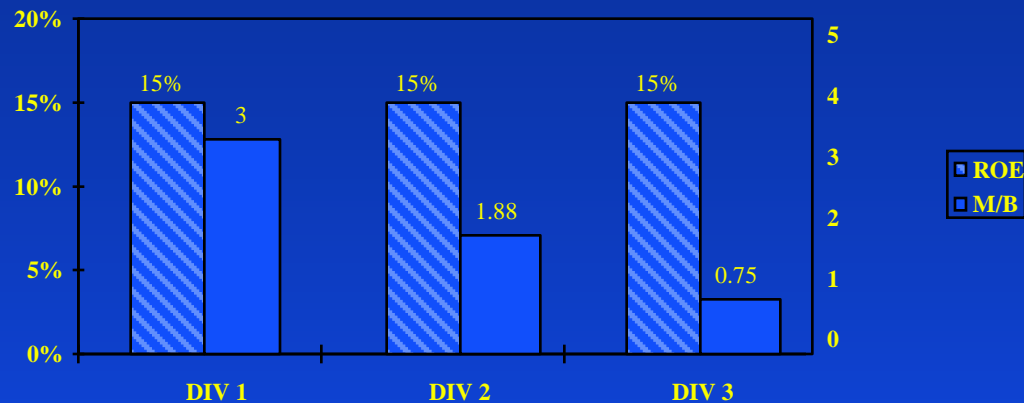
	DIV 1	DIV 2	DIV 3
ROE	15%	15%	15%
Required Return*	**10%**	**13%**	**25%**
Growth of Earnings	5%	5%	5%
M/B	3	1.88	0.75
P/E**	20	12.50	5

The required return is that return which investors require for bearing a specific degree of risk.

Because of the differences in required return, every dollar that the company allocates to Division 1 creates $3.00 of enterprise value, $1.88 for Division 2 and $0.75 for Division 3.

*   Determined by Risk
**   P/E = (M/B)/ROE

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PREDYCT ANALYTICS

Required Return

$$M/B = \frac{ROE}{RR - G}$$

The required return is what the investors require for bearing different levels of risk.
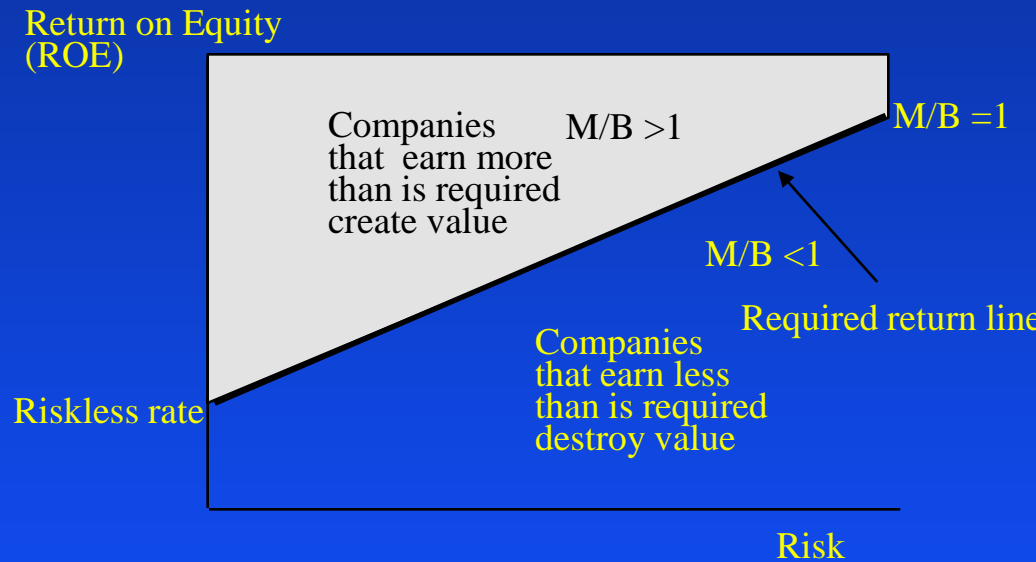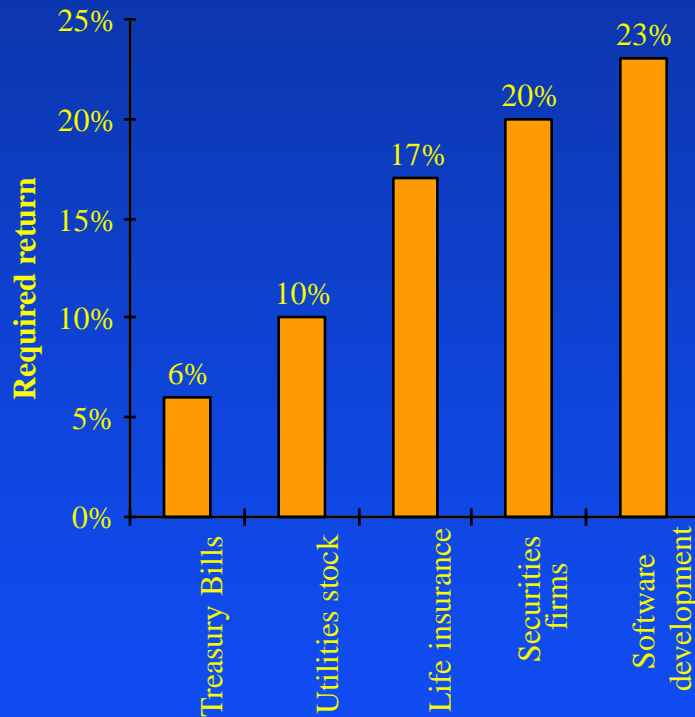
Required return is calculated with one or a combination of market pricing models

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PREDYCTANALYTICS

Cost of equity capital can be estimated with one or a combination of many mainstream techniques.

Techniques	Comments
CAPM	- Standard method but quickly losing ground.
Arbitrage Pricing Theory	- Multi-factor model using macroeconomics factors.
Multi-Factor Model	- Multi-factor model using macroeconomic as well as company-specific factors.
Modified CAPM	- Seabury proprietary model measuring the impact of non-market risk.
Option Theory	- Backing out required return from market value and volatility of company's assets.

Cost of equity is usually measured with Capital Asset Pricing Model (CAPM) not because it is accurate but because it is simple.

PREDYCT ANALYTICS

Divisions with identical ROE and risk may also contribute very different shareholder value due to the difference in their growth prospects
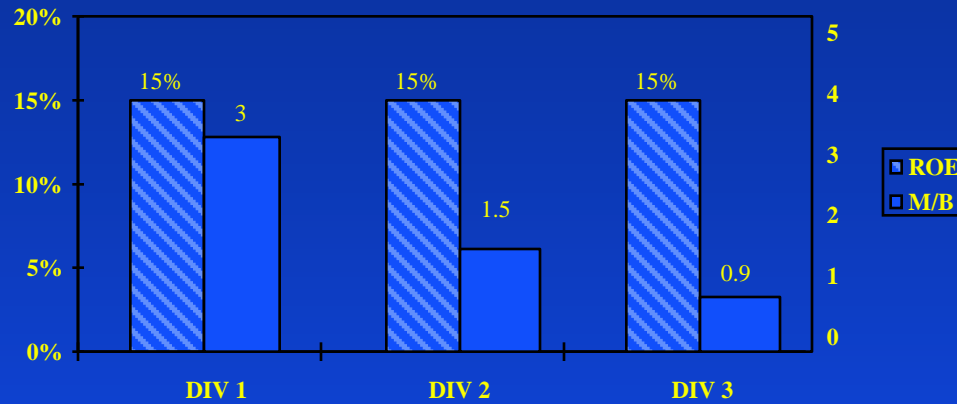
ROE	15%	15%	15%
Required Return	10%	10%	10%
Growth of Earnings	**5%**	**0%**	**(7%)**
M/B	3	1.5	0.9
P/E	20	10	6

Because of the differences in growth, every dollar that the company allocates to Division 1 creates $3.00 of enterprise value, $1.50 for Division 2 and $0.90 for Division 3.

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PREDYCT ANALYTICS

Long-term Growth

The market's anticipation of a firm's long-term growth will also affect its market-to-book.

$$M/B = \frac{ROE}{RR - \boxed{G}}$$
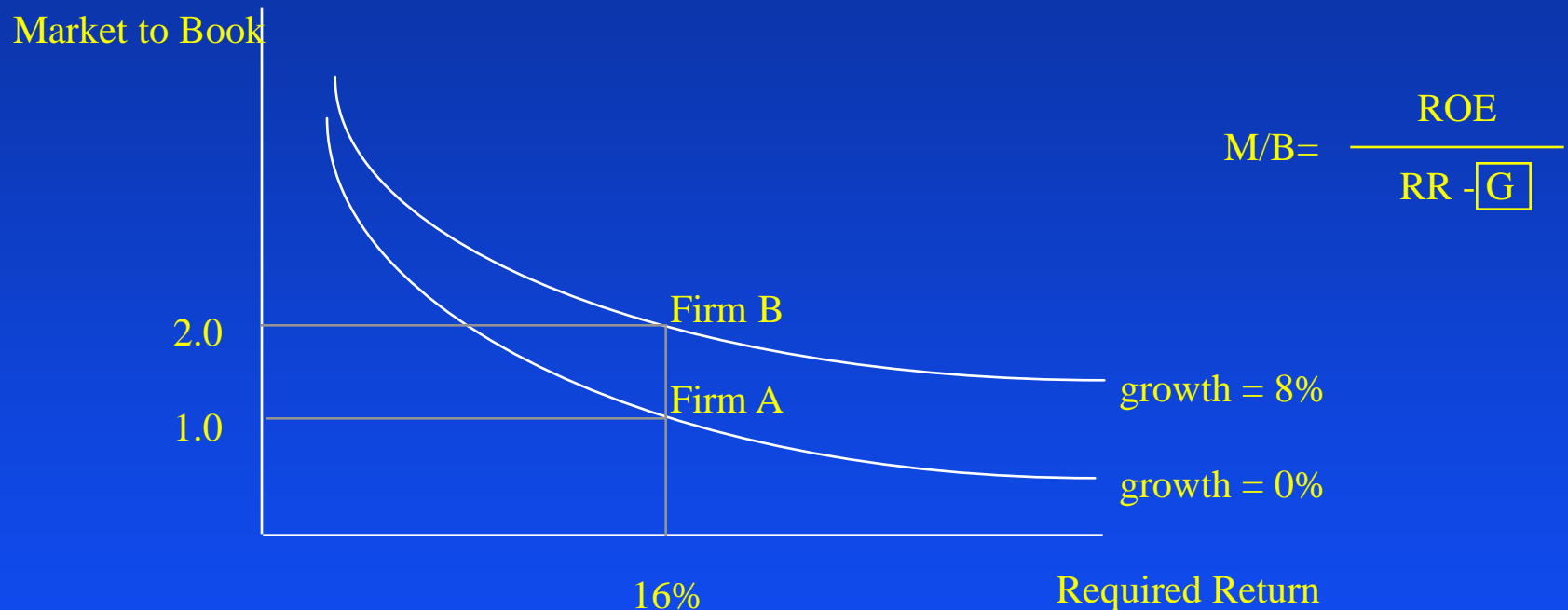
Firms A and B have the same required return which each attains, but the market projects firm B to grow at 8%, while it projects firm A to have no growth. As a result, firm B achieves a higher market-to-book ratio than firm A.

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PREDYCTANALYTICS

Analysis reveals the complex relationships between ROE, price-earnings and market-to-book in the Property and Casualty industry.
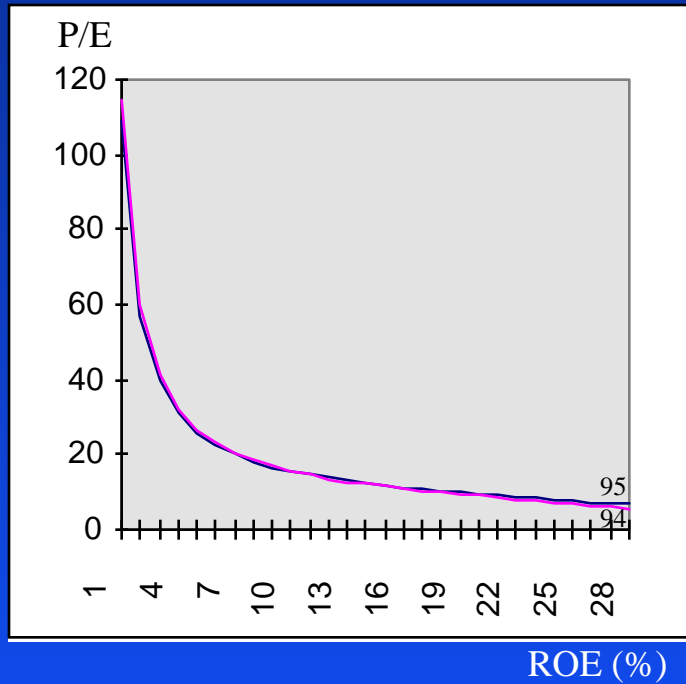
The higher the ROE the lower the P/E ratio

ROE has diminishing marginal contribution to shareholder value
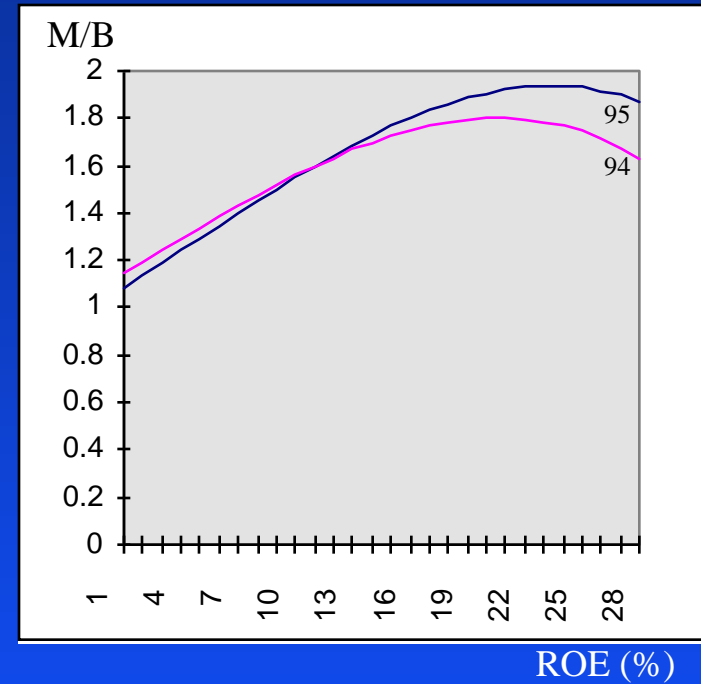
ROE in general improves M/B, but at a decreasing pace. The market stops crediting a company for the improvement of ROE after a certain level has been attained

In 1995, the plateau M/B for the P&C industry was 1.9.

PREDYCT ANALYTICS

Case Study

Company X's initiative in cost-cutting has pushed its before restructuring charge ROE close to 15% in 1996. Further improvement in ROE may have a limited impact on the company's stock value.
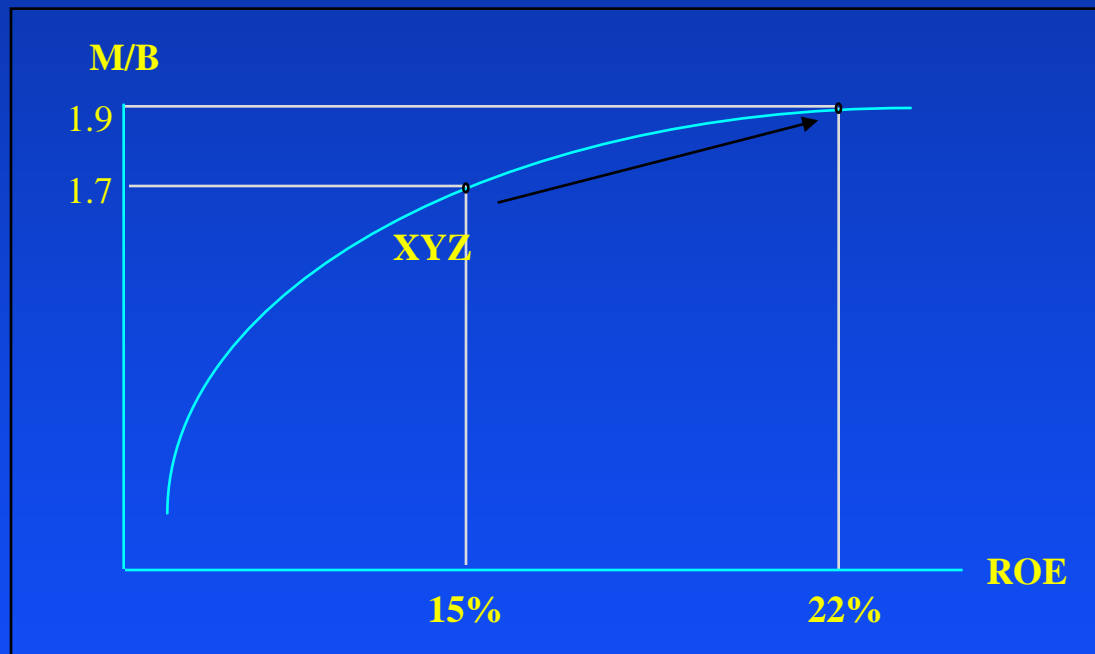
Predyct Analytics estimates that Company X will only increase its stock value by 10% if it increases its ROE from 15% to 22%. Company X is a case study in Section 6.

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PREDYCT ANALYTICS

It would be incorrect to simply shut down the divisions that destroy value. Corporate decisions need to be made on a marginal, as well as total, basis

INCOME STATEMENT OF A LOB

	1st $100M	2nd $100M	3rd $100M
Additional Premium			
Additional Policies In-Force	500,000	500,000	500,000
Incurred Losses on New Business	$70M	$80M	$90
Additional Rent	$3	$0	$0
Additional Marketing	$12	$10	$5
Additional Net Income	$15M	$10M	$5M
Capital Cost*	$10M	$10M	$10M
Marginal EVA	$5M	$0M	($5M)

Contribution to Shareholder Value

MCSV

$5M

$3M

($5M)

1st   2nd   3rd
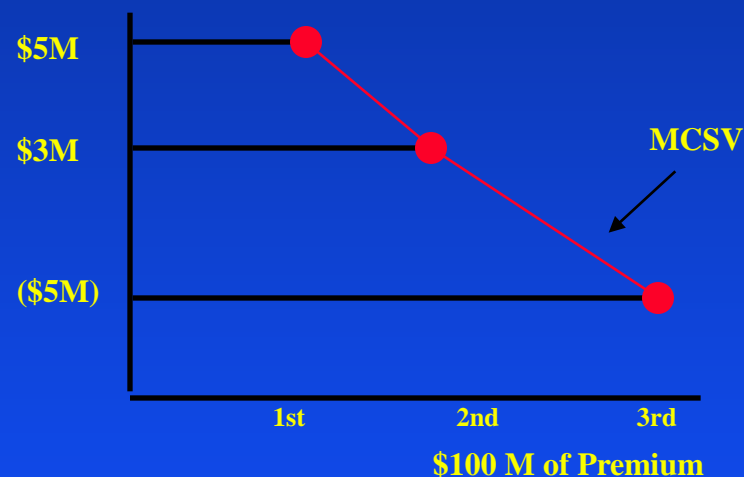
$100 M of Premium

The first $100M of premium yields $5M of EVA, the second $100M yields $0M, and the third $100M destroys $5M.

*Capital Cost is capital allocated multiplied by the required return

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PREDYCT ANALYTICS

Marginal Economics

Analysis should be performed to estimate the marginal impact on shareholder value of various corporate strategies

ILLUSTRATION

Contribution to Shareholder Value

Budget*	-3rd $100M	-2nd $100M	-1st $100M	No Change	+1st $100M	+2nd $100M	+3rd $100M
Division 1	-200M	-200M	-300M	0	+300M	+200M	+200M
Division 2	-100M	-100M	-0M	0	-300M	-100M	-100M
Division 3	-1000M	-1000M	-1000M	0	+0M	+0M	+0M

To Grow

Conclusion
- Leave Division 3 alone
- Taking $300M from Division 2 reduces shareholder value by $200M ($100M + $100M)
- Deploying $300M to Division 1 enhances shareholder value by $750M ($300M + $250M + $200M)
- Net gain in shareholder value = $750M - $200M = $550M

*Salaries, business investment, ordinance etc.

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PREDYCT ANALYTICS

Effective financial performance measurements must be _risk-adjusted_ and _value-driven_.

PREDYCT ANALYTICS
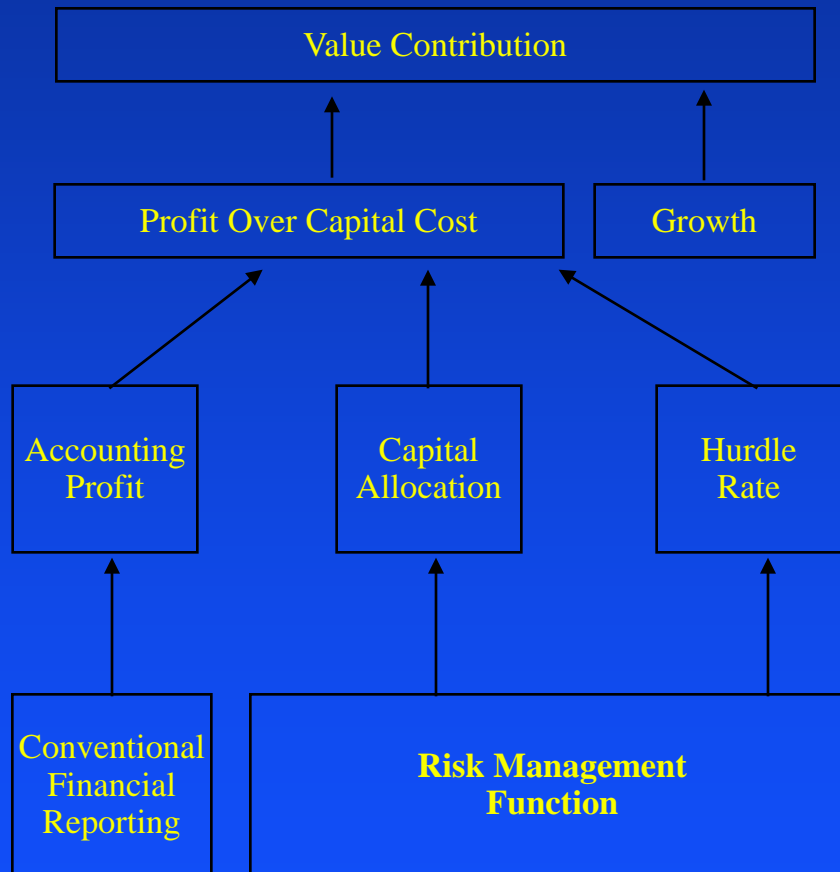
Rather than concentrating on current ROE, a company should also manage its risk exposure and the potential growth of its business.

SHAREHOLDER VALUE DRIVER	SHAREHOLDER VALUE IMPLICATIONS
ROE	• How much capital does each division consume? • What is the risk-adjusted ROE of each division?
Required Return	• How much risk does each division create? • What is the corresponding required return?
Growth	• What is the market expectation of growth for each division?
M/B	• What is the price-to-earnings and market-to-book ratio of each division? • How much shareholder value does each division create or destroy?
Extra	• In what division will the next investment dollar create the highest shareholder value? • Can capital redeployment create shareholder value? • Should more capital be raised?

PREDYCT ANALYTICS

Each company strategic business unit should be valued independently in order to observe where the company is creating and destroying value

```
            ┌──────────┐
            │  Parent  │
            └────┬─────┘
        ┌────────┼────────┐
   ┌────┴───┐ ┌──┴─────┐ ┌┴──────┐
   │  Life  │ │ Health │ │  P&C  │
   └────────┘ └────────┘ └───┬───┘
                      ┌───────┼───────┐
                   ┌──┴─┐  ┌──┴──┐  ┌─┴──┐
                   │ WC │  │Auto │  │CMP │
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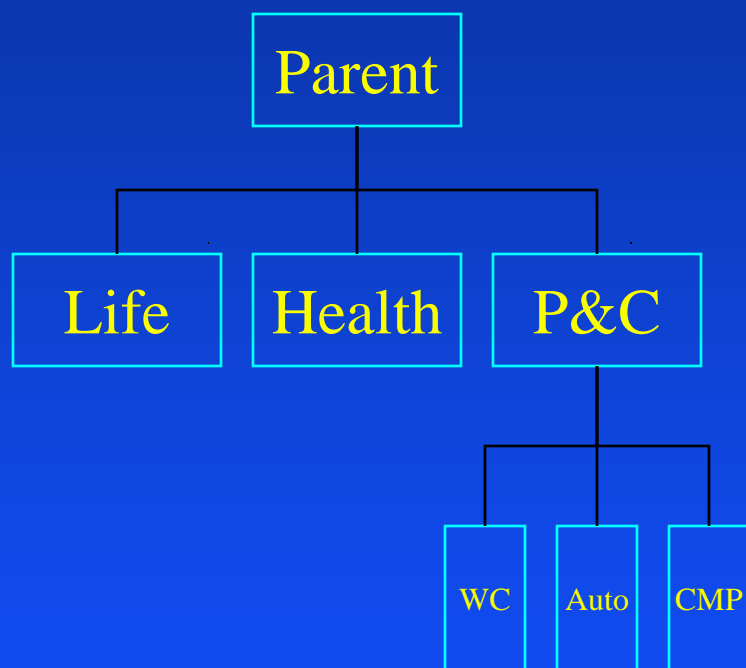
Each company, and segment within a company, can be valued and benchmarked against an appropriate publicly traded peer group.

PREDYCT ANALYTICS

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PREDYCT ANALYTICS

Difficulties of implementing SVA in a global financial company:

Estimating the cost of capital for different countries

Defining risk and assigning capital

PREDYCT ANALYTICS

Regional Differences in Cost of Capital

There is much debate regarding the cost of capital for a global company:

- Should each country have its own cost of capital?

- Should each country have its own risk premium?

- Should the cost of capital capture foreign exchange and political risk?

Financial Theory and Seabury Practice:

- A company should have only one risk premium to be used across all subsidiaries

- The cost of capital difference between two countries is only due to the difference in risk-free rate, or expected inflation

- Foreign exchange risk is not important because it can be hedged

- Political risk should be treated like normal risk. Countries with higher political risk will be assigned more capital.

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PREDYCT ANALYTICS

Risk premium* should be constant across countries. If the risk premium is higher in one country, capital will flow there to until the equilibrium is reached.

	Expected Inflation	Risk-free Rate	Risk Premium	Cost of Capital
High Inflation Country	15%	17%	8%	25%
	10%	12%	8%	20%
Base Country (Germany)	4%	6%	8%	14%
Low Inflation Country	2%	4%	8%	12%

*Defined as reward per unit of risk

PREDYCT ANALYTICS

Cost of equity capital can be estimated with one or a combination of many mainstream techniques.

Techniques	Comments
CAPM	- Standard method but quickly losing ground.
Arbitrage Pricing Theory	- Multi-factor model using macroeconomics factors.
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Cost of equity is usually measured with Capital Asset Pricing Model (CAPM) not because it is accurate but because it is simple.

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PREDYCT ANALYTICS

Recommendations for Application:

❏ Use all available methods

❏ Do not to rely on a company's own stock value experience.

❏ Use industry average and then adjust a stock return by its relative leverage

Example: Company X's required return is calculated in several ways:

Methods		Required Return Estimates
Company X's observed beta:	0.83	12.7%
Industry-wide unleveraged beta:	0.22	
Company X's beta given its leverage:	2.08	19.8%
Total Volatility Model:		
Company X's stock volatility:	31%	15.6%
MM model:		
Implied cost of equity to maintain industry WACC		20.5%

PREDYCT ANALYTICS

Estimating Cost of Capital

There is much debate on cost of capital methodology for a global company:

- Should the beta be calculated with parent company's local stock index?

- Or should the beta be calculated with a global stock index?

According to modern financial theory:

- If the parent company is locally owned, and its shareholders primarily hold local stocks, then a local stock index should be used.

- If the stockholders are spread around the globe, a global stock index should be used.

- A company's cost of capital is determined by the 'marginal' shareholders - those who are ready to buy or sell the company's shares. It is believed that the 'marginal' shareholders are global investors. Therefore, the cost of capital should be estimated with a global stock index

- However, some countries have explicit and implicit restrictions on foreign ownership of domestic companies. The restriction may prevent global investors from being the marginal investors

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PREDYCT ANALYTICS

Translating EVA concept to Operational Goals

Underwriters' bonus pool will depend on the loss ratios. Assume the bonus pool is 5% of EVA.

	Product A	Product B
Premium	$10M	$10M
Capital Allocated	$5M	$8M
Cost of Capital	15%	15%
Cost of Capital in dollars	$750K	$1.2M
Expenses less investment gain	30%	40%
Loss Ratio for EVA>0	62.5%	48%

Underwriters are entitled to a bonus if the loss ratio is lower than 62.5% for Product A, and 48% for Product B. Every 1% drop in loss ratio, the bonus pool will increase by $5,000.

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PREDYCT ANALYTICS

Capital allocation in financial service companies is more complicated because the amount of capital at risk is usually unknown. Capital should be allocated to businesses according to their contribution to the company's total risk

Economic Capital Allocation in Non-Financial Company is Explicit	Economic Capital Allocation in Financial Company is Hidden
• A division in a manufacturing company has a known amount of fixed assets, such as plant and equipment, and current assets, such as cash and inventory. • Managers in the division can only use the capital allocated to them. • Managers are evaluated based on the amount of capital allocated to them. • The total capital used to support the division is easily calculated.	• The amount of fixed assets required to operate an insurance LOB is small. • The insurance and investment risk going forward are supported by a portfolio of investment securities. • The capital is not spent until unexpected losses surface in the future. • More judgment is required to determine the capital required to support the LOB.

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PREDYCT ANALYTICS

What is the Risk to Shareholders?

OR

Risk of Insolvency
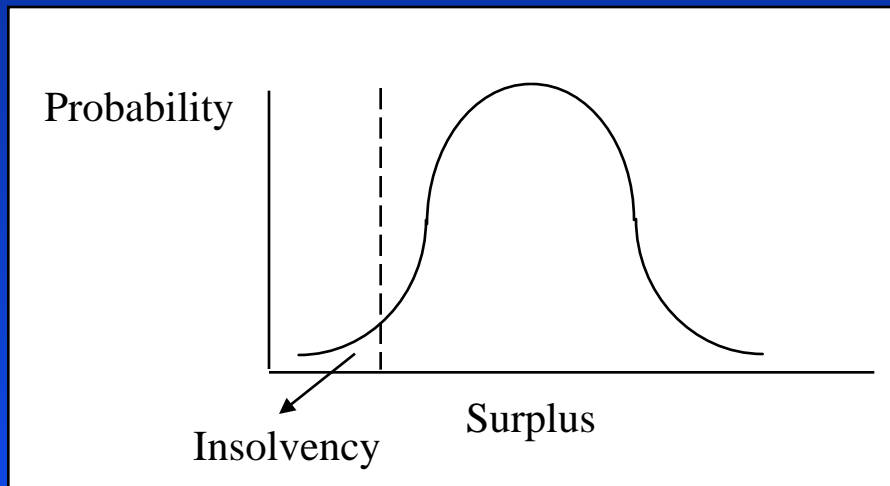
Earnings Volatility
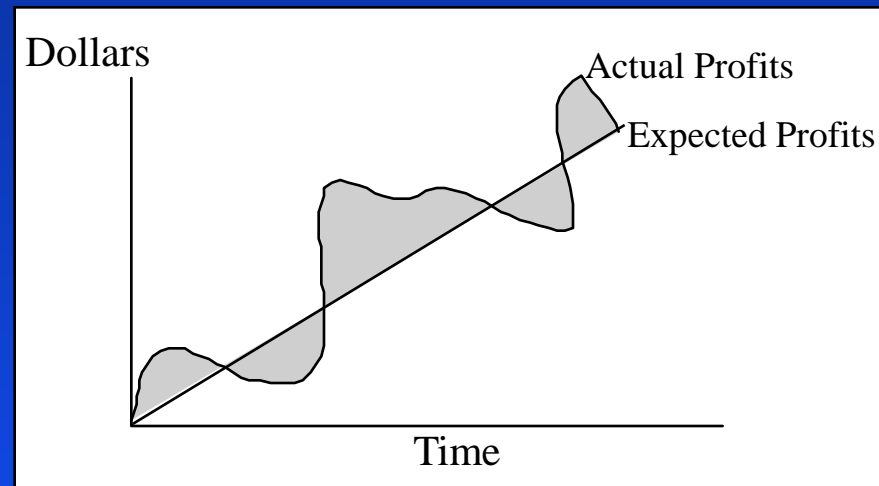
Capital required to prevent insolvency is important to policyholders and regulators.

Capital required to fund earnings volatility is important to shareholders. Risk of insolvency to shareholders can be diversified away

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PREDYCT ANALYTICS

Solvency Capital vs. Economic Capital

The effective capital requirement for insurance companies is usually higher than the capital required to prevent default.

Solvency Capital	Economic Capital
• Fund solvency risk	• Fund market risk
• To prevent default	• To remain competitive
• To satisfy rating agencies' and regulatory agencies' requirement	• To satisfy capital market requirement
• Allocate across LOBs to maintain the same default risk in all LOBs	• Allocate across LOBs to match contribution to volatility value
• Cannot be used to estimate ROE by LOB	• Used to estimate ROE, P/E, and M/B by LOB

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PREDYCT ANALYTICS

Solvency Capital vs. Economic Capital: Examples

	Solvency Capital Requirement	**Economic Capital Requirement**
Microsoft • No liability • No chance of default	• Not required because there is no chance of default • ROE on solvency capital is infinite.	• Capital required by the market to stay competitive. • Capital required to finance innovations and developments. • Capital required to buffer volatility in profit or cash flow.
Insurance Company • Significant liability • Some chance of default	• Required to limit chance of default such that its products are marketable.	• Required by the capital market to stay competitive. • To finance growth and new product developments. • To finance new distribution channels.

PREDYCT ANALYTICS

Products with consistent earnings have a lower capital cost and a higher level of EVA

LOB #1

Cum Surplus

Realized

Expected

125% RBC

Year

LOB #2

Cum Surplus

Realized

Expected

125% RBC

Year
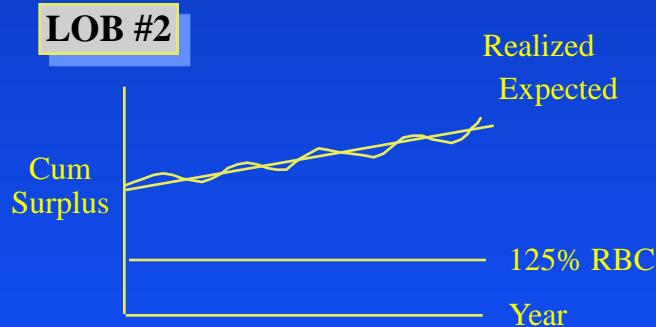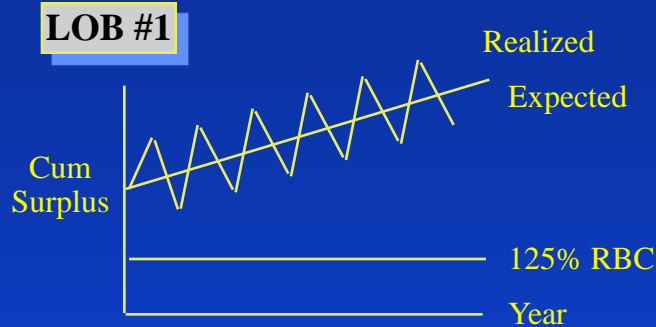
Illustration	LOB #1	LOB #2
Expected Annual Earnings	$6M	$4M
Target Default Probability	1%	1%
Solvency Capital Required	$40M	$40M
Return on Solvency Capital	**15%**	**10%**
Earnings Volatility (in standard deviation)	$30M	$10M
Risk Capital Required (4 standard deviations**)	$120M	$40M
Risk Adjusted ROE	**5%**	**10%**
Req Return	12%	12%
M/B*	0.83	2

This example also reveals that allocating capital based on solvency requirement alone will lead to a suboptimal allocation of resources.

* Assume Required Return is 12%, long-term growth is 6%.
** Based on peer analysis

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PREDYCT ANALYTICS

The Impact of Capital Reallocation

Real Life Example: A Top 20 Life Insurer

Before Economic Capital Allocation

	Assigned Capital	Income	ROE
LOB #1	$595M	$83M	14.0%
LOB #2	$509M	$45M	8.8%
LOB #3	$135M	$13M	9.6%
LOB #4	$307M	$24M	7.8%
LOB #5	$761M	$55M	7.3%
Total	$2,307M	$220M	9.5%

After Economic Capital Allocation

	Required Capital	Income	ROE
LOB #1	$421M	$83M	19.7%
LOB #2	$1,149M	$45M	3.9%
LOB #3	$121M	$13M	10.7%
LOB #4	$247M	$24M	9.7%
LOB #5	$369M	$55M	14.9%
Total	$2,307M	$220M	9.5%

The results reveal that LOB #2 was using significantly more capital than believed. LOB #2 is undesirable because it destroys about 20% of the company's market value

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PREDYCT ANALYTICS

Some Observations on Risk Based Capital

- RBC ratio is a gross approximation of true risk. Although it is a good regulatory tool, it is not nearly accurate enough for financial service and insurance companies to manage risk

- RBC does not take many risks into consideration, such as correlation or the risk exposure of non financial and non-insurance subsidiaries.

- Correlation is a huge driver of risk, but the RBC standard assumes a simple correlation structure. For example, correlation between underwriting risk and asset risk is 0, and between business risk and interest rate risk, it is 1.

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PREDYCT ANALYTICS

While the rating agencies have been requiring insurance companies to increase capital, more capital does not guarantee a higher rating

Agencies' ratings have little relationship with their own capital adequacy indicators

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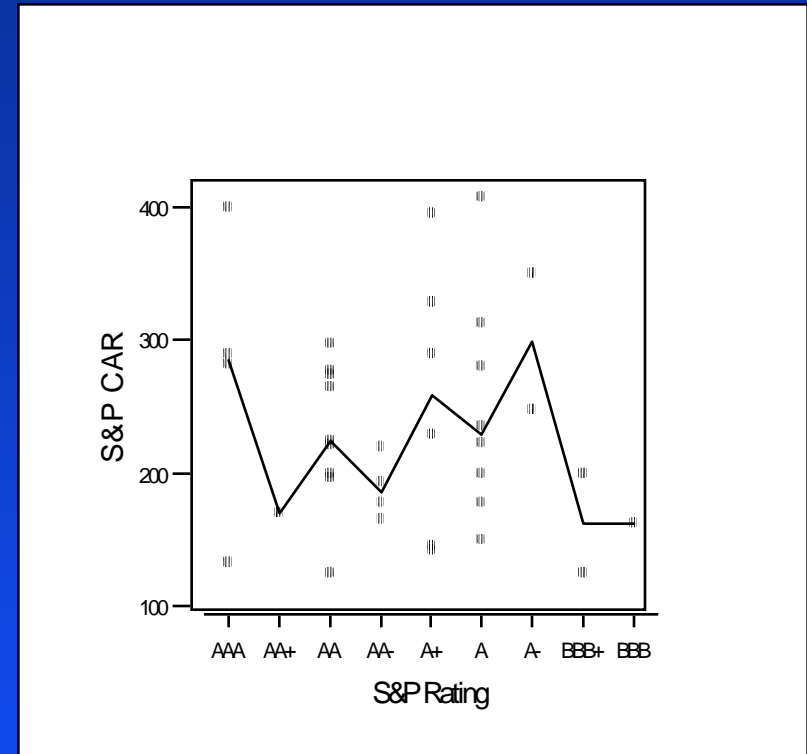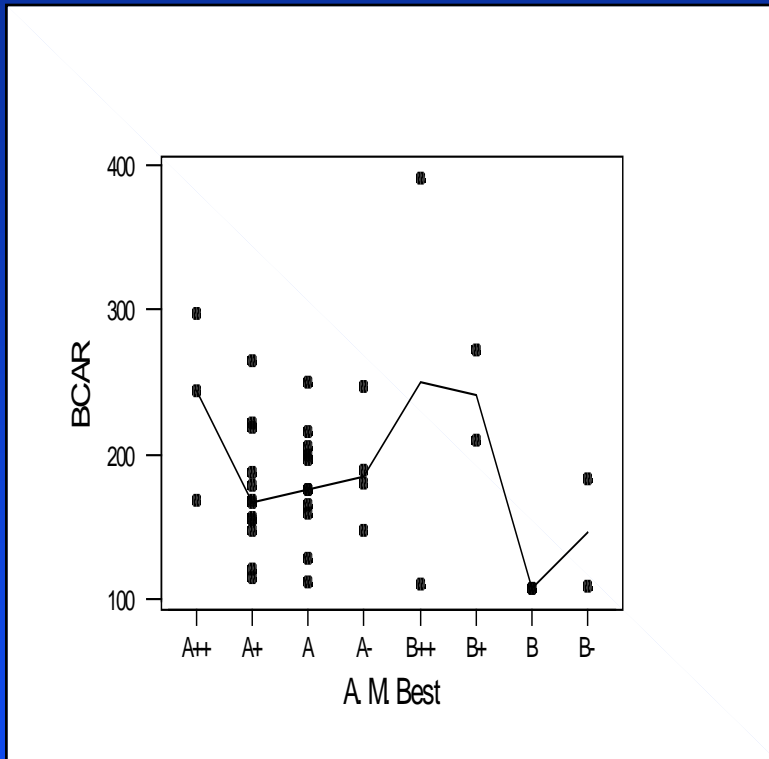
PREDYCT ANALYTICS

Calculating the C1 risk of Company A's asset portfolio can mislead the company in two ways: how much capital is required and how the capital should be allocated to each division.

Real Life Example

Division	LOB #1	LOB #2	Division	LOB #1	LOB #2
Total Asset	$11,773	$4,448	**RBC Capital Allocation**		
Treasury	1.99%	28.66%	RBC Requirement	$251	$95
AAA/AA	11.11%	7.18%	Size Factor	1.16	1.16
A	19.37%	24.26%	Adjusted RBC Requirement	$291	$110
BBB	24.55%	11.93%	300% RBC	$873	$330
BB	0%	5.27%	Capital Allocation	73%	27%
B	0%	5.23%			
Agency	0.79%	0.13%	**Economic Capital Allocation**		
Mortgage	36.47%	11.63%	Observed Volatility	$599	$140
Equity	2.39%	2.38%	Diversification Benefit	61%	61%
Other (Real Estate)	3.33%	3.33%	One Std Deviation of Capital	$234	$55
			Three Std Deviation of Capital	$702	$165
			Capital Allocation	81%	19%

The RBC capital distortions are substantially greater for liabilities than for assets

PREDYCT ANALYTICS

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PREDYCT ANALYTICS

Company X's market value and profitability are observed to be below average among its peers.

Value Map
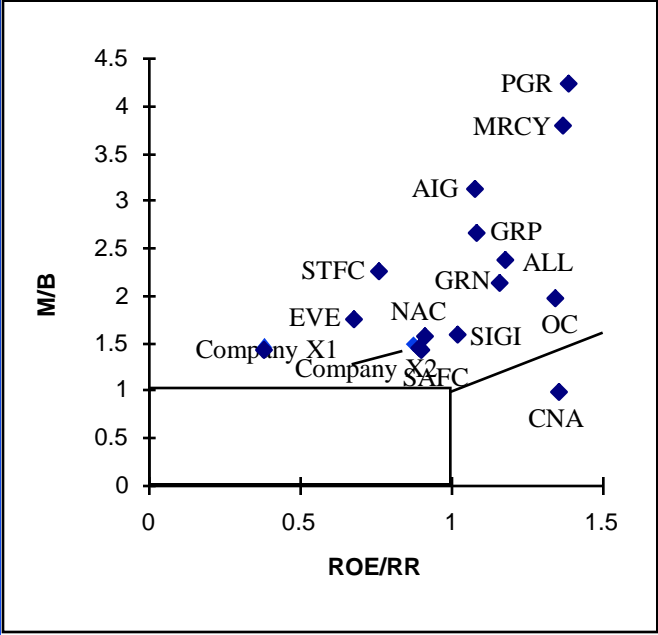
P/C: AIG (AIG), Allstate (ALL), Progressive (PGR), Gen Re (GRN), Safeco (SAFC), Company X (Company X), CNA (CNA), Mercury General (MRCY), Allied Group (GRP), State Auto (STFC), Orion (OC), Everest RE (EVE), Selective (SIGI)

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PREDYCT ANALYTICS

The market does not accept Company X's ROE claims. Company X's capital adequacy and the risk-adjusted Return-on-Equity is calculated.

Peers

Company X

	536
Commercial	288	
Retail	270	656
Reinsurance	1309	1067

Company Assigned Book Equity

Market Required* Book Equity
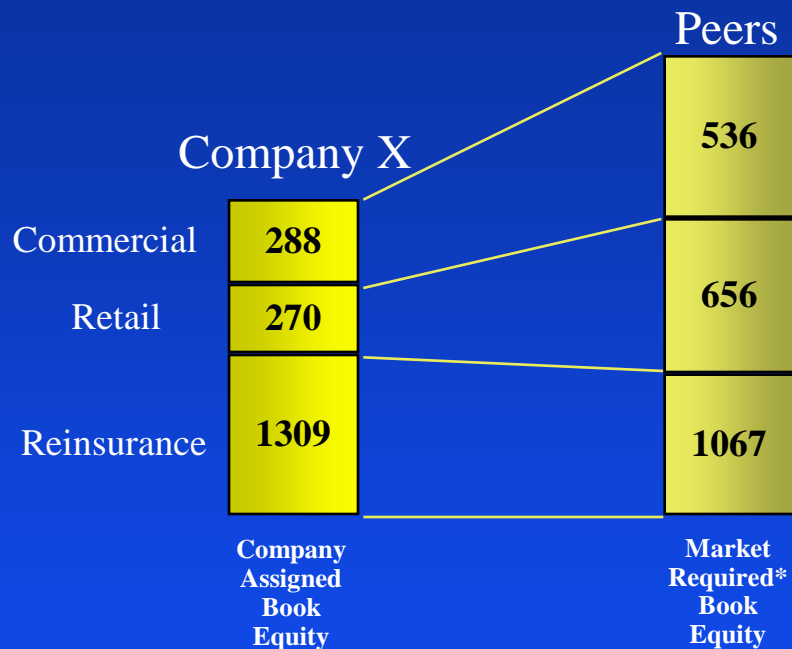
	Surrogate Req. Return	Surrogates Risk-Adjusted ROE	X's Nominal ROE	X's Risk Adjusted ROE***
Commercial	12.5%	13.3%	36.2%	14.0%
Retail	12.3%	13.8%	38.4%	11.9%
Reinsurance	12.9%	11.6%	18.7%	20.3%

This analysis reveals Company X's true profitability after adjusting for risk.

*   Equity required to maintain the same leverage as that of its peers
**   Based on Seabury's assigned Book Equity, which is the capital allocation in proportion to the peer group
***   Based on Market Required Book Equity

PREDYCT ANALYTICS

While Company X has adequate RBC and agency ratings (A), investors do not accept the validity of these capital standards.

Full Economic Value: $4.46B

Current Market Value: $3.4B

Billion

FEV $4.4

Run-off $548

Risk Estimate ($1,280M)

Commercial $864

Retail $1,493

Growth Gap ($1,158M)

Margin Gap $1496M

Reinsurance $1,550 M

Company's Current Value $3.4B

Billion

$3.4

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PREDYCT ANALYTICS
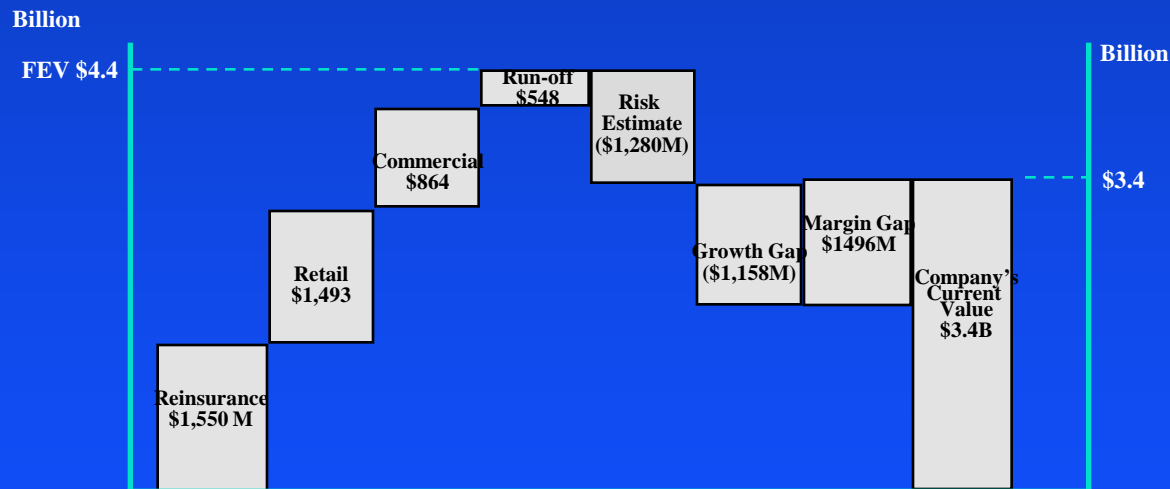
Some Observations

- The observed ROE is not reliable since this company is more leveraged than its peers.

- Retail and Commercial divisions have high ROE, but an acquirer would need to invest more capital to support its risk.

- Company is rated A by AM Best and A- by S&P. These divisions have insufficient economic capital

- Reinsurance division on the other hand is adequately capitalized

- Company continued its aggressive share repurchase program and failed 18 months later due to insufficient capital

PREDYCT ANALYTICS

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PREDYCT ANALYTICS

Implementation of the risk and value-based performance measurement system is quite simple conceptually.

PROCEDURE	TOOL
• Estimate risk exposure of each division. Assign capital accordingly.	• Predyct ERM • Predyct ERM Benchmarking

• Expense is allocated at each level
   – Through internal allocations
   – Through outsourcing market transfer pricing
   – Through best practice comparative benchmarking
	• Company Financial Reporting
	• Survey of Market
	• Best Practice Benchmarking

• Income is distributed between divisions or business activities using performance benchmarks.	• Capital Allocation • Performance Measurement
• Estimate required return	• Multi-Factor Model • Other Capital Market Pricing Models
• Calculate Economic Profit - Risk-adjusted profit contribution	• (Gross Income - Expense) - Economic Capital x Required Return
• Estimate growth potential by reporting unit • Enterprise Value Contribution	• Surrogate Analysis

PREDYCT ANALYTICS

Unless market based capital is allocated to each business activity, there can be no realistic basis for measuring performance

Market-Based Economic Capital Allocation

Insurance (Consolidated)

1	Face Value		$	10,000.0
2	Capital Required for risk	2.8%	$	280.0
3	Working Capital	1.50%	$	150.0
4	Total Capital		$	430.0

Income Statement

5	Investment Income	7.55%	$	755.0
6	Interest credit	6%	$	600.0
7	Capital Interest	4%	$	17.2
8	Loading	5%	$	500.0
9	Gross Earnings		$	672.2
10	Admin Expenses		$	55.0
11	Option-Adjusted Spread	0.05%	$	5.0
12	Increase in Default Reserve	0.05%	$	5.0
	Commission	5%	$	500.0
13	Net Income Before Tax		$	107.2
14	Net Income After Tax	35%	$	69.7
15	Capital Cost	15%	$	64.5
16	EVA		$	5.2
17	ROE			16.2%

Balance Sheet

18	Total Assets	$	10,604.7
19	Deposits	$	10,100.0
20	Required Capital	$	430.0
21	Default Reserve	$	5.0
22	Retained Earnings	$	69.7
23	Total Liabilities	$	10,604.7

Yield

Investment Return 7.55%

10 Yr. Transfer Price 7.1%

5 Yr. Transfer Price 6.8%

Interest Credit 6%

Investment Earnings

Treasury Earnings

} Product Earnings

Transfer Price Curve

5 Year 10 Year

Duration

See appendix for a key to the profit & loss statement

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PREDYCT ANALYTICS

Capital Allocation Based on Risk Exposure

Economic capital is allocated to support the volatility in future cash flows introduced by each division or function.

Risk	$4M	$6M	$10M
Percentage of Total Risk	40%	60%	100%
Total Capital			$25M
Capital Allocation	$10M	$15M	$25M

PREDYCT ANALYTICS

Expenses are allocated to different business activities where the expenses are actually incurred

Allocate Expenses

Insurance (Consolidated)

1	Face Value		$	10,000.0
2	Capital Required for risk	2.8%	$	280.0
3	Working Capital	1.50%	$	150.0
4	Total Capital		$	430.0
	Income Statement			
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22	Retained Earnings		$	69.7
23	Total Liabilities		$	10,604.7

Yield

Investment Return	7.55%
10 Yr. Transfer Price	7.1%
5 Yr. Transfer Price	6.8%
Interest Credit	6%

Investment Earnings

Treasury Earnings

} Product Earnings

Transfer Price Curve

5 Year   10 Year

Duration

PREDYCT ANALYTICS

Expense Allocation

Some support services are supplied to reporting units partly or wholly by the corporation.

The costs of these services can be assigned to reporting units in one of two ways.

- Actual costs to the corporation can be allocated.

- The costs of these services in the marketplace, i.e., the outsourcing costs, can be charged

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PREDYCT ANALYTICS

Allocating income to business functions further refines the performance measurement system

Allocate Income

Insurance (Consolidated)

1	Face Value		$	10,000.0
2	Capital Required for risk	2.8%	$	280.0
3	Working Capital	1.50%	$	150.0
4	Total Capital		$	430.0
	Income Statement			
5	Investment Income	7.55%	$	755.0
6	Interest credit	6%	$	600.0
7	Capital Interest	4%	$	17.2
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16	EVA		$	5.2
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	Balance Sheet			
18	Total Assets		$	10,604.7
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20	Required Capital		$	430.0
21	Default Reserve		$	5.0
22	Retained Earnings		$	69.7
23	Total Liabilities		$	10,604.7

PREDYCT ANALYTICS

Allocating income to product and investment functions. The debate here is what percentage of earnings is due to product versus investment performance

```
┌────────────────────────────────────────────────────────┐
│ ◄─────────────── Total Earnings of LOB #1 ───────────► │
└────────────────────────────────────────────────────────┘
```

```
                              ┌──────────────────────────────┐
                              │ Earnings to Investment Function │
              ┌───────────────┤                                │
              │ Earning to Product Function                    │
              │               └────────────────────────────────┘
              └───────────────┘
```
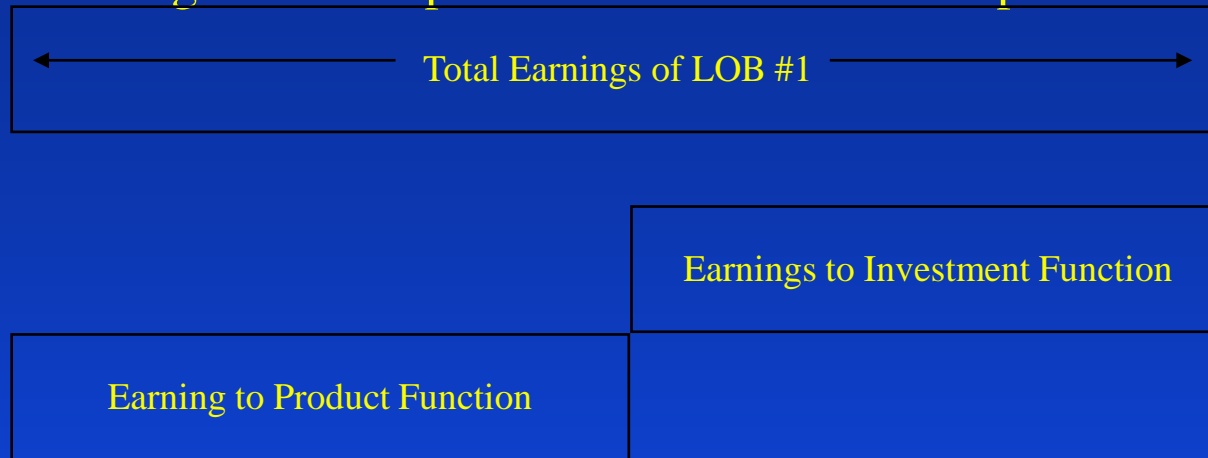
- Earnings to Investment Function = [Average Investment Return - Benchmark Rate*] x Total Asset - Investment Expenses

- Earnings to Product Function = Total Earnings minus Earnings to Investment Function

- Establishing the benchmark rate is a delicate task because it strongly affects the income allocation among divisions or functions. The process to establish the benchmark rate must be market-driven and reasonable to gain buy-in within the corporation.

* Control for duration

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PREDYCT ANALYTICS

The final step of the value-based performance measurement system is to measure the contribution to enterprise value by business activities

Calculate Economic Profit

Yield

Investment Return	7.55%
10 Yr. Transfer Price	7.1%
5 Yr. Transfer Price	6.8%
Interest Credit	6%

} Investment Earnings

} Treasury Earnings

} Product Earnings

5 Year   10 Year

Duration

Transfer Price Curve

Insurance (Consolidated)

1	Face Value		$ 10,000.0
2	Capital Required for risk	2.8%	$ 280.0
3	Working Capital	1.50%	$ 150.0
4	Total Capital		$ 430.0
	Income Statement		
5	Investment Income	7.55%	$ 755.0
6	Interest credit	6%	$ 600.0
7	Capital Interest	4%	$ 17.2
8	Loading	5%	$ 500.0
9	Gross Earnings		$ 672.2
10	Admin Expenses		$ 55.0
11	Option-Adjusted Spread	0.05%	$ 5.0
12	Increase in Default Reserve	0.05%	$ 5.0
	Commission	5%	$ 500.0
13	Net Income Before Tax		$ 107.2
14	Net Income After Tax	35%	$ 69.7
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16	EVA *		$ 5.2
17	ROE		16.2%
	Balance Sheet		
18	Total Assets		$ 10,604.7
19	Deposits		$ 10,100.0
20	Required Capital		$ 430.0
21	Default Reserve		$ 5.0
22	Retained Earnings		$ 69.7
23	Total Liabilities		$ 10,604.7

- EVA refers to Economic Value Added. it measures economic profit.
- See appendix for a key to profit and loss statement

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PREDYCT ANALYTICS

Example: Measuring Risk-Adjusted ROE of Two Products

Assume Products A and B produce the same profit margin but Product B contributes more risk to the enterprise. After allocation of economic capital, Product A generates a higher ROE.

Firmwide Required Return: 15%
Desired Capital - Risk Ratio: 2.5*

Illustration

		Product A	Product B	Remarks
1	Premium	$10M	$10M	
2	Earnings	$1M	$1M	
3	Risk Contribution	20% of Revenue	30% of Revenue	Based on future cash flow volatility
4	Total Risk Contribution	$2M	$3M	Revenue X Risk per Dollar 1 X 3
5	Economic Capital Allocated	$5M	$7.5M	Capital Risk Ratio X Total Risk 2.5 X 4
6	**ROE**	**20%**	**13.3%**	2 5
		ROE> Required Return	ROE < Required Return	

* Assume the company desires to maintain a capital level of 2.5 times its risk

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PREDYCT ANALYTICS

Estimate the Growth and Enterprise Value

Shareholder value contribution is the present value of all future profits of a reporting unit. Therefore, the growth potential is a major driver of shareholder value.

$$\text{P/E Ratio} = \frac{1}{RR - G}$$

$$\text{M/B} = \frac{ROE}{RR - G}$$

Growth:	**Estimate:**
- Market expectation for similar companies - Long-term average - 30 years - Growth of profitability - Estimated with market data	- Use surrogate analysis for major LOBs - Use cross-sectional regression for smaller segments

This information is used to decide which divisions should receive additional investments

PREDYCT ANALYTICS

Example: Contribution to Enterprise Value

Long term growth as well as risk-adjusted ROE are used to determine the enterprise value contribution of a division.
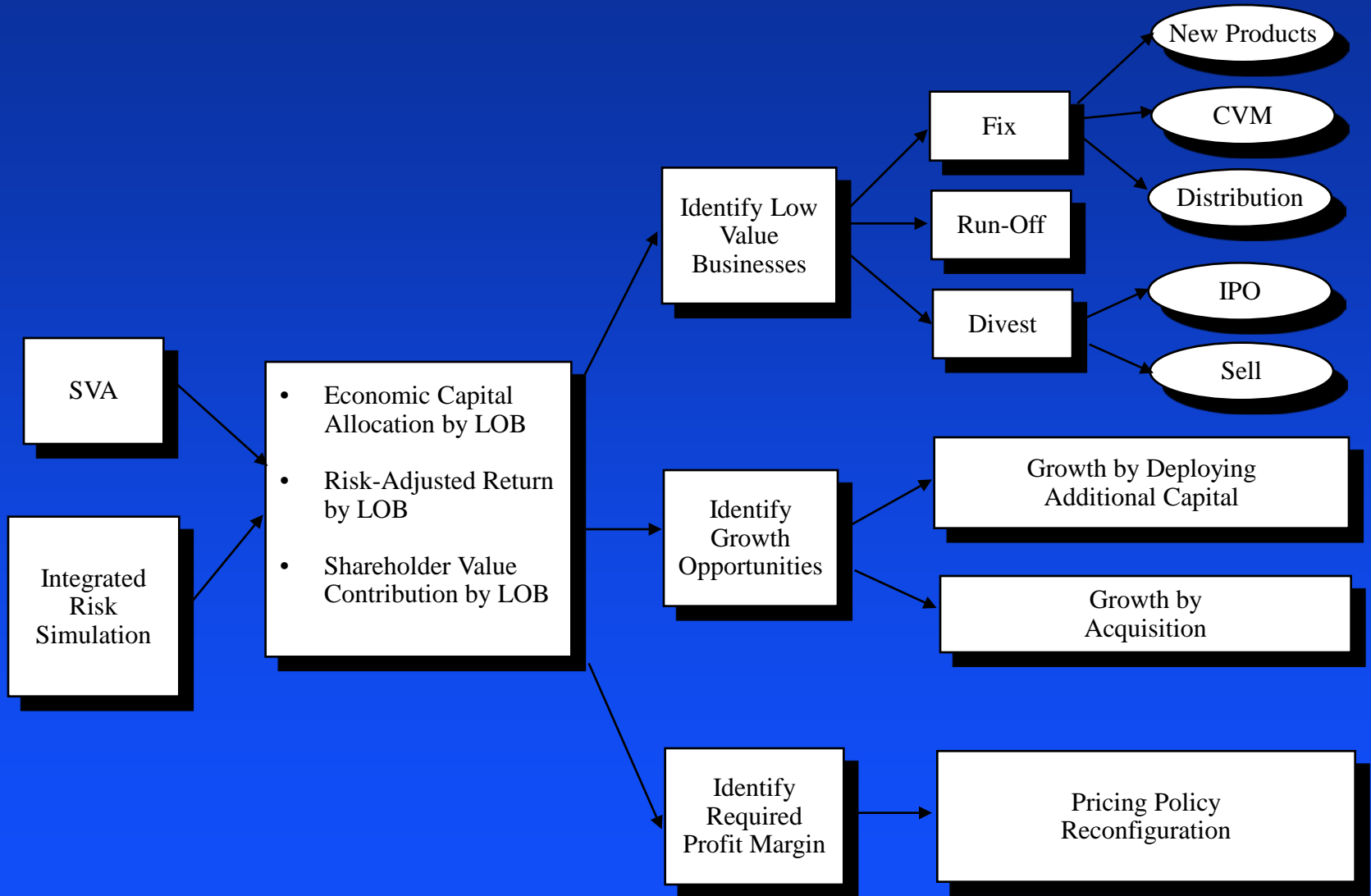
		Product A	Product B	Remarks
1	ROE	20%	13.3%	
2	Firmwide - RR	15%	15%	
3	Economic Capital	$5M	$7.5M	
4	Growth	2%	10%	
5	Market-to-Book	1.53	2.67	1 / (2 - 4)
6	**EVA**	**$250,000**	**-$127,500**	**(1 - 2) * 3**
7	**Contribution of Enterprise Value**	**$7.65M**	**$20.0M**	**3 * 5**

A less profitable product may create more enterprise value if it has strong growth potential.

PREDYCT ANALYTICS

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PREDYCT ANALYTICS

Strategic Options

Flowchart:

- SVA → Economic Capital Allocation by LOB / Risk-Adjusted Return by LOB / Shareholder Value Contribution by LOB
- Integrated Risk Simulation → (same central box)

Central box branches to:
- Identify Low Value Businesses
  - Fix → New Products, CVM, Distribution
  - Run-Off
  - Divest → IPO, Sell
- Identify Growth Opportunities
  - Growth by Deploying Additional Capital
  - Growth by Acquisition
- Identify Required Profit Margin
  - Pricing Policy Reconfiguration

PREDYCT ANALYTICS

Surrogate Analysis

Identifying Surrogates - First Method:

Find surrogates for each lines of business

Usually does not work very well if a company is divided into more than 5 divisions

No perfect match is available, but hope that some imperfections cancel each other out

PREDYCT ANALYTICS

Surrogate Analysis

Identifying Surrogates – Second Method:

Creating Pure-Play Surrogates by Stripping out Unwanted Business

E.g.

A Pure-Play Disability Surrogate is required to estimate the normal P/E ratio. Surrogate 1, however, is 50% Ordinary Life and 50% Disability business.

Observed P/E = 11

| Disability |
| Life |

Implied P/E is then 10 ←

Life Pure-Play's P/E = 12 ←
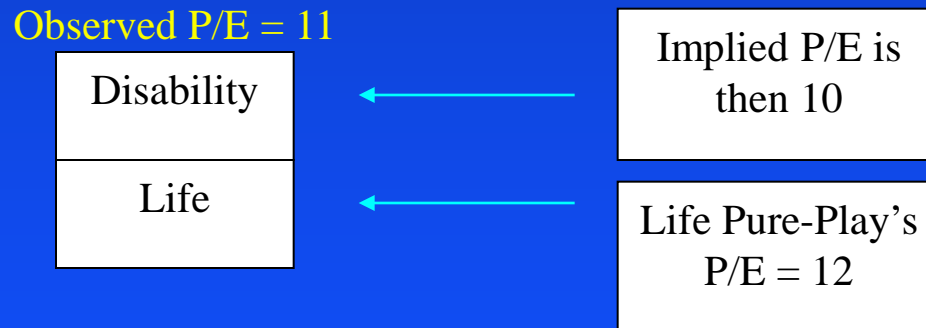
P/E for Life business is observed from pure-play life surrogates. The Life's contribution to P/E ratio is stripped out to obtain a pure-play disability P/E.

PREDYCT ANALYTICS

Surrogate Analysis

Regression Method

Use Regression analysis to estimate the industry average valuation parameters

E.g.
To estimate the industry average Capital/Revenue ratio for Disability. A simple regression as following can be used:

$$\begin{matrix} Co.1 \rightarrow \\ Co.2 \rightarrow \\ \\ Co.n \rightarrow \end{matrix} \begin{bmatrix} Capital \\ Capital \\ \\ Capital \end{bmatrix} = (\frac{Capital}{Revenue})_{Disability} \times \begin{bmatrix} Revenue \\ Revenue \\ \\ Revenue \end{bmatrix}_{Disability} + (\frac{Capital}{Revenue})_{Life} \times \begin{bmatrix} Revenue \\ Revenue \\ \\ Revenue \end{bmatrix}_{Life} + ...$$

The Capital-to-Revenue ratio for Disability is the first regression coefficient for this regression. Predyct also applies a VaR (Predyct ERM) standard* and derives the M/B and P/E ratios using both regression and VaR standards.
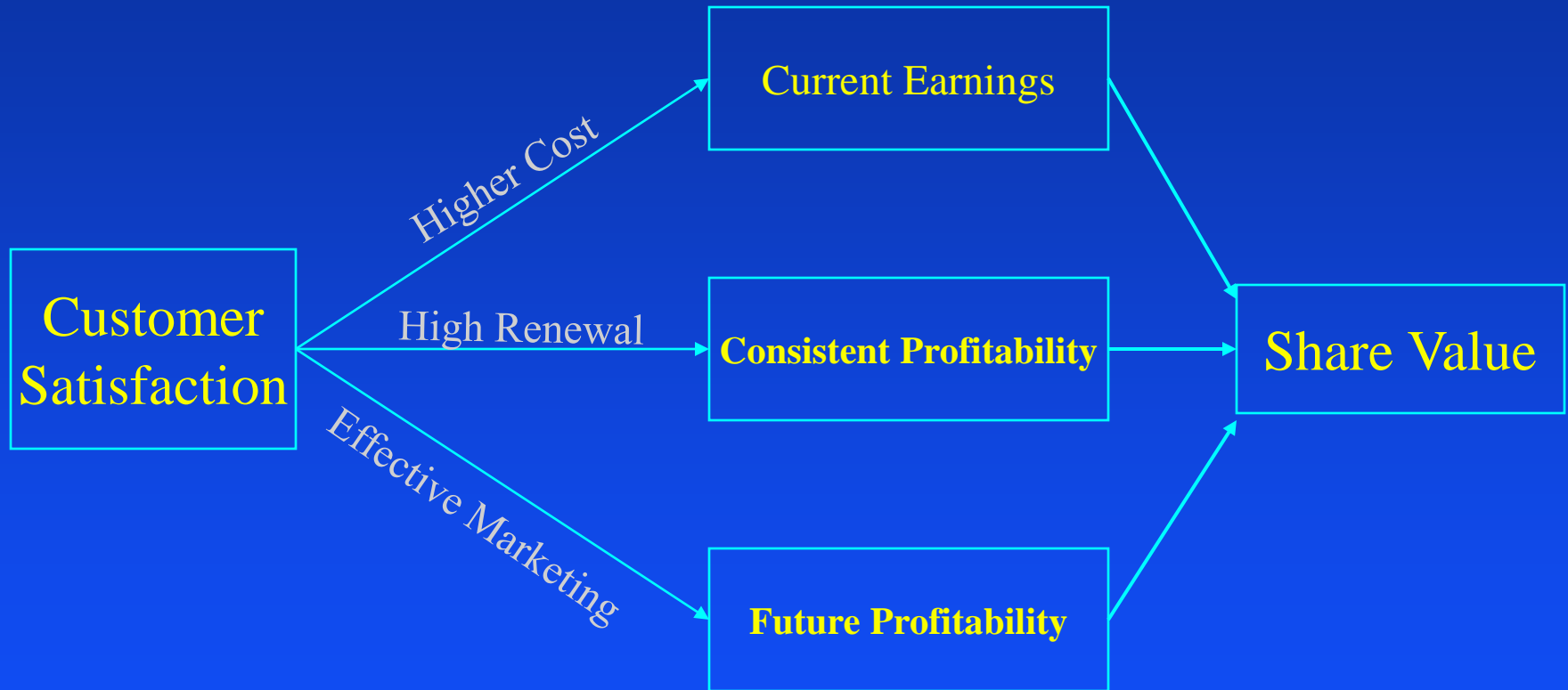*

*VaR simulation is applied to the loss triangles of each line of business and
capital is allocated in accordance with each company's rating. .
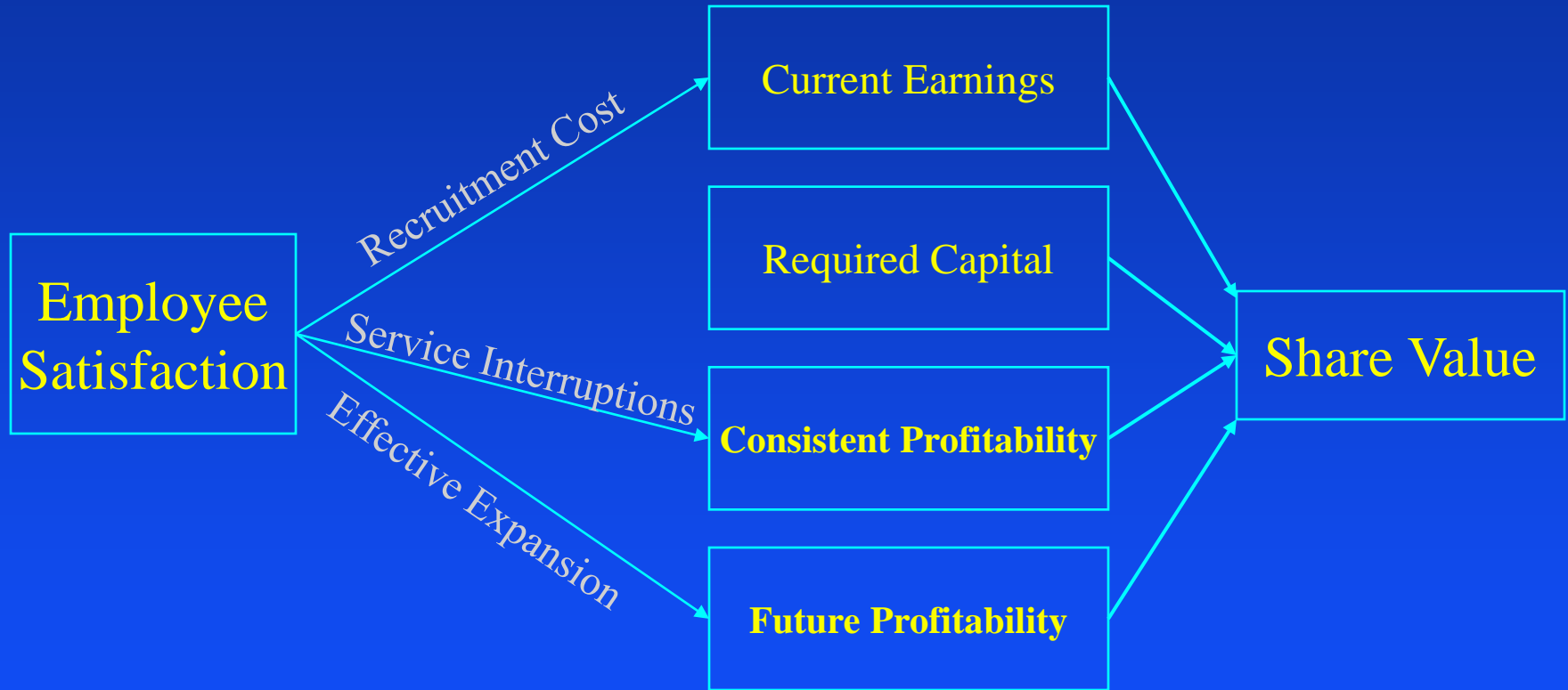
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PREDYCT ANALYTICS

Non Financial Performance Measurement

- **Some performance measures, such as customer and employee satisfaction, are not in the financial statements.**

- **These performance measures drive the company value as much as financial results.**

- **These performance measures are usually incorporated into 'Risk' and 'Growth'**

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PREDYCT ANALYTICS

Every measures that impact company value can be traced through the four value drivers.

Customer Satisfaction

— Higher Cost → **Current Earnings**

— High Renewal → **Consistent Profitability**

— Effective Marketing → **Future Profitability**

→ **Share Value**

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PREDYCT ANALYTICS

Employee Satisfaction also drive company value

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PREDYCT ANALYTICS

The impact of these non-financial measures on the company value should be modeled and incorporated into performance measurement

Company Value

Earnings Growth

Required Return

ROE

Optimal Point

Customer Satisfaction

PREDYCT ANALYTICS
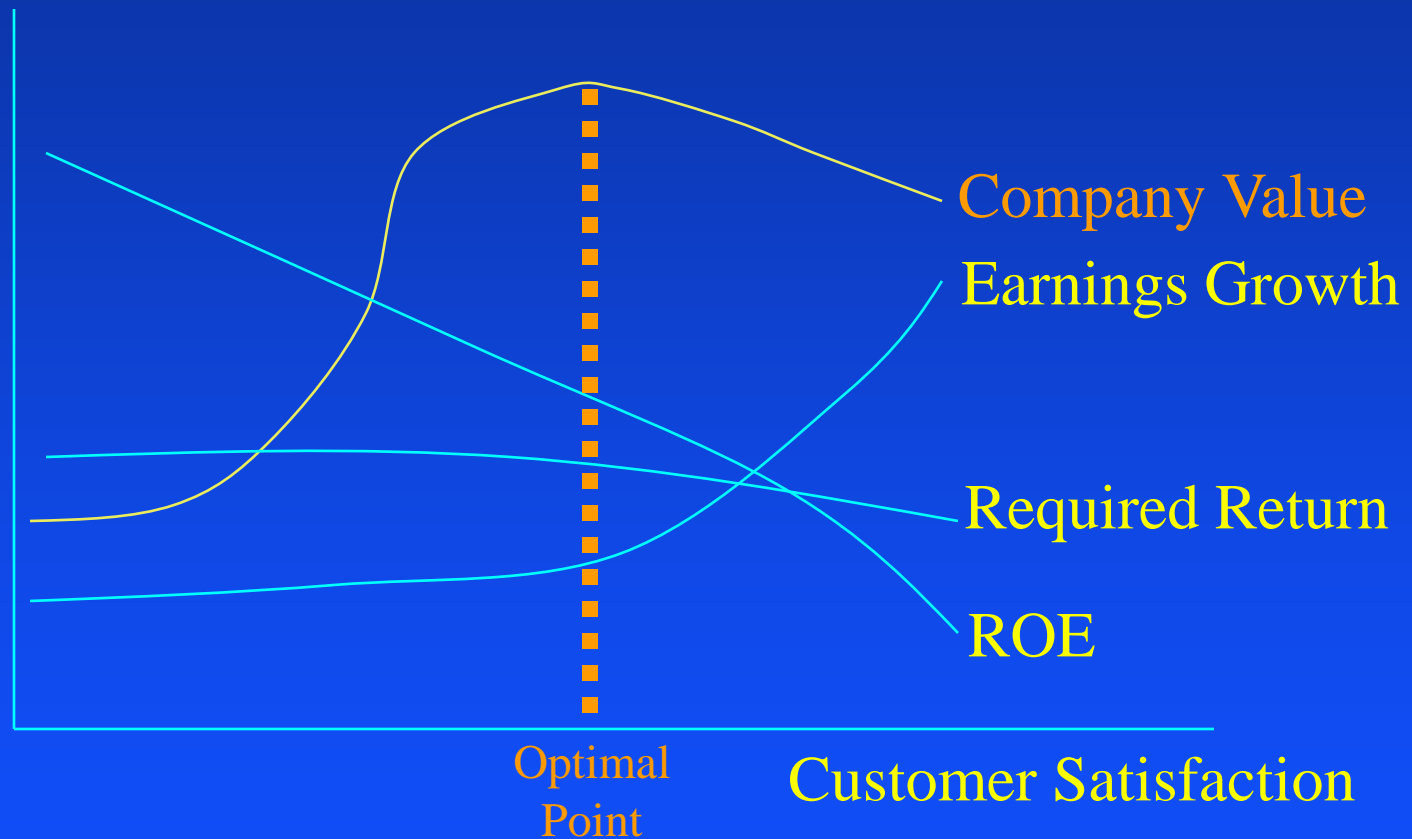
We observe that CAPM does not apply to the insurance companies. CAPM states that high volatility has no impact on a company's value as long as it is not market-related.

Dow Jones	Insurance
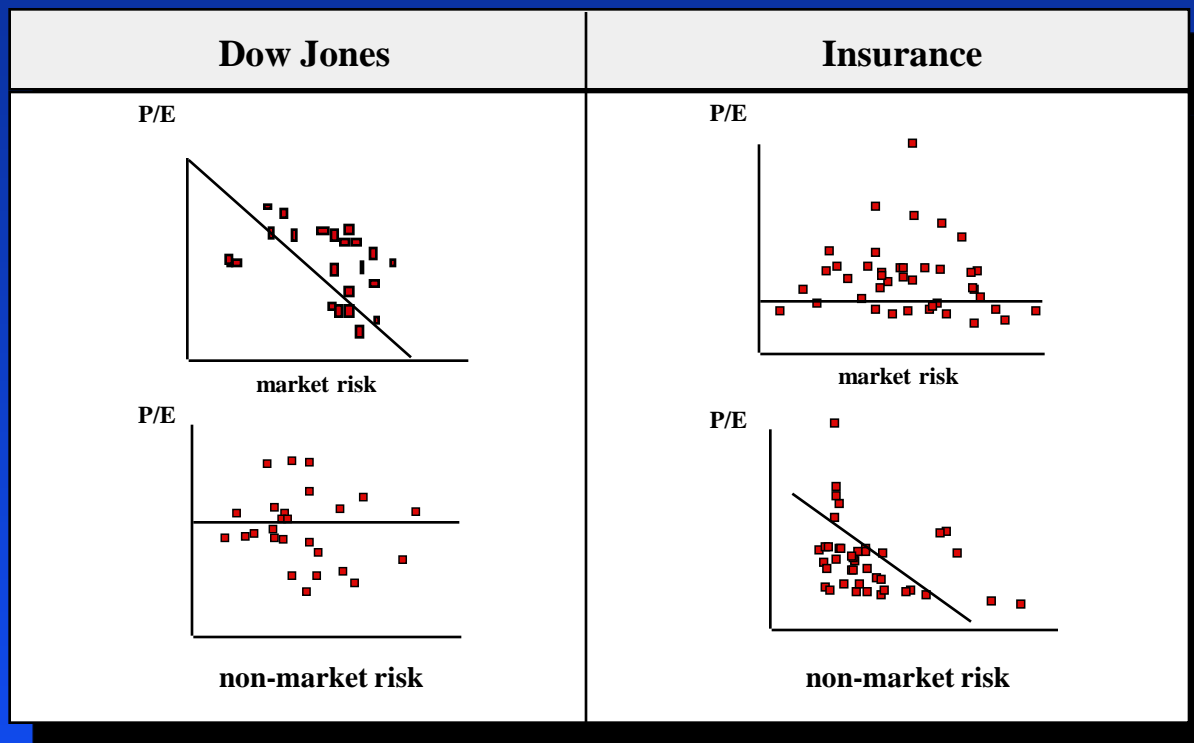
Unlike industrial companies, insurance companies' value are destroyed by non-market risk* rather than by their market risk**.

Non market risk: the risk of the company that is not related to the market, or total risk minus market risk.
** Market risk: the risk of the company that is related to the total market movement
Source: Value Line Dec.1993. Merrill Lynch Betascreen. Seabury Analysis.

PREDYCT ANALYTICS

We also observe that non-market risk affects insurance companies' growth in addition to their costs of capital.
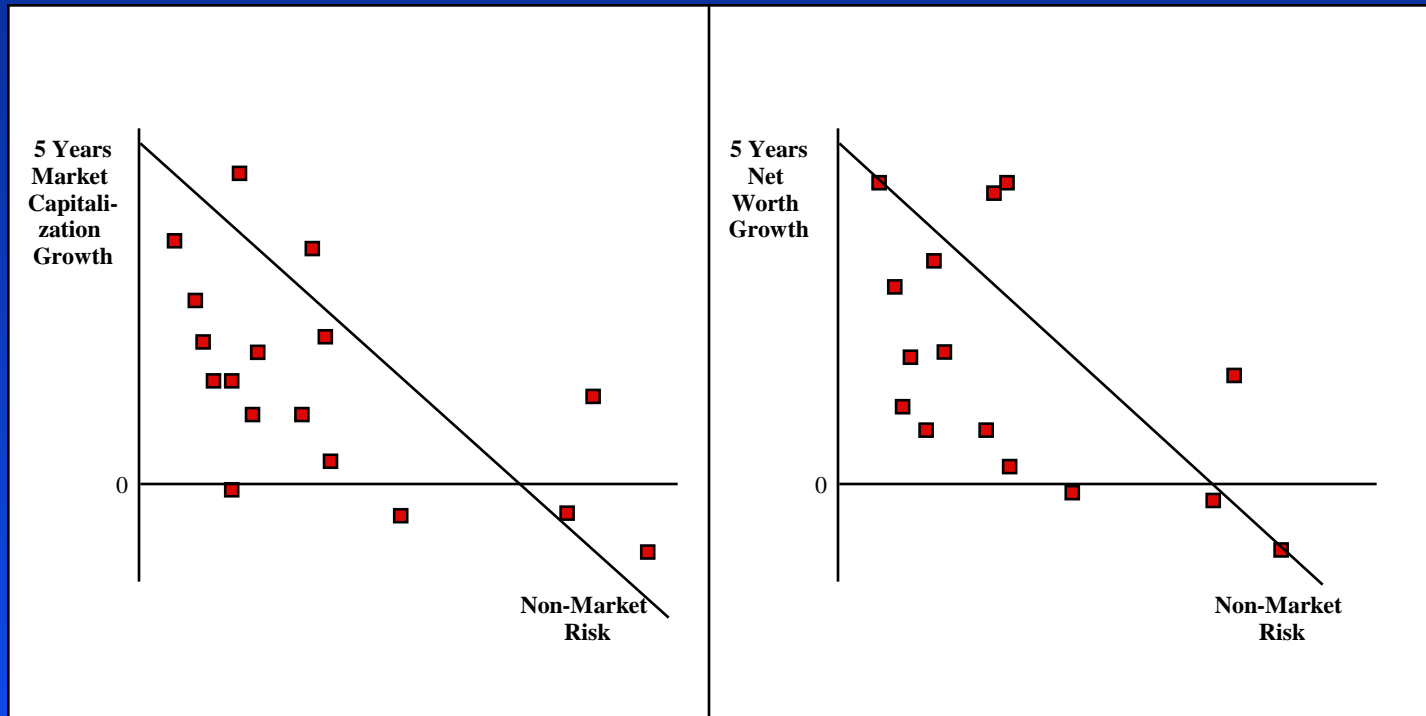
We estimated that using CAPM to estimate cost of equity capital for insurance companies is off-target by 1.7 to 2.6 percentage points. These mistakes appear insignificant but in fact can destroy hundred millions of the enterprise value.

Note: Sample includes insurance companies with total asset more than $500 million in 1988
Source: Valueline. Seabury Analysis.

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PREDYCT ANALYTICS

Notes to Financial Statement

Line #	Notes
1	Assume the face value of the liability to be $10,000
2	Given the expected volatility of cash flow of this LOB, loan department and the treasury, analysis reveals that capital required to support the unexpected loss is 3.3% of liability.
3	Assume the this LOB requires 0.5% of liability as working capital.
4	Line 2 plus line 3.
5	Loan yield.
6	CD rate. Cost of fund for this LOB
7	Interest of capital (in line 4).
8	Front-end loading
9	Administration Expenses
10	Option-adjusted spread represents the present value of the options (such as early withdrawal) that the company granted to its customers.
11	The expected loss this year is credited to the loss reserve account.
12	
13	Assume tax rate is 35%
14	Capital market analysis reveals the required return of the bank's equity capital is 15%. Various methods, including CAPM, APT, and Multi-factor Model are used. 15% of Line 4 is charged as capital expense.
15	Economic Value Added. Net income minus capital cost. Line 13 minus line 14.
16	Return on Equity. Line 13 divided by line 4.
17	
18	The deposit in line 1 plus the interest paid to the CD in line 6.
19	Line 4.
20	Reserve from line 11.
21	Line 13. Assume no dividend payout.
22	

PREDYCT ANALYTICS