Course Summary
Part II

LESE 306

Fall 2010

Business Risk

✓ Risk associated with **price** of the product or products you are producing.

✓ Risk associated with the **unit costs** for the inputs used in producing the product(s).

✓ Risk associated with **yields** (productivity) in production.

✓ All three represent random variables affected by forces external to the firm!
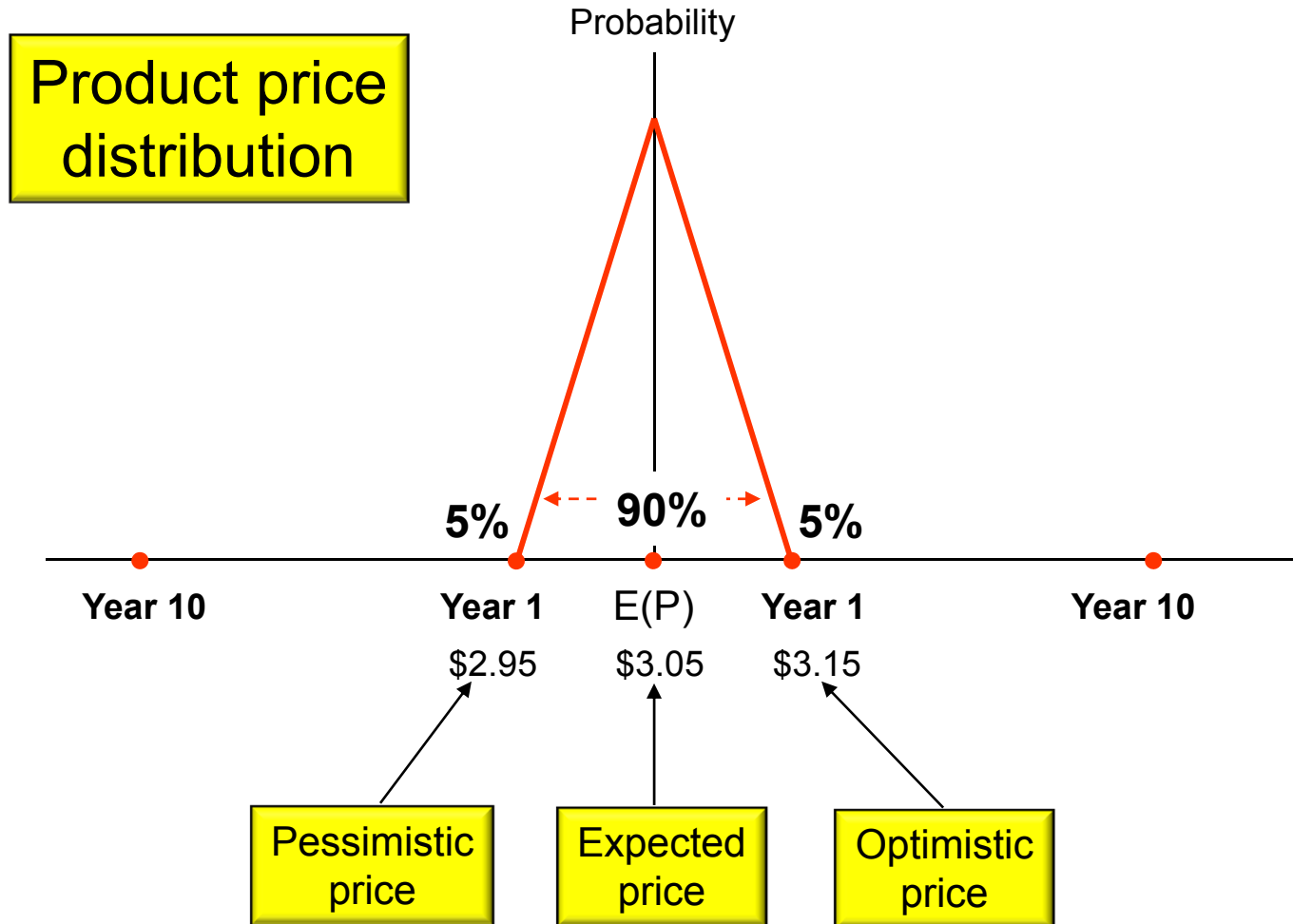
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Business Risk

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✓ Risk associated with the **unit costs** for the inputs used in producing the product(s).

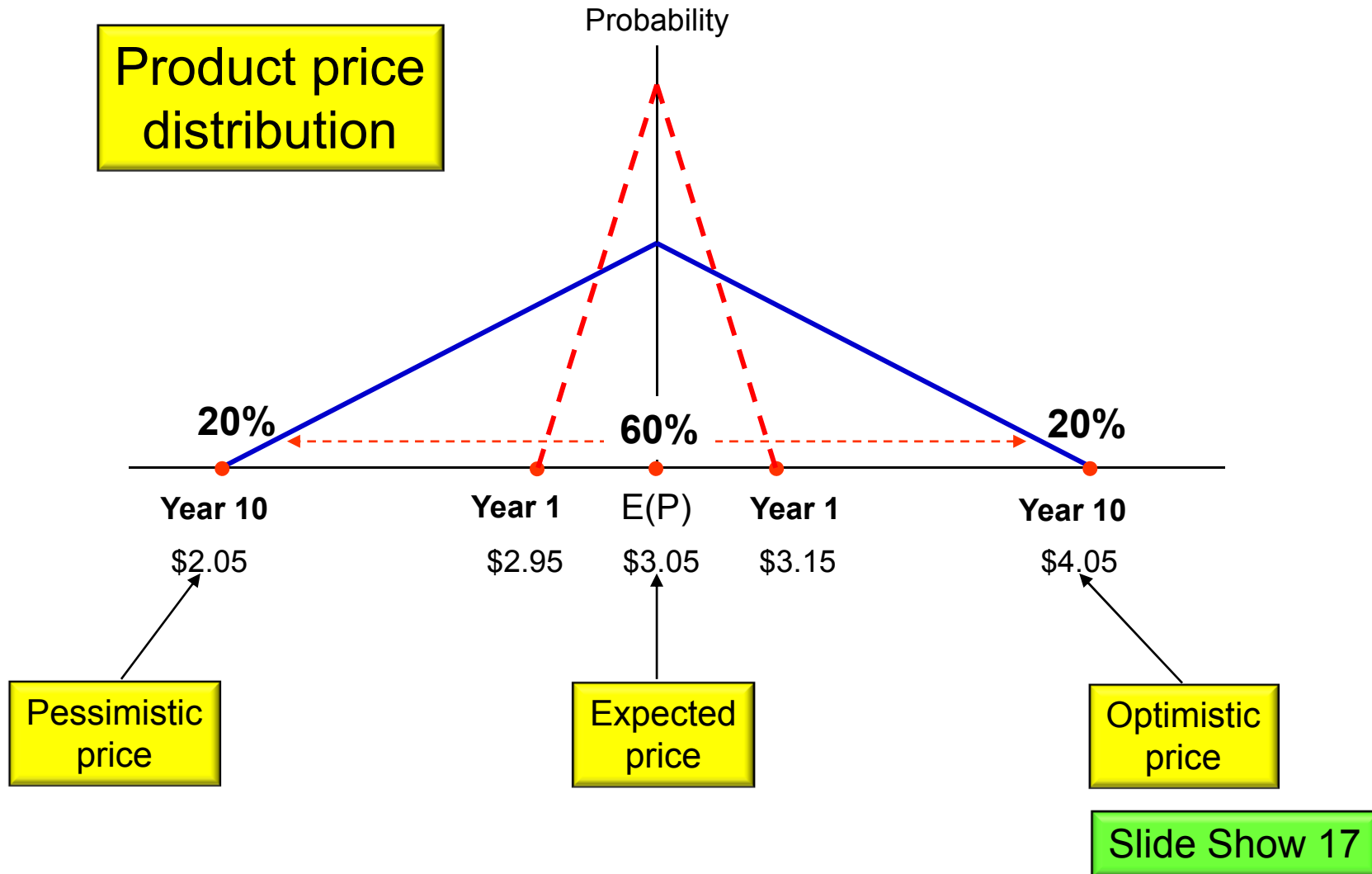✓ Risk associated with **yields** (productivity) in production.

✓ $NCF_i = P_i \times yields_i \times acres - C_i \times unit\ inputs$

Increasing Risk Over Time

Increasing Risk Over Time

Product price distribution

Probability

20%   60%   20%

Year 10   Year 1   E(P)   Year 1   Year 10

$2.05 $2.95 $3.05 $3.15 $4.05

Pessimistic price

Expected price

Optimistic price

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Required Rate of Return

The required rate of return is often referred to as a "hurdle" rate, or the rate of return required by the investor or firm to compensate for the risk associated with a specific investment.
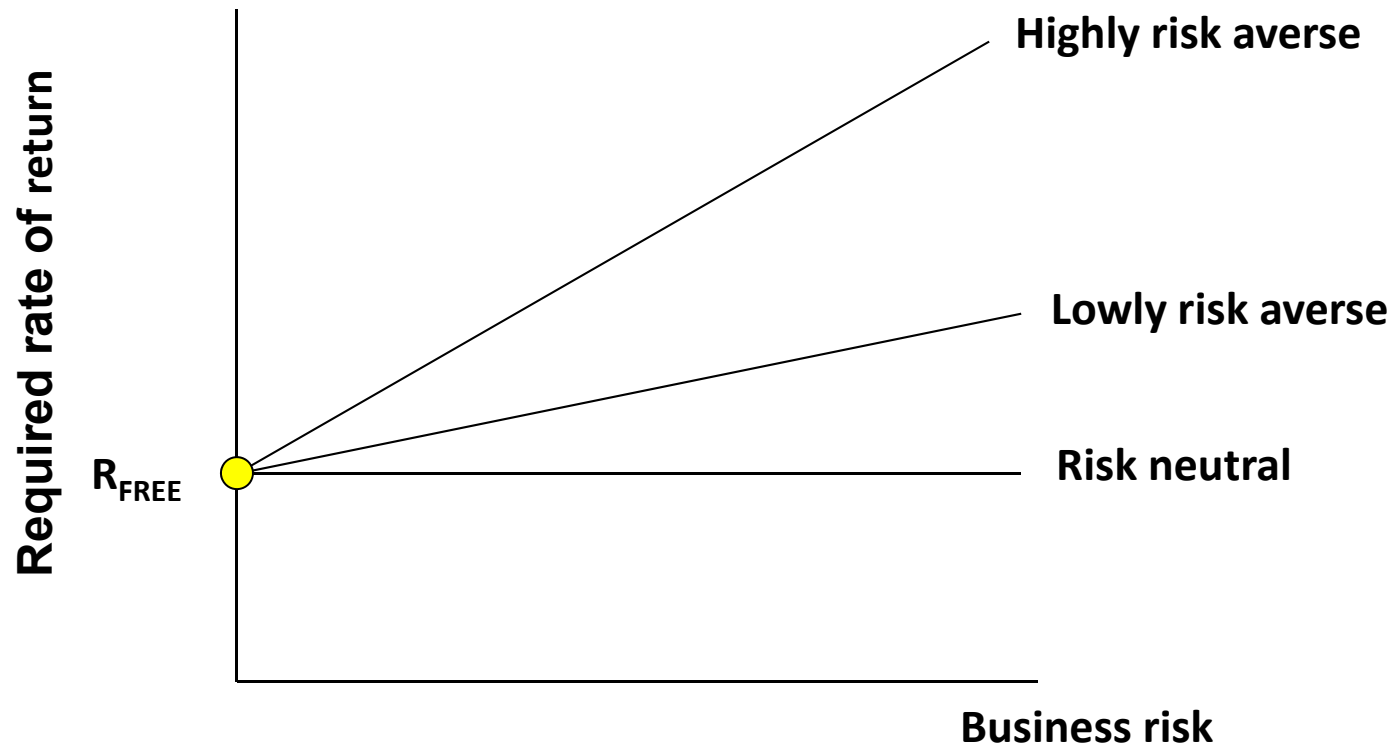
In the case of IRR capital budgeting model we would compare the IRR to the *required rate of return* when assessing the economic feasibility of an investment.

Requiring a risky investment to clear a hurdle above a risk free rate of return
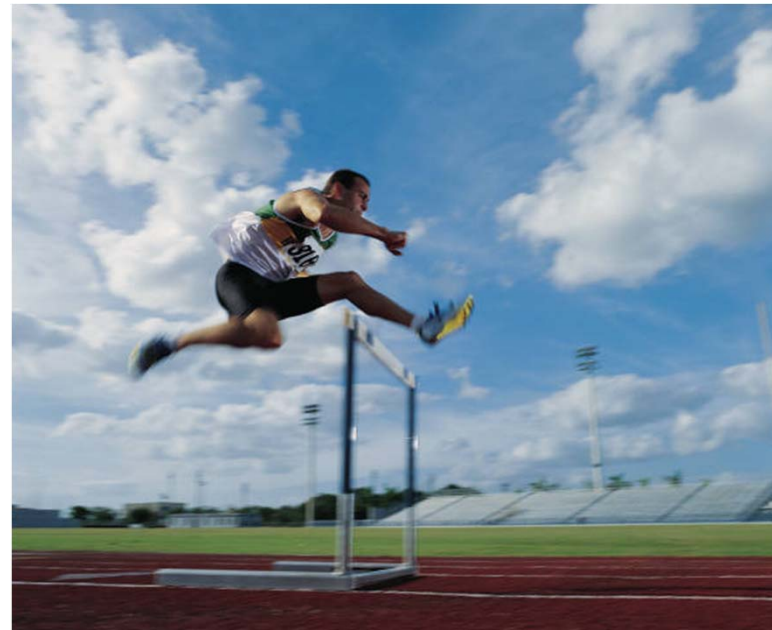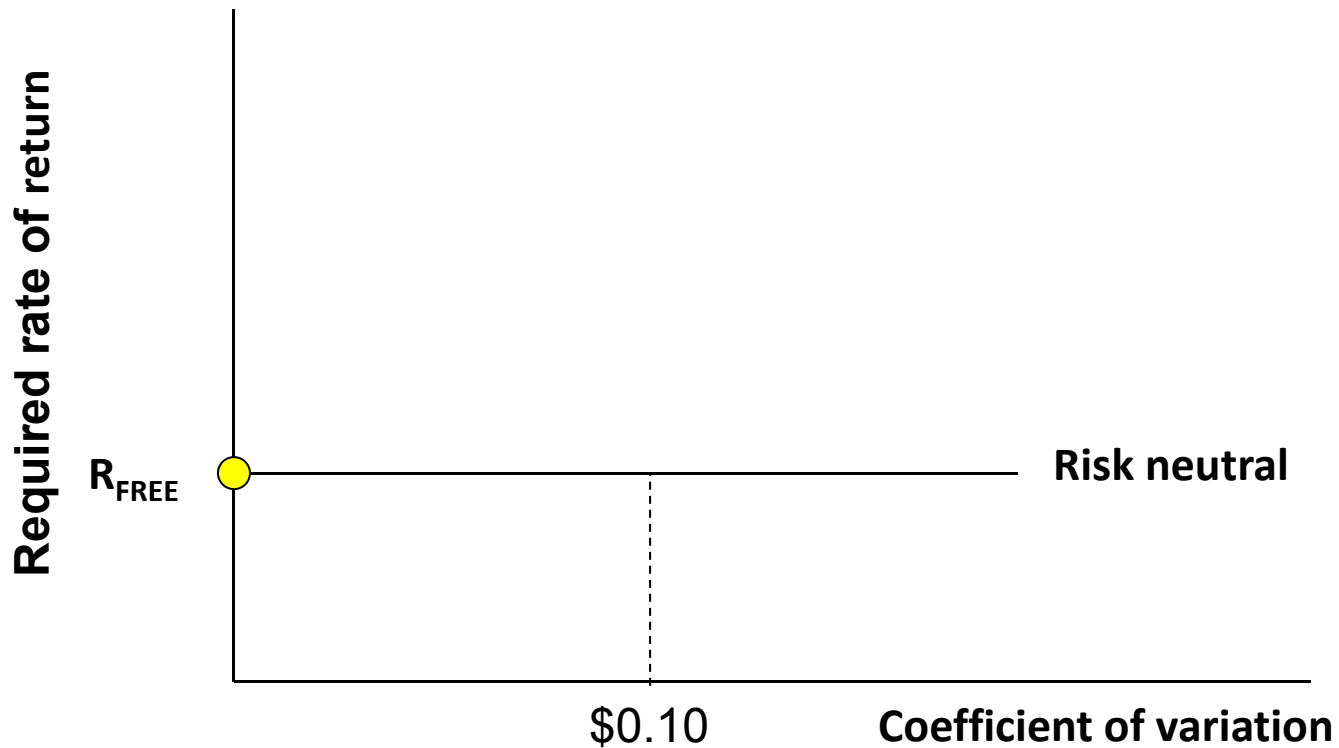
Aversion to Business Risk

Different investors or firms may exhibit different attitudes toward accepting the degree of potential business risk associated with a particular investment.
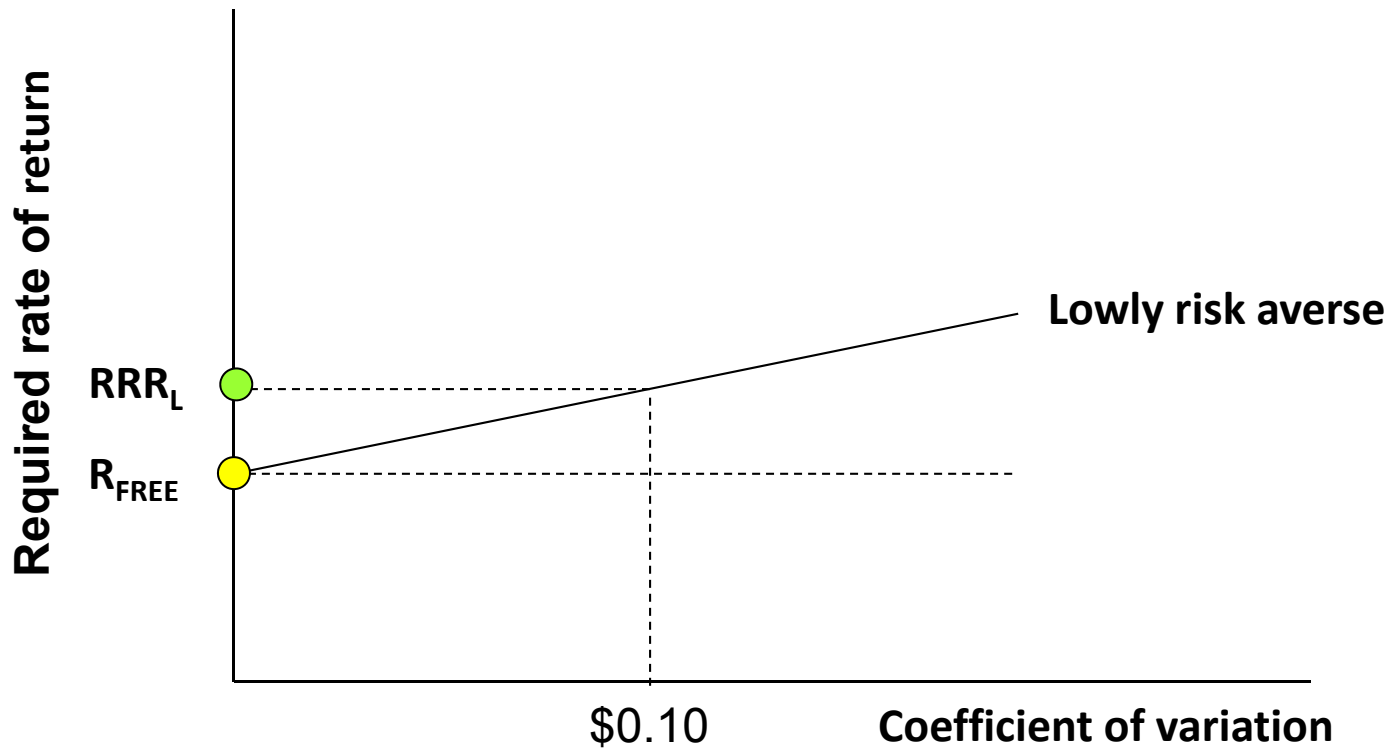
Aversion to Business Risk

A risk neutral investor or firm would use the risk free rate of return (e.g., yield on a government bond) as the required rate of return when evaluating an IRR or computing an NPV.

Aversion to Business Risk

A lowly risk averse investor or firm would use a higher required rate of return (here $0.10 per dollar of expected net cash flow) to compensate for taking this risk. A risk premium of $RRR_L - R_{FREE}$ is added.

Aversion to Busiiness Risk
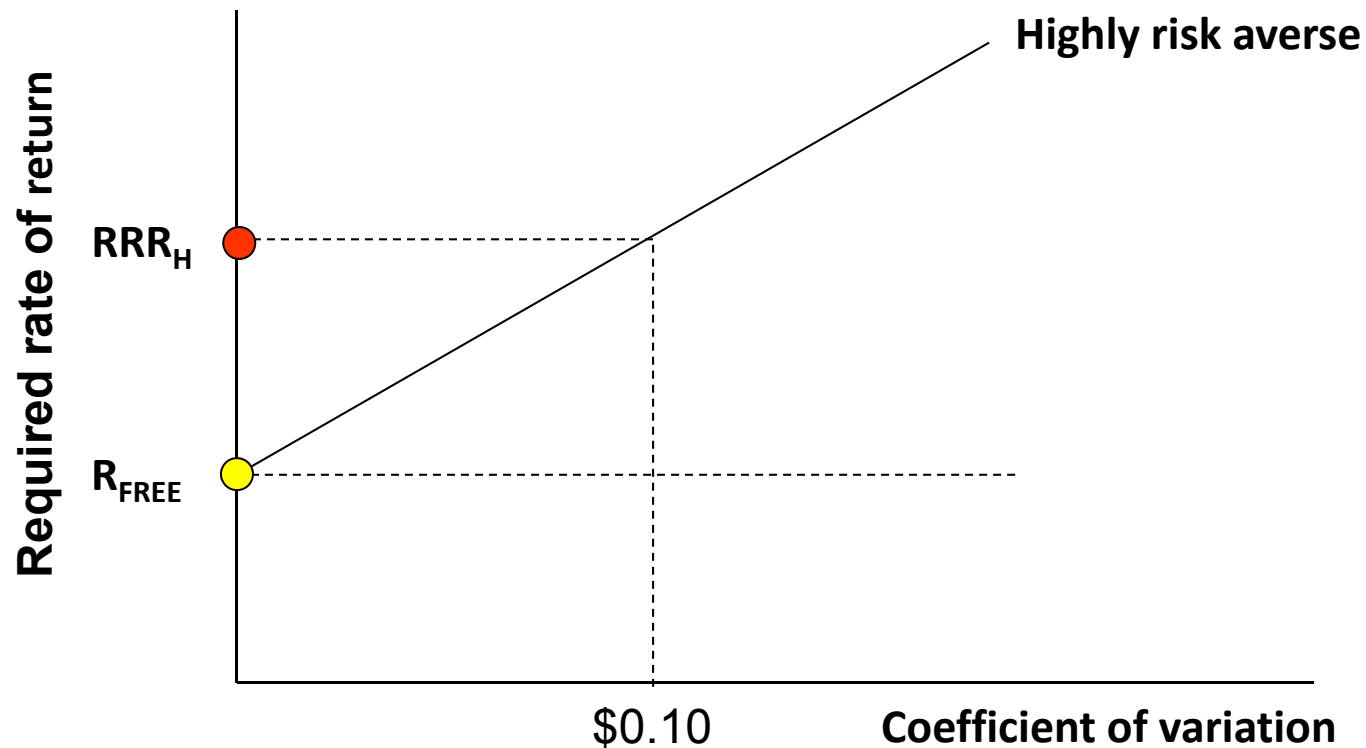
A highly risk averse investor or firm would use an even higher required rate of return to compensate for taking this *same level of risk*. A risk premium of RRR_H-R_{FREE} is added.

Aversion to Business Risk
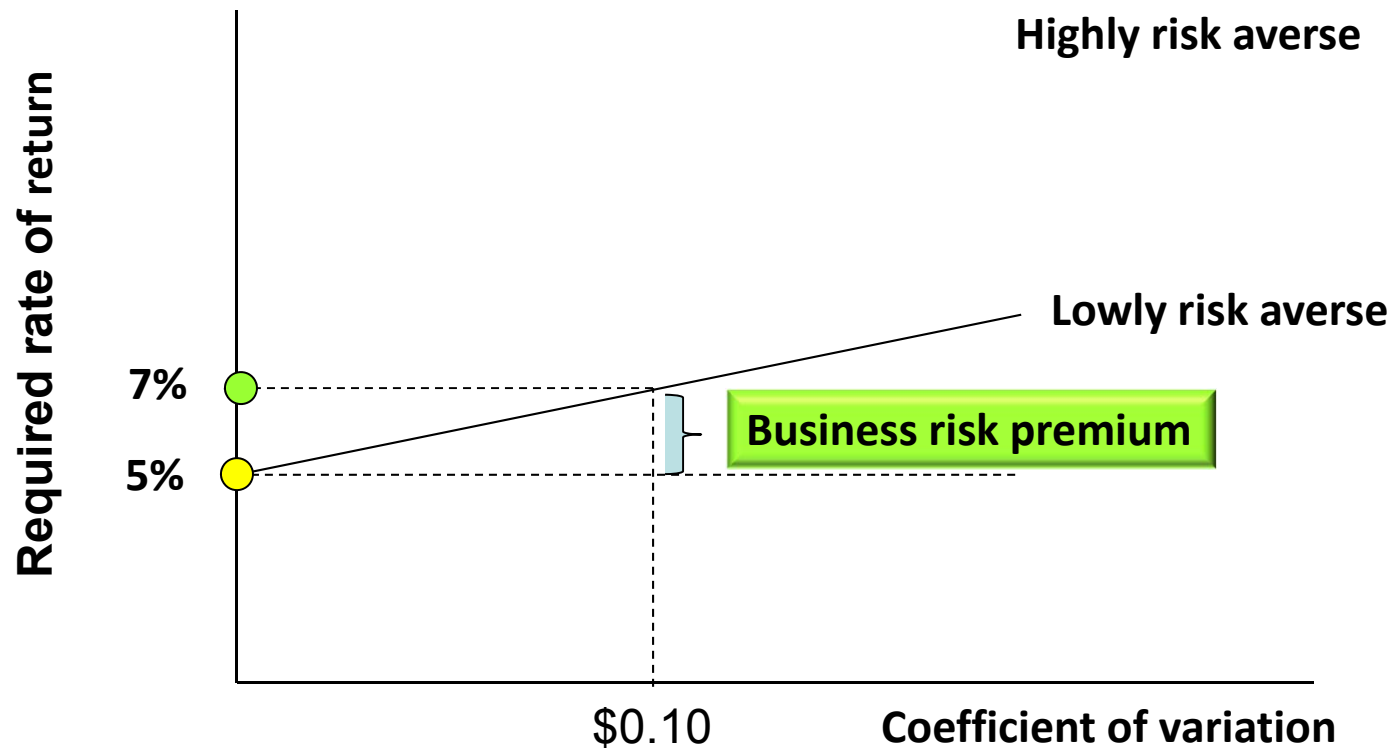
The risk neutral investor would use a RRR of 5% as a hurdle. The lowly risk averse investor would use a RRR of 7% as a hurdle, which includes a 2% business risk premium.

Aversion to Business Risk
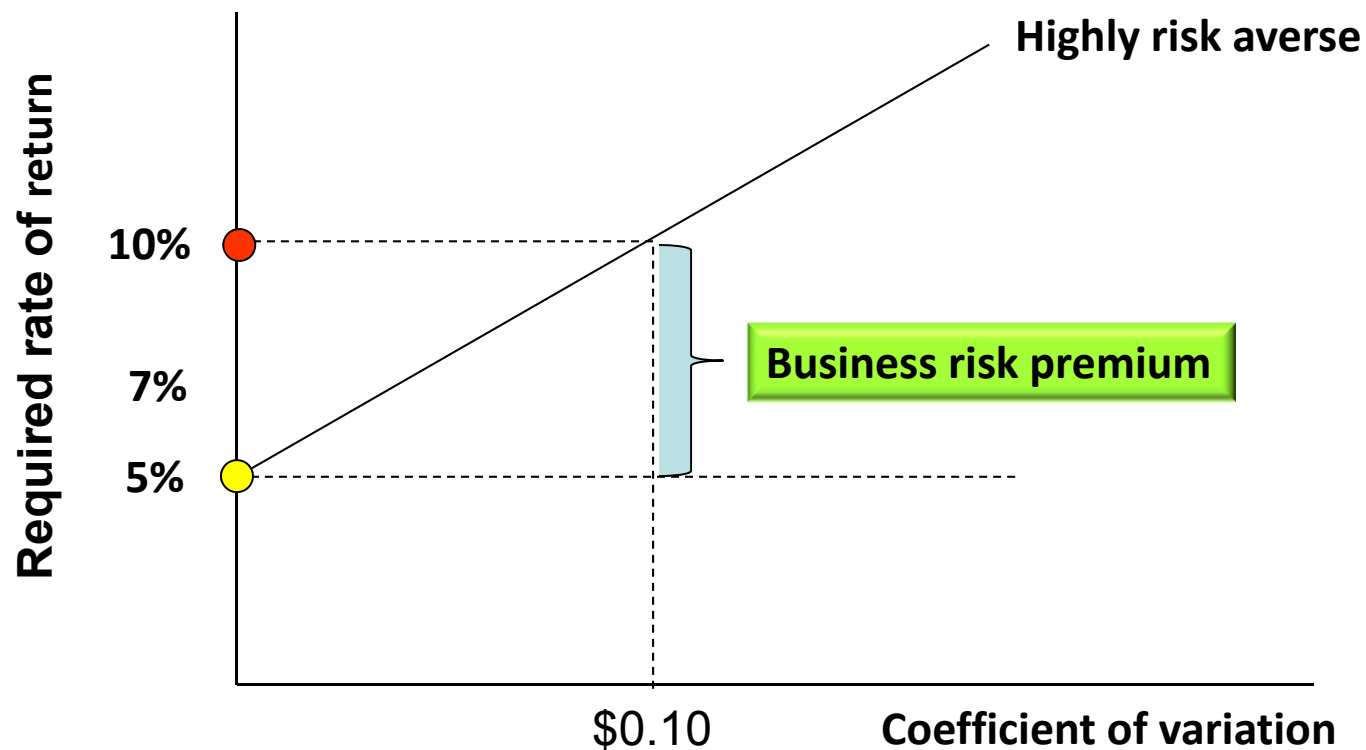
The highly risk averse investor would use a RRR of 10% as a hurdle, which includes *a 5% business risk premium*, or a 3% additional return required over and above that required by the lowly risk investor.

Financial Risk

✓ Risk associated with low used borrowing capacity (remember we captures this in the implicit cost of capital).

✓ Risk associated with increasing explicit cost of debt capital relative to ROA. We discussed this when analyzing the economic growth model:

ROE = [(r − i)L + r](1 − tx)(1 − w)

Aversion to Financial Risk
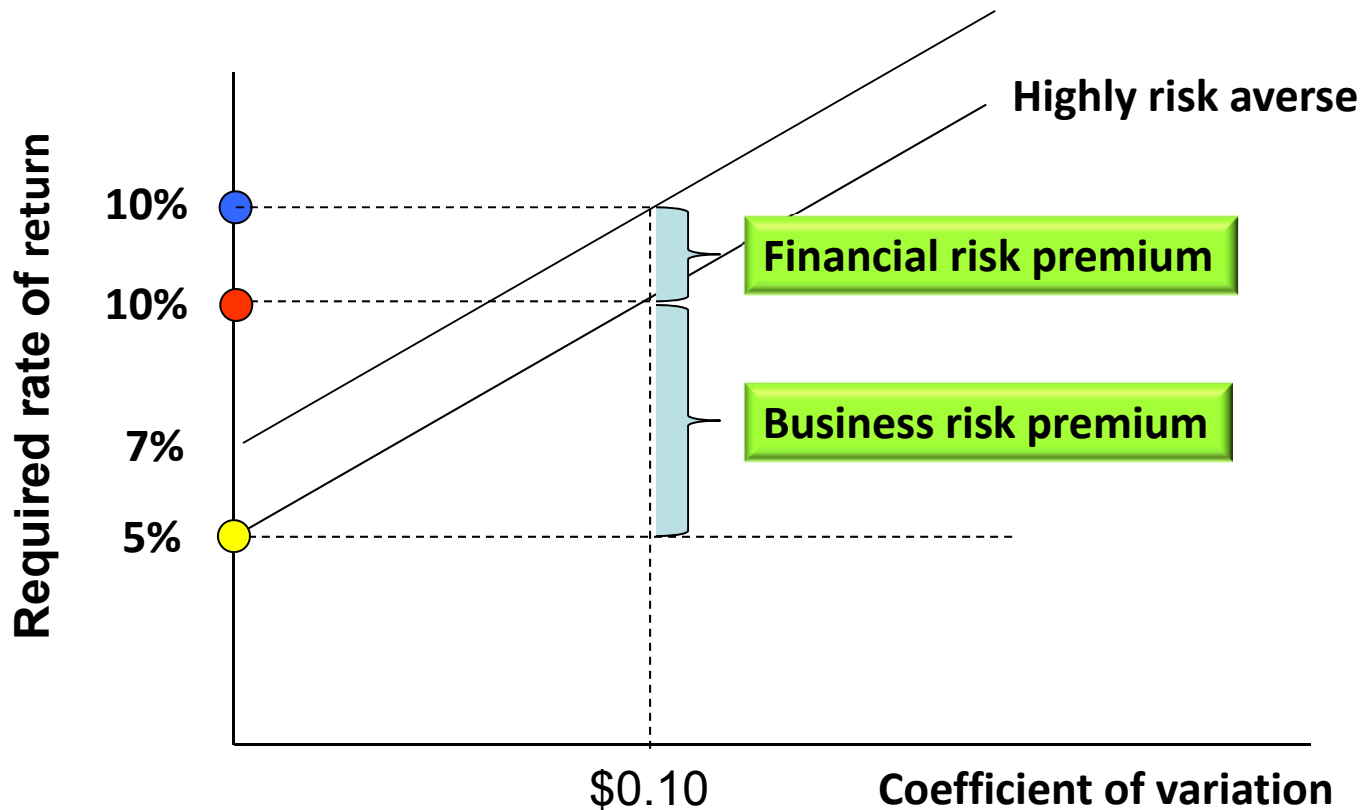
Assuming the case of the highly risk averse investor, an additional financial risk premium to account for exposure to financial risk at high levels of debt or leverage is included. Let's assume it is 2%.

Required Rate of Return

✓ For the purposes of this course, we will measure the annual required rates of return based upon a subjective methods.

✓ Ask yourself what additional return you require above a risk-free rate given your perceived annual business risk.

✓ Ask yourself what additional return you require given existing leverage position.

✓ $RRR_i = R_{free,i} + R_{business,i} + R_{financial,i}$

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Using the RRR

✓ A highly risk averse investor will require an investment clear a higher "hurdle" than required by a lowly risk averse investor.

✓ A risk neutral investor requires *no additional hurdle* when evaluating a risky investment.

✓ Under the internal rate of return capital budgeting model, we would want to see of the IRR > RRR.

✓ Under the net present value capital budgeting model, we use the annual RRR_i to discount the net cash flows and terminal value back to the present to determine if the NPV > 0.

Our Complete NPV Capital Budgeting Model

$$NPV = NCF_1[1/(1+RRR_1)] +$$
$$NCF_2[1/(1+RRR_1)(1+RRR_2)] + ... +$$
$$NCF_n[1/(1+RRR_1)(1+RRR_2)...(1+RRR_n)] +$$
$$T[1/(1+RRR_1)(1+RRR_2)...(1+RRR_n)] -$$
$$tx(T - C)[1/(1+RRR_1)(1+RRR_2)...(1+RRR_n)]$$
$$- C$$

Discounted NCF in year 1

Discounted NCF in year 2

Discounted NCF in year n

Discounted terminal value

Discounted capital gains tax

Original cost of project

Decision rule:

NPV > 0 suggests project is economically feasible

NPV = 0 suggests indifference

NPV < 0 suggests project is economically infeasible

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One Strategy to Minimizing Risk Exposure

Highly Negatively Correlated Net Cash Flows

Net cash flows from the firm's existing production assets

Net cash flows from a new highly negatively correlated enterprise

Annual Net Cash Flows

Time

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The Portfolio Effect

Annual Net Cash Flows (y-axis)

Forecast horizon (x-axis)
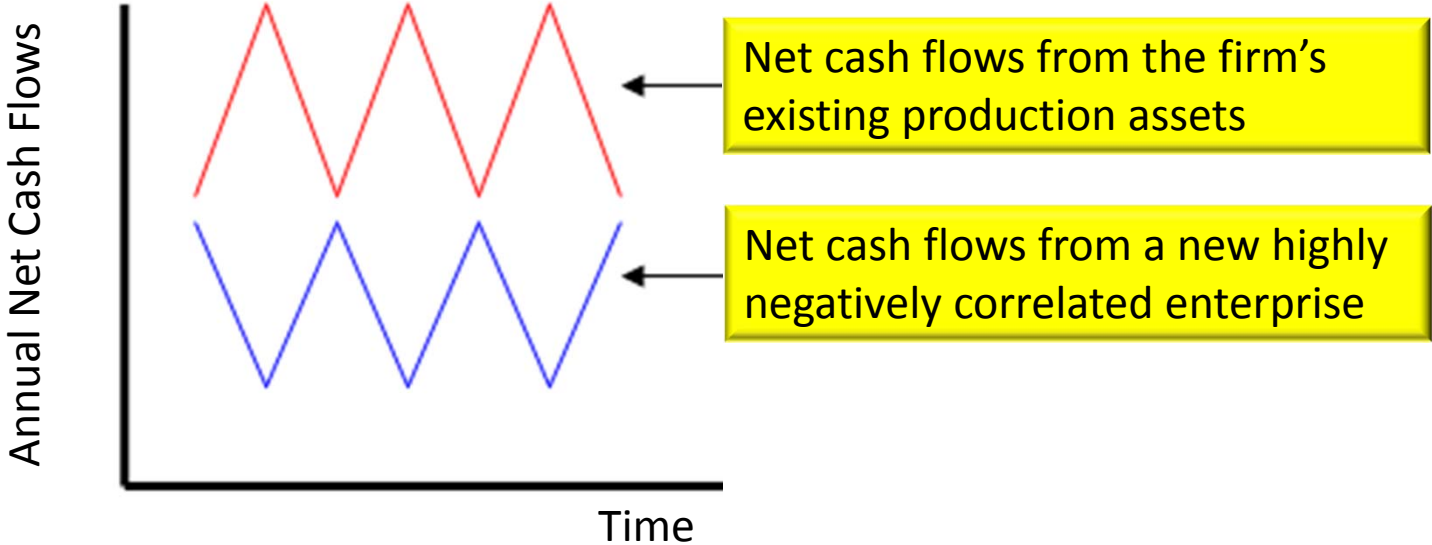
Average annual NCF after making new investment.
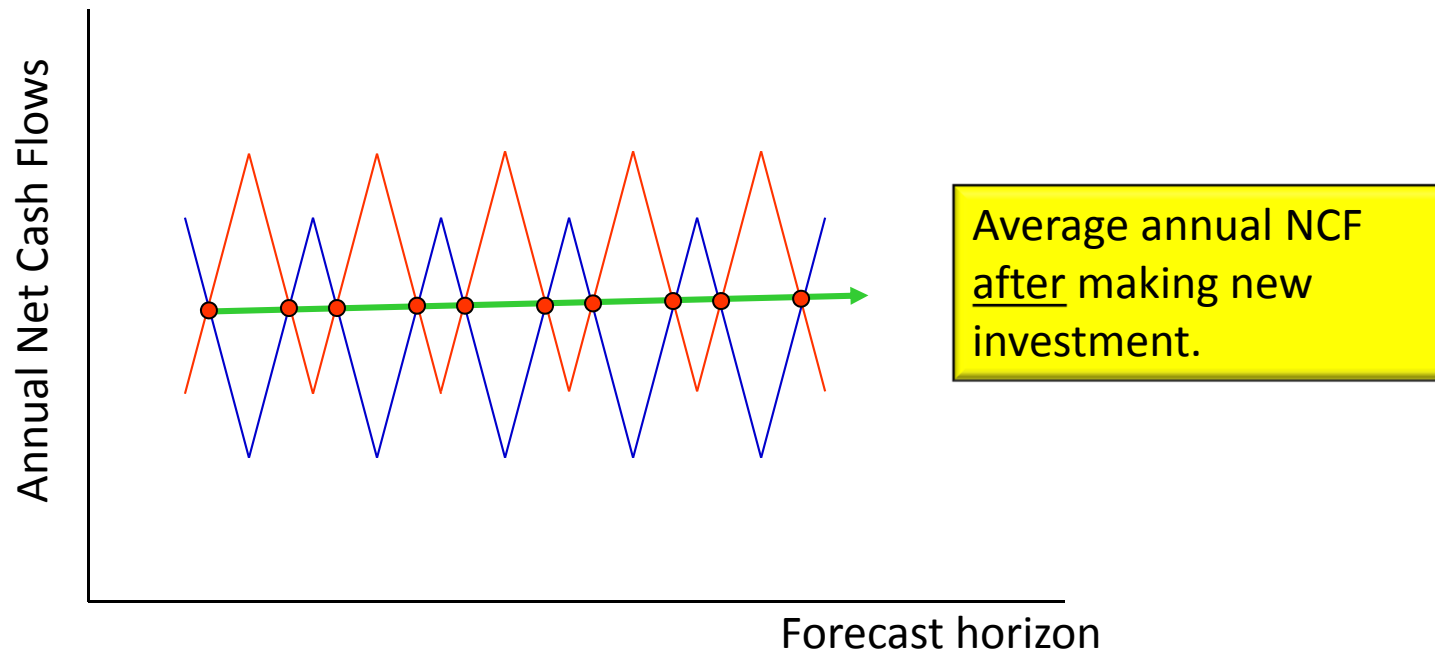
This allows use to lower the business risk premium associated with the calculated the NPV for the new investment project. Exchanging stable profits for lowering exposure to risk.

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Both Sides of the Desk

The borrower:
- Historical, comparative and pro forma analysis
- Cash management
- Line of credit needs
- Enterprise analysis
- Investment planning
- Term loan application
- Planning for long run

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Both Sides of the Desk

The borrower:
- Historical, comparative and pro forma analysis
- Cash management
- Line of credit needs
- Enterprise analysis
- Investment planning
- Term loan application
- Planning for long run

The lender:
- Loan application analysis
- Credit scoring
- Loan pricing for risk
- Loan approval process
- Loan portfolio analysis
- Regulatory oversight
- Lending institutions serving commercial agriculture and rural businesses.

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Financial Intermediation

Farm Credit System

| Investors in bond market | → | Government bond market | → | Farm Credit System entities | → | Farm borrowers |

Commercial Banks
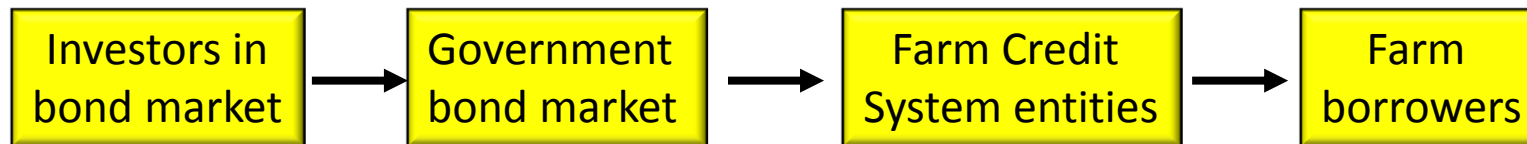
| Individual depositors | → | Commercial banks | → | Farm borrowers |

Definition:
In both instances, financial intermediation transfers savings and investment of others into loan funds borrowed by farmers.

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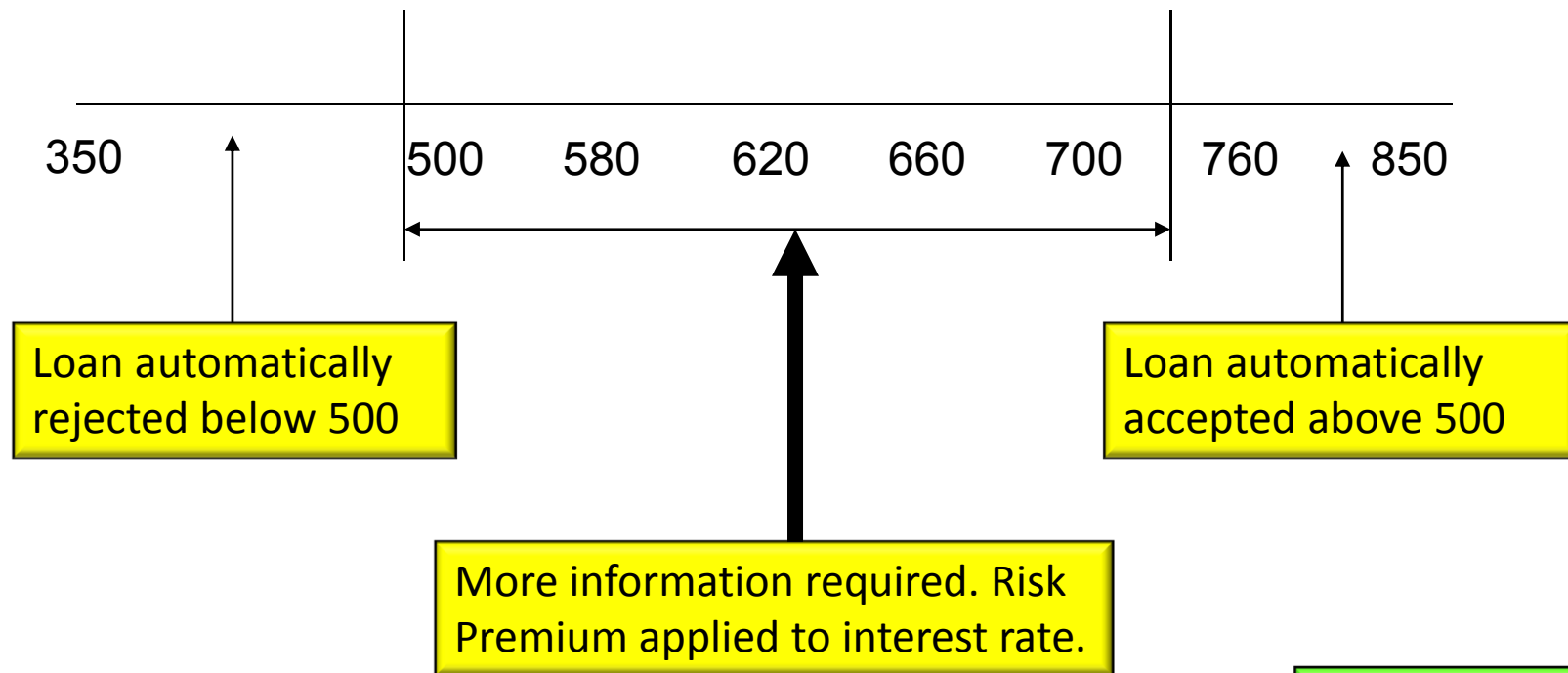
Credit Standards

✓ Lenders use credit scores as a part of its standards when evaluating loan applications.

✓ They will also establish standards related to liquidity, solvency and debt repayment capacity (minimum current ratio of 1.50, maximum debt ratio of 0.50, minimum term debt and capital lease coverage ratio of 1.0).

✓ Lenders also focus on the "Six C's" of assessing a borrower's creditworthiness.

The Six C's of Lending

1. **Character** – assess intention to repay the loan. Responsibility, truthfulness.

2. **Capacity** – legal authority to request loan and sign a contract.

3. **Cash** – asset and cash flow liquidity.

4. **Collateral** – quality assets to provide adequate support for the loan.

5. **Conditions** – economic climate in the customer's industry.

6. **Control** – can changes in the law or regulations adversely affect the customer.

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Score Card Lending Ruler

0   50 | 51   55   60   65   70   75 | 76   82   100

Loan automatically rejected if $\leq$ 50

Loan automatically accepted if > 75

More information required. Risk premium applied to interest rate.

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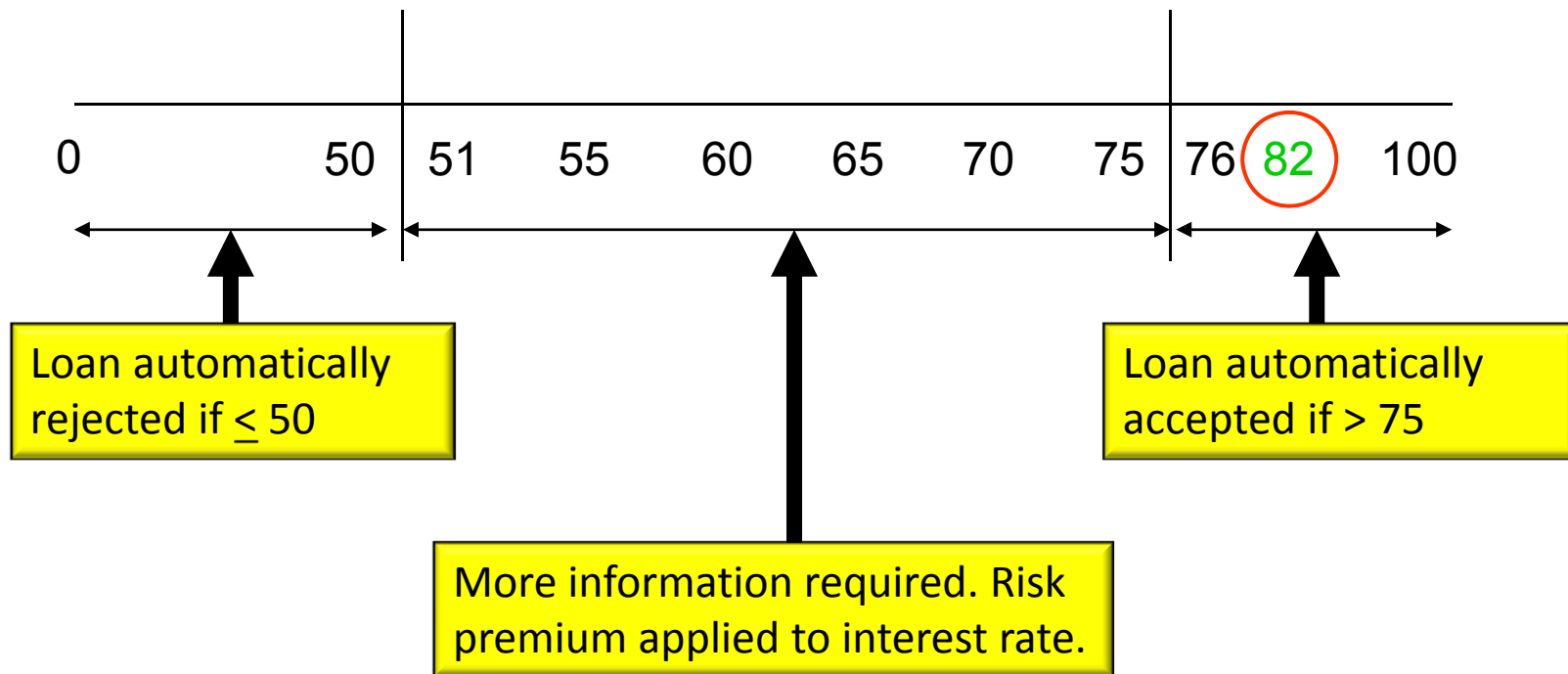
Hypothetical Scorecard

	Weight	Assessment
1. Credit score from credit bureau	15%	___13___
2. Current ratio	15%	___15___
3. Debt ratio	20%	___14___
4. Debt coverage ratio	30%	___25___
5. Other factors"	20%	___15___
a. Continuing customer		
b. Primary commodity		
c. External control factors		
TOTAL SCORE →		___82___

0 ←→ X_1 ←→ X_2 ←→ 100

auto reject   manual review   auto accept
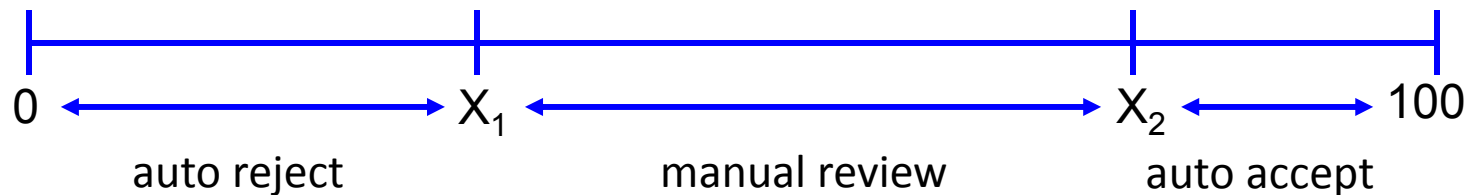
Hypothetical Loan Rates

Bank cost of funds	4.0%
Score > 75	6.0%
Score = 71 – 75	7.0%
Score = 66 – 70	7.5%
Score = 61 – 65	8.0%
Score = 56 – 60	8.5%
Score = 51 – 55	9.0%

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Lending Decisions

✓ You must decide upon your bank's credit standards and weights associated with each of these standards.

✓ You must decide on your credit score card ruler cutoffs.

✓ You must decide on the rates of interest you will charge based upon these scores.

✓ You must decide how much to stress test the loan applications.

What is Stress Testing?

✓ **Ad Hoc stress testing**

    ✓ What is it?

    ✓ Strengths and weaknesses

✓ **Systematic event stress testing**

    ✓ What is it?

    ✓ Strengths and weaknesses

What are the differences?

Ad Hoc Stress Testing

✓ **Assume a change commodity prices**

✓ **Assume a change in input prices**

✓ **Assume a change in land values**

✓ **Assume a change in wages and salaries**

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What are the differences?

Ad Hoc Stress Testing

- ✓ **Assume a change commodity prices**
- ✓ **Assume a change in input prices**
- ✓ **Assume a change in land values**
- ✓ **Assume a change in wages and salaries**

Event Stress Testing

- ✓ **Use projections from econometric models that have significant probability of actually occurring**
- ✓ **Can address "What if" questions associated with potential events**
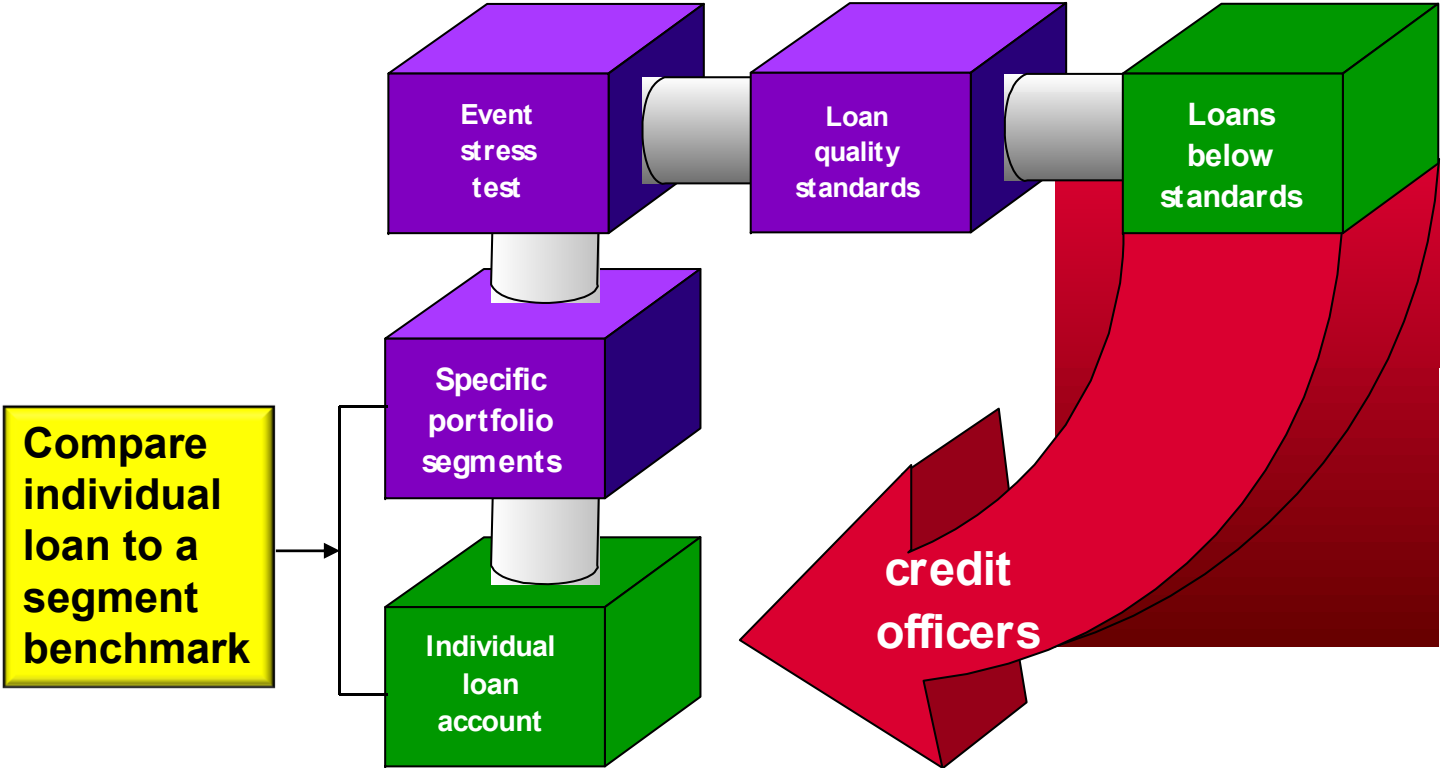
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Portfolio Modeling

✓ Assess portfolio's performance at the segment level using an existing borrower as a representative of the segment.

✓ Identify stress on representative borrower and problem loans within that segment.

✓ Use representative borrowers as benchmarks for evaluating new loan requests.

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Migration of Loans

✓ Portfolios are examined periodically to monitor outstanding loans *falling into lower loan classifications*.

✓ This can be done in a stress testing context by examining the effects of lower net incomes and land values on representative borrowers in each loan segment.

✓ This helps the portfolio manager to stay on top of changing economic conditions in each of these segments.

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Portfolio Analysis Process

Stress segments to identify strengths and weaknesses

Event stress test

Loan quality standards

Loans below standards

Specific portfolio segments

Individual loan account

credit officers

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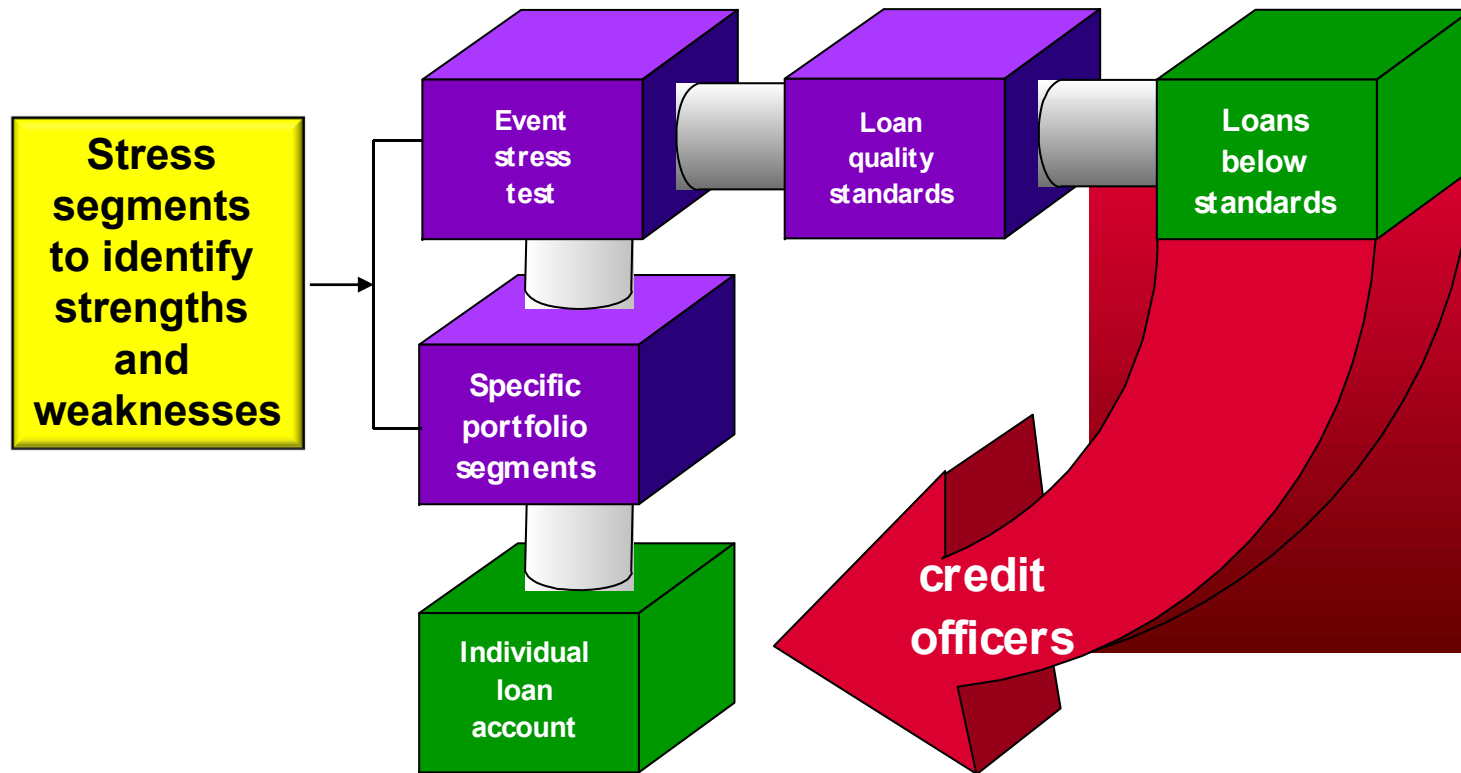
Portfolio Process

Utilize credit standards to assess effects of stress
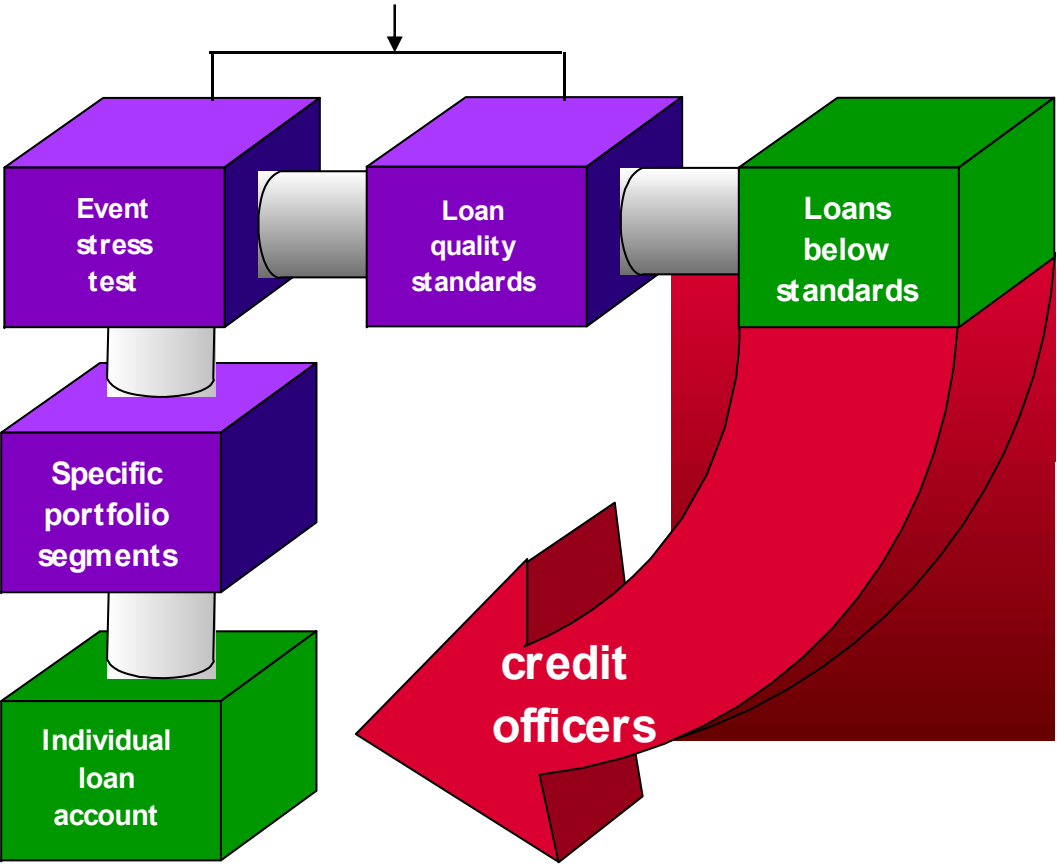
Event stress test

Loan quality standards

Loans below standards

Specific portfolio segments

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Slide Show 20

Portfolio Analysis Process

Event stress test

Loan quality standards

Loans below standards

Specific portfolio segments

credit officers

Individual loan account
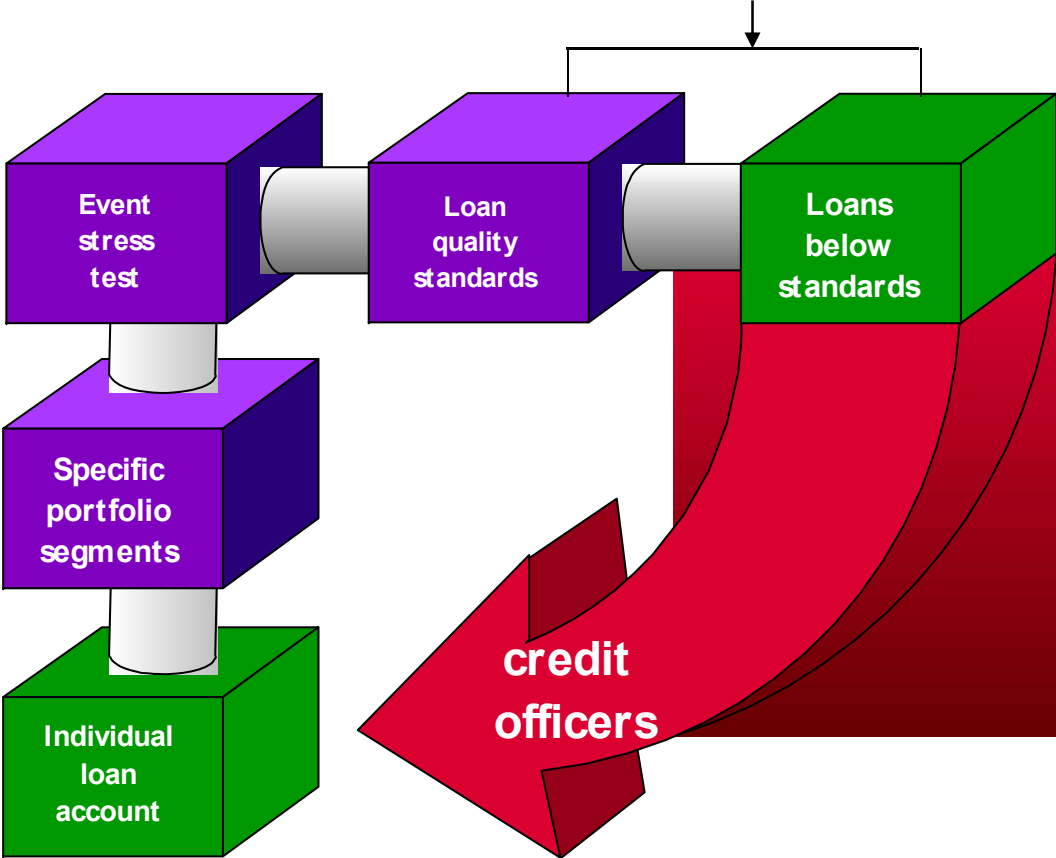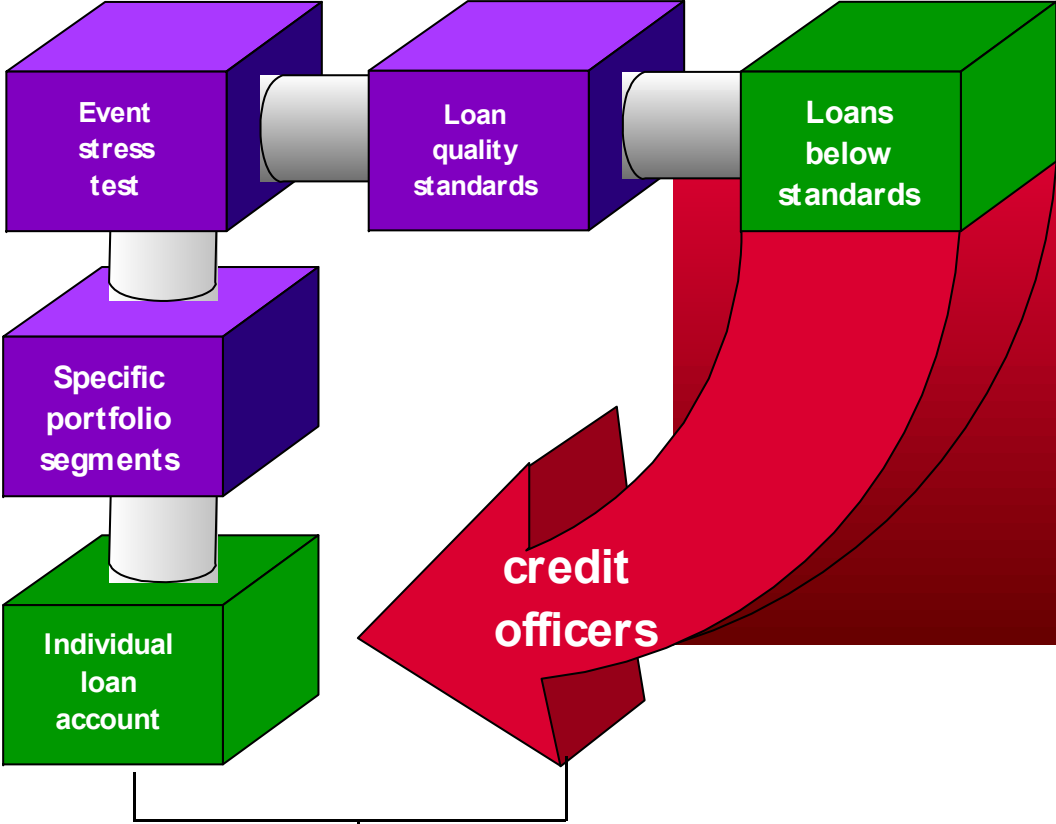
Refer problem loans to individual credit officers for meetings with borrowers

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Triangular Probability Distribution

Querying the Portfolio

Entity size → > 1,000,000

Loan class → Acceptable

Location → Northwest Texas

Farm type → Wheat

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Segment Stress Testing

Most likely scenario:
- Commodity prices
- Input costs
- Yields and disease

Benchmark Model #1

Pessimistic scenarios:
- Commodity prices
- Input costs
- Yields and disease

Measure of liquidity

Measure of solvency

Measure of profitability

Measure of efficiency

Measure of debt coverage

Lender's Credit Standards

Potential Adverse Migration ?

If yes

Follow up action

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Loan Classification Scheme

Accept-able	Special Mention	Sub-standard	Doubtful	Loss

One approach would be to tie the calculated Term Debt and Capital Lease Coverage Ratio (TDCLC) to each of these classes when doing stress testing. For example:

Acceptable = TDCLC $\geq$ 1.25

Special mention = 1.10 $\leq$ TDCLC < 1.25

Substandard = 1.00 $\leq$ TDCLC < 1.10

Doubtful = 0.90 < TDCLC < 1.00

Loss = TDCLC < 0.90

Impact of Stress on EBIT

Crop	Baseline
Crop #1	$2,982
Crop #2	$3,852
Crop #3	$4,288
TDCLC ratio	2.25

Let's look at the following case example of a farm producing three crops…

The baseline scenario reflects no shocks to yields, prices and costs. The last row represents the term debt and capital lease coverage ratio, or the ability of the borrower to cover scheduled term debt and capital lease payments after withdrawals for family living expenses.

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Impact of Stress on EBIT

Crop	Baseline	Shock #1
		Yield↓ 10%
		Price↑ 5%
		Cost↑ 10%
Crop #1	$2,982	$1,526
Crop #2	$3,852	$3,197
Crop #3	$4,288	$3,697
TDCLC ratio	2.25	1.41

The baseline scenario reflects no shocks to yields, prices and costs. The last row represents the term debt and capital lease coverage ratio, or the ability of the borrower to cover scheduled term debt and capital lease payments after withdrawals for family living expenses.

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Impact of Stress on EBIT

Crop	Baseline	Shock #1	Shock #2
		Yield↓ 10%	Yield↓ 5%
		Price↑ 5%	Price↓ 5%
		Cost↑ 10%	Cost↑10%
Crop #1	$2,982	$1,526	$1,785
Crop #2	$3,852	$3,197	$3,549
Crop #3	$4,288	$3,697	$4,042
TDCLC ratio	2.25	1.41	1.82

The baseline scenario reflects no shocks to yields, prices and costs. The last row represents the term debt and capital lease coverage ratio, or the ability of the borrower to cover scheduled term debt and capital lease payments after withdrawals for family living expenses.

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Impact of Stress on EBIT

Crop	Baseline	Shock #1	Shock #2	Shock #3
		Yield↓ 10%	Yield↓ 5%	Yield↓ 5%
		Price↑ 5%	Price↓ 5%	Price ↓ 5%
		Cost↑ 10%	Cost↑10%	Cost↑10%
Crop #1	$2,982	$1,526	$1,785	$1,316
Crop #2	$3,852	$3,197	$3,549	$2,912
Crop #3	$4,288	$3,697	$4,042	$3,418
TDCLC ratio	2.25	1.41	1.82	1.07

The baseline scenario reflects no shocks to yields, prices and **Substandard** sents the term debt and capital lease coverage ratio, or the ability of the borrower to cover scheduled term debt and capital lease payments after withdrawals for family living expenses.

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Impact of Stress on EBIT

Crop	Baseline	Shock #1	Shock #2	Shock #3	Shock #4
		Yield↓ 10%	Yield↓ 5%	Yield↓ 5%	Yield↓15%
		Price↑ 5%	Price↓ 5%	Price ↓ 5%	Price↑ 5%
		Cost↑ 10%	Cost↑10%	Cost↑10%	Cost↑10%
Crop #1	$2,982	$1,526	$1,785	$1,316	$1,267
Crop #2	$3,852	$3,197	$3,549	$2,912	$2,844
Crop #3	$4,288	$3,697	$4,042	$3,418	$3,352
TDCLC ratio	2.25	1.41	1.82	1.07	0.99

The baseline scenario reflects no shocks to yields, prices and costs. The last row **Doubtful** the term debt and capital lease coverage ratio, or the ability of the borrower to cover scheduled term debt and capital lease payments after withdrawals for family living expenses.

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Use of Benchmarks

✓ Evaluate all farms falling below benchmark borrower under a baseline scenario.

✓ Evaluate the impacts of adverse scenarios on the representative or benchmark borrowers based on the assumption that they are representative of a particular segment.

✓ This can be done by examining the effects of potential adverse trends in key random variables (i.e., commodity prices, yields per acre and unit costs of production).

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