Benchmark Analysis

LESE 306
Fall 2010

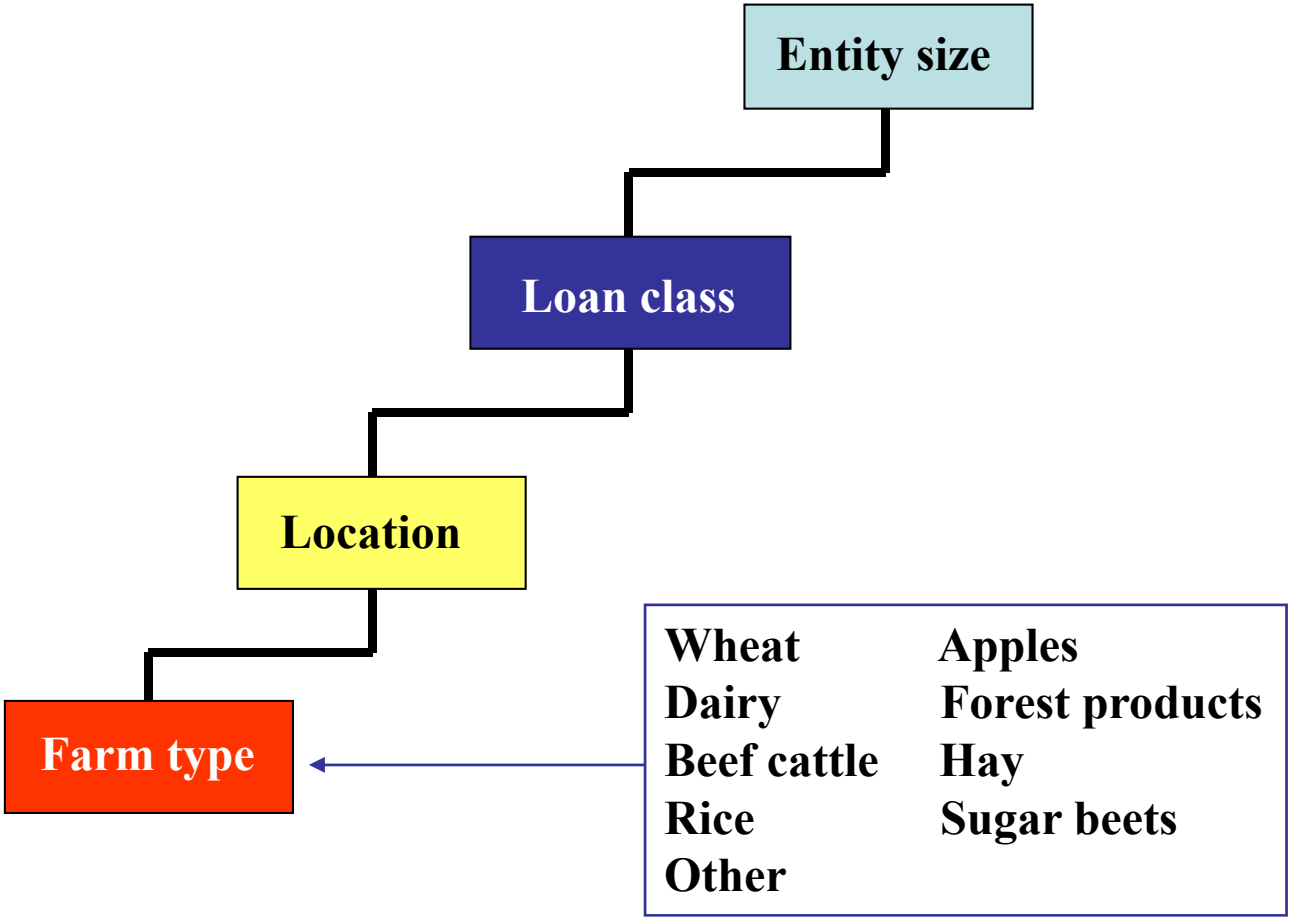
What is it?

- ✓ Benchmarks analysis is a simpler or “poor man’s” version of data mining.
- ✓ Represents a “acceptable” borrower in a specific segment.
- ✓ Basis for comparison with other borrowers in the segment.

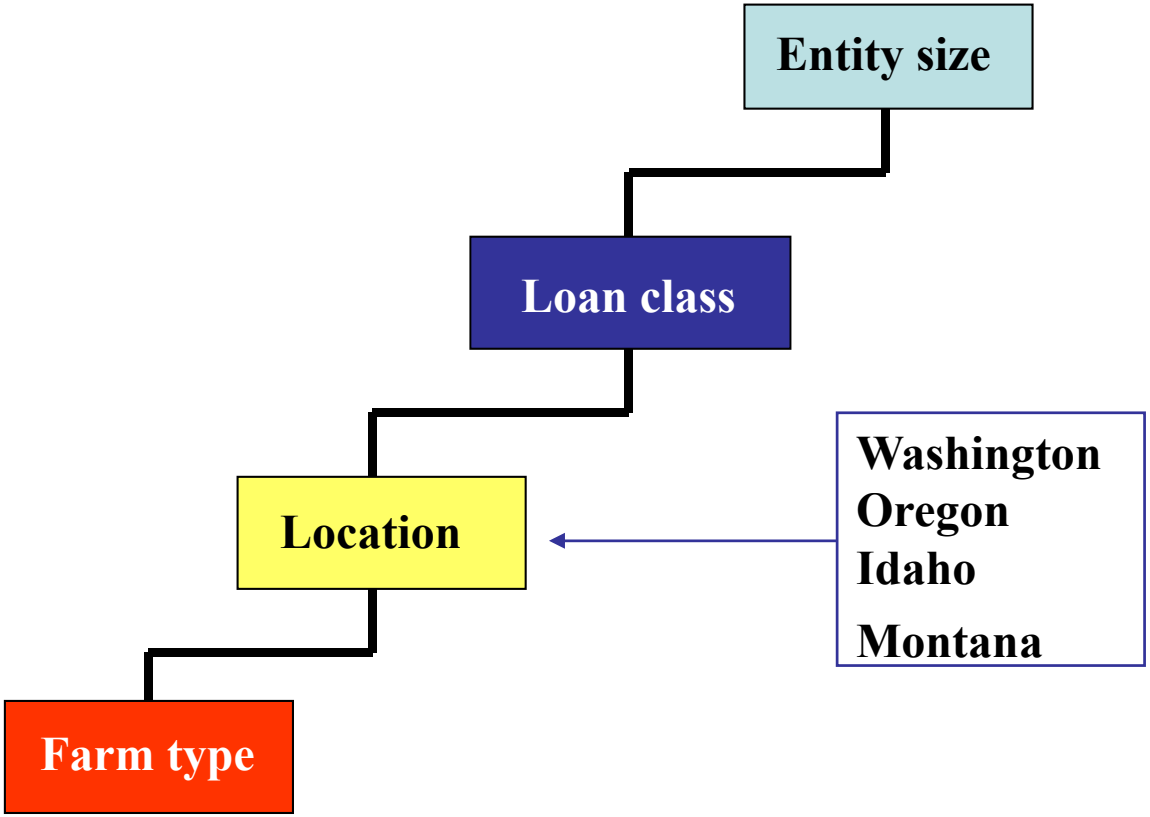
Risk and Uncertainty

- ✓ The 5-year strategic business plan typically reflects a “point” forecast of performance.
- ✓ Loan repayment capacity is affected by such random variables as commodity prices, unit input costs, weather and disease.
- ✓ Prudent planning requires an assessment of alternative scenarios with a realistic probability of occurrence.
- ✓ Typical approach used by FCS entities is to create and simulate “benchmark” borrowers.

Simulation Tree for Benchmark Farms



Simulation Tree for Benchmark Farms



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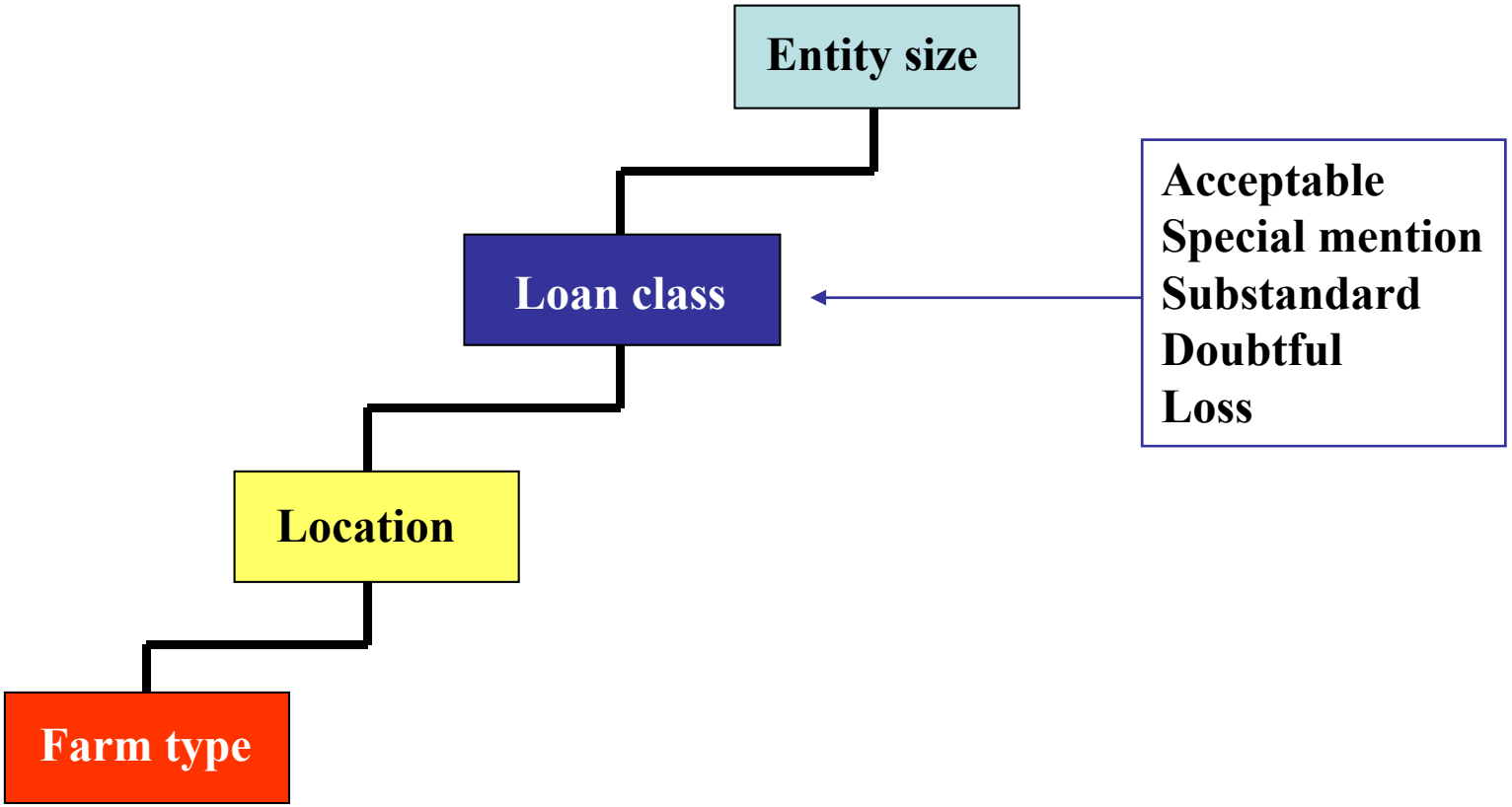

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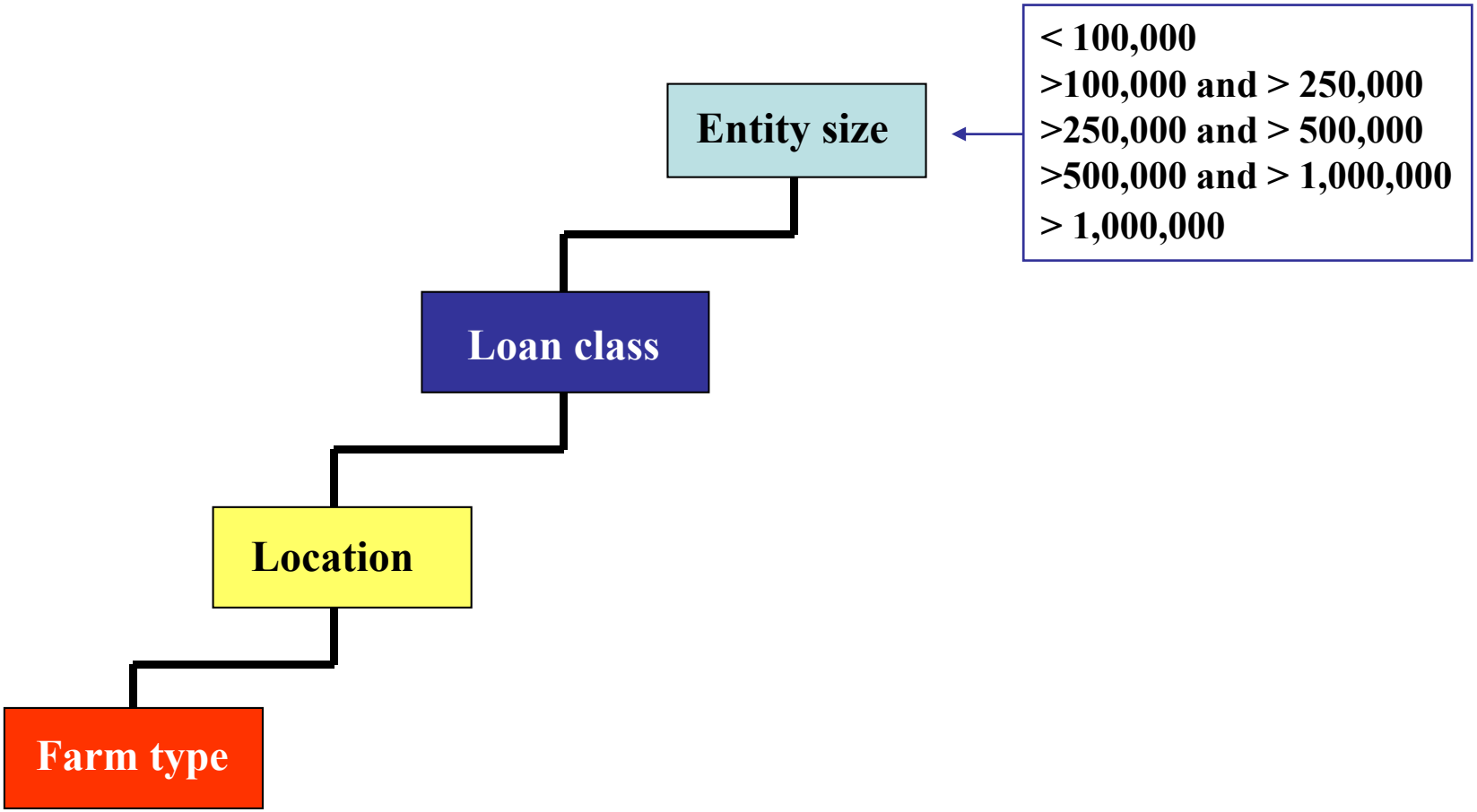
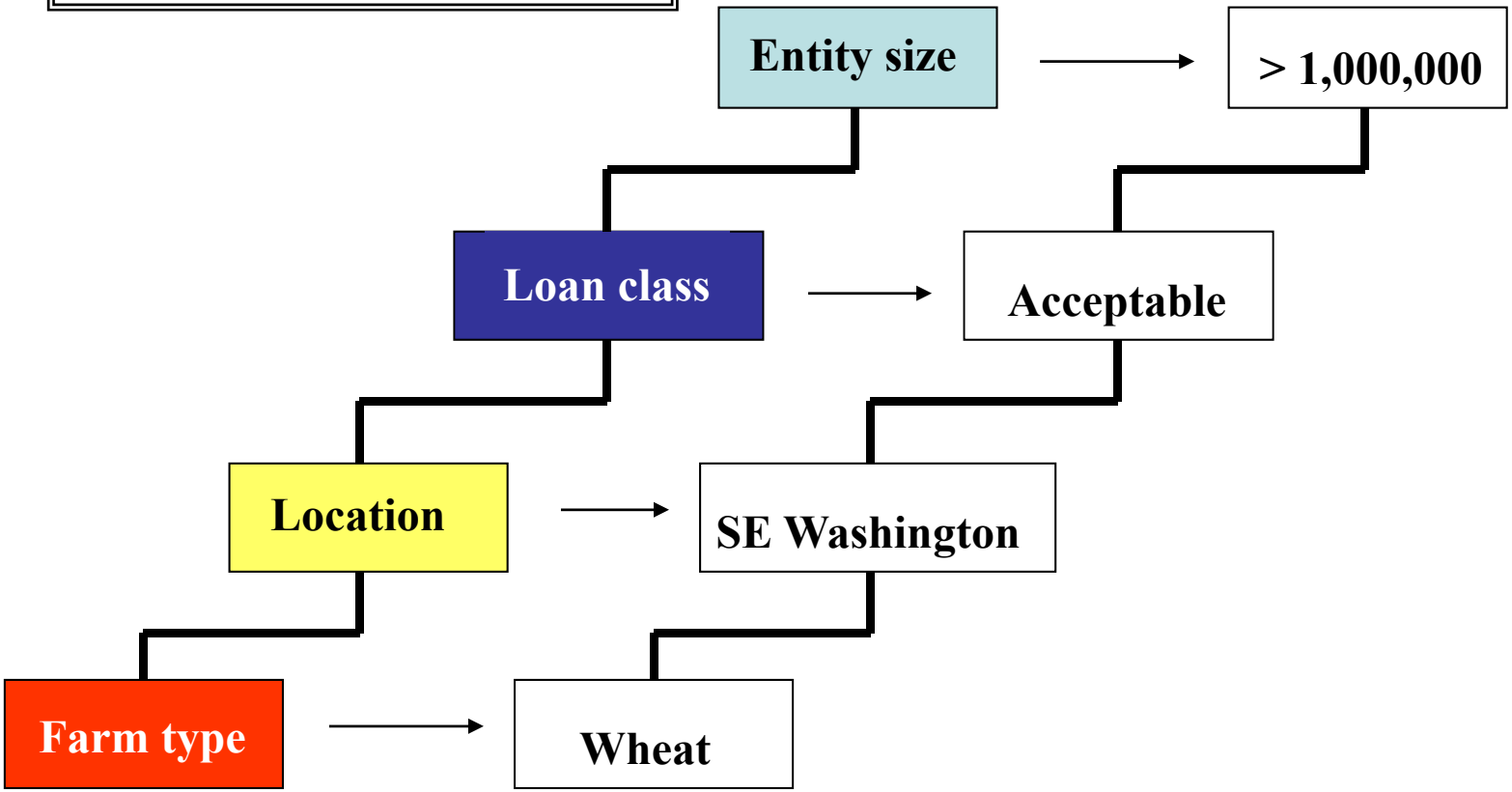


Simulation Tree for Benchmark Farms

Step #1: Create query



Development Approach

1. We can use information gathered when conducting cash flow analysis at the time of loan application (i.e., hectares planted).
2. We can also available cost of production budgets updated to reflect current unit costs.
3. Develop a spreadsheet capable of simulating all the benchmark farms in a particular location.
4. Link the benchmark worksheets to a simulation design worksheet complete with macros.

Stress Test Design

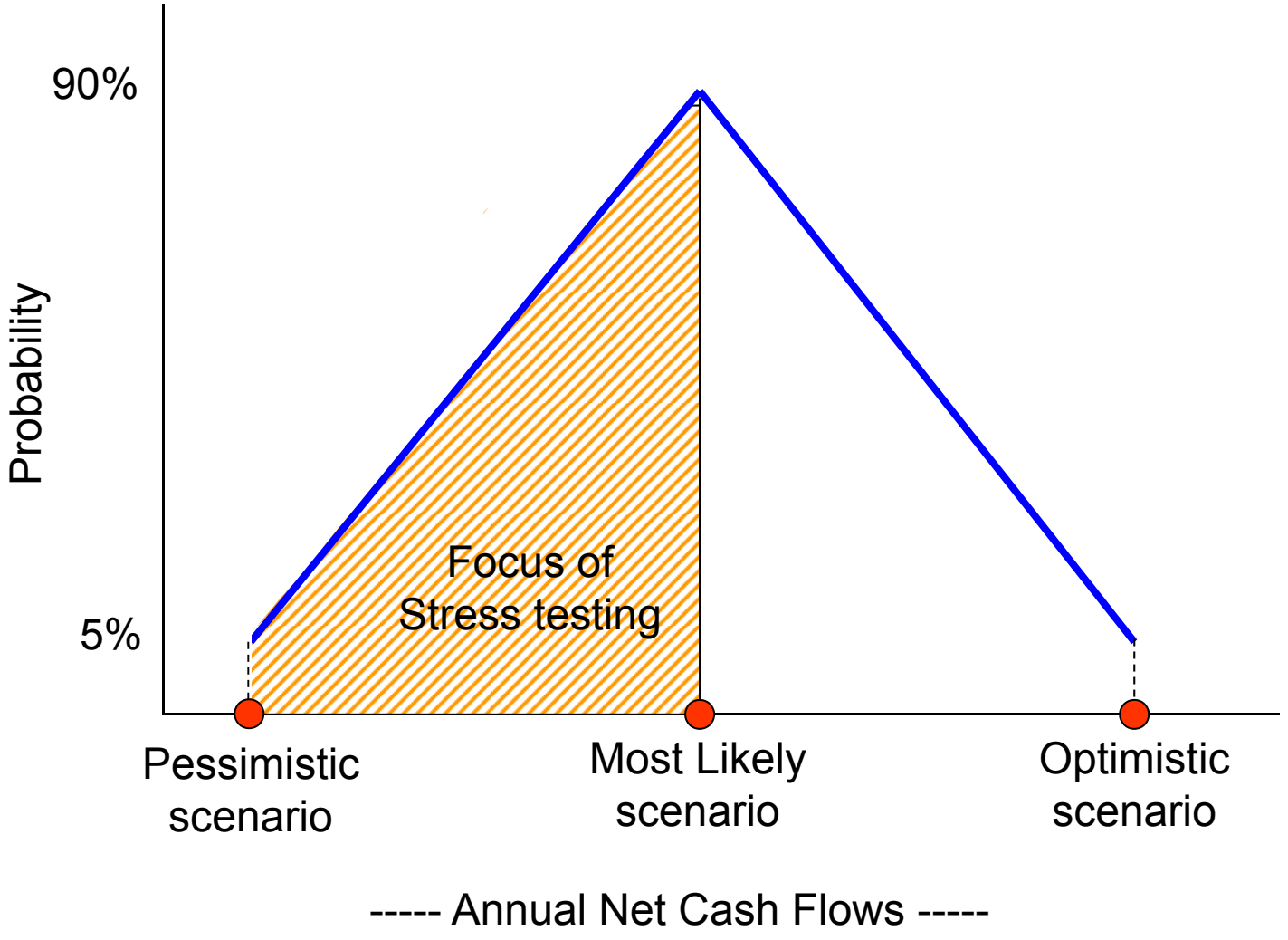
Forecast Approaches

- ✓ Three year average price, unit costs and yields - approach currently used in FCA cash flow analysis.
- ✓ Olympic average to remove highs and lows over previous 5-year period.
- ✓ Available outlook projections.
- ✓ Trend analysis.
- ✓ Econometric analysis.

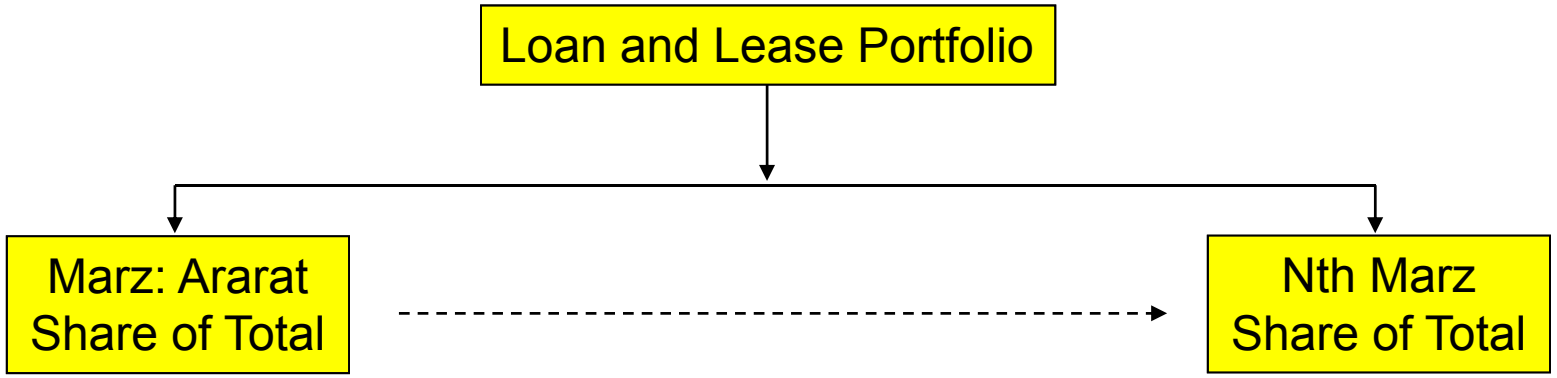
Simulation Design

1. Revenue = ***prices*** x ***yields*** x hectares
2. Costs = ***unit costs*** per hectare x hectares
3. Random variables include prices, yields and unit costs.
4. Stress test random variables with adverse deviations.
5. Compare baseline scenario (forecasted values) performance indicators with those from alternative scenarios reflecting adverse deviations from historical trends.

Triangular Probability Distribution

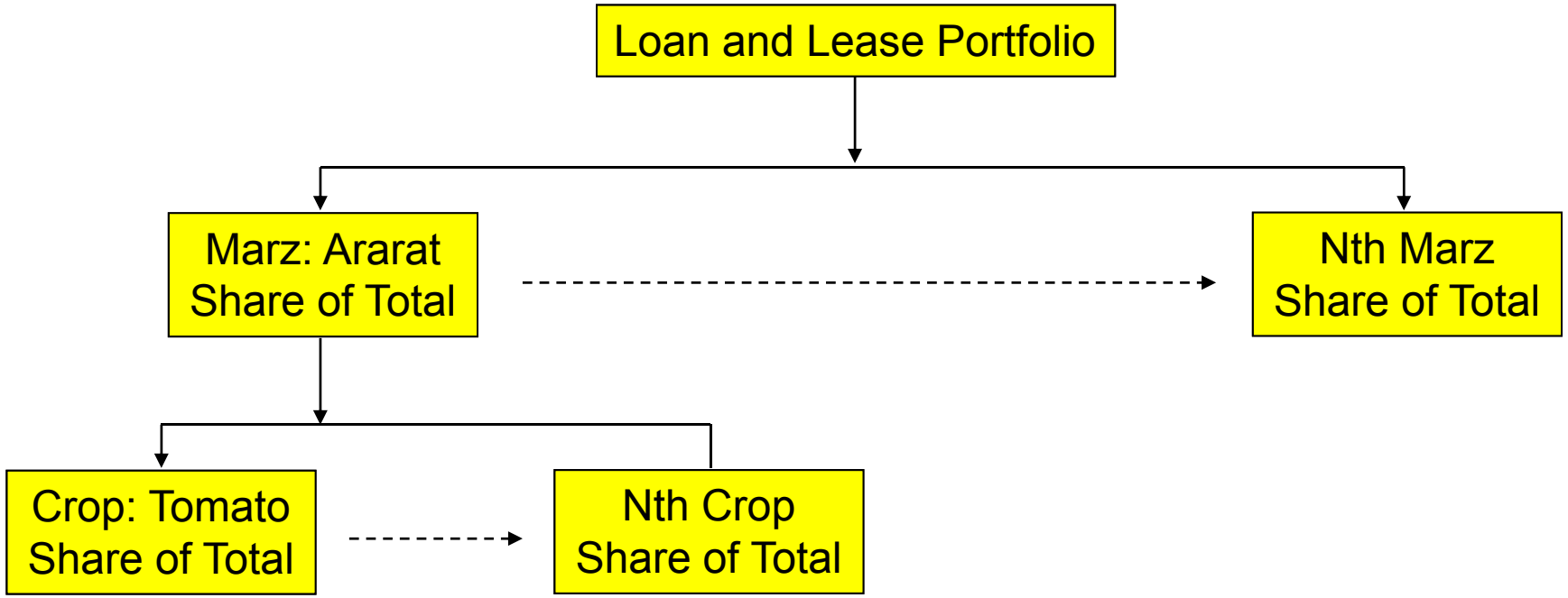


Segment Stress Testing



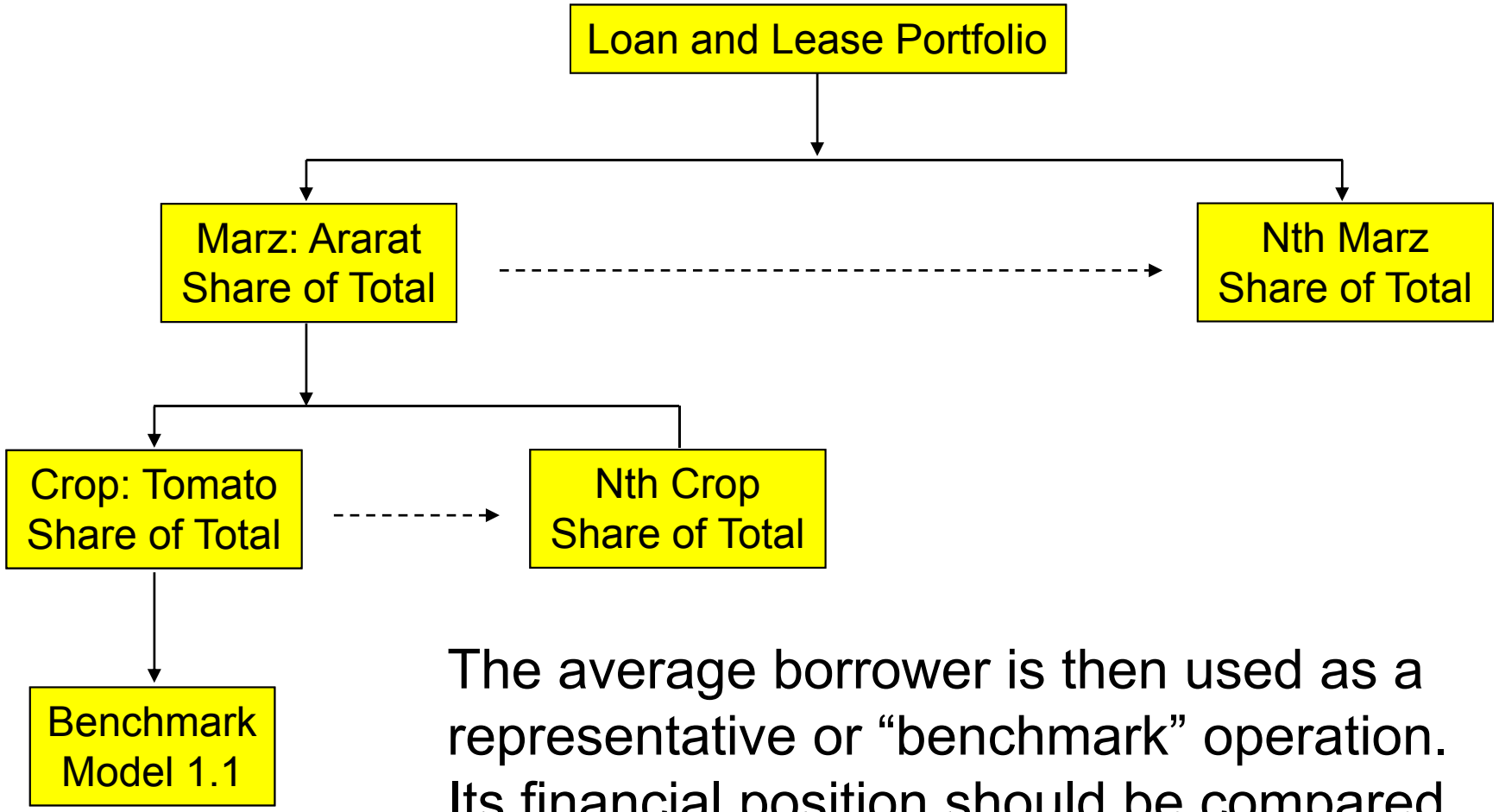
The first step is to divide the loan and lease portfolio into segments. Each segment represents a key characteristic of borrowers comprising the portfolio. For example, segment #1 might be all loans or leases in the Ararat marz.

Segment Stress Testing



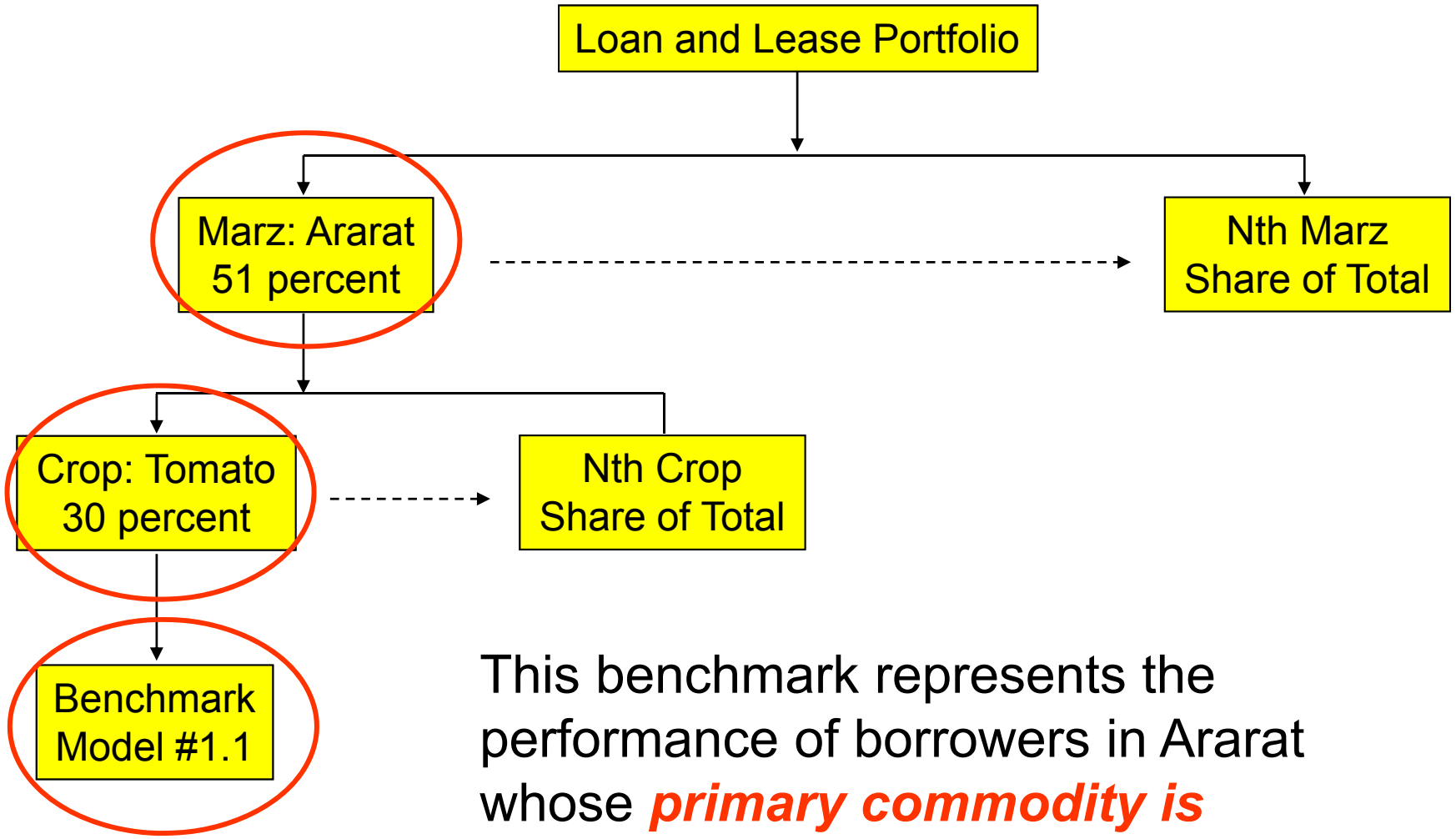
To learn more about the performance of the portfolio, one can further disaggregate all loans and leases in Ararat where the ***primary crop*** is tomatoes.

Segment Stress Testing



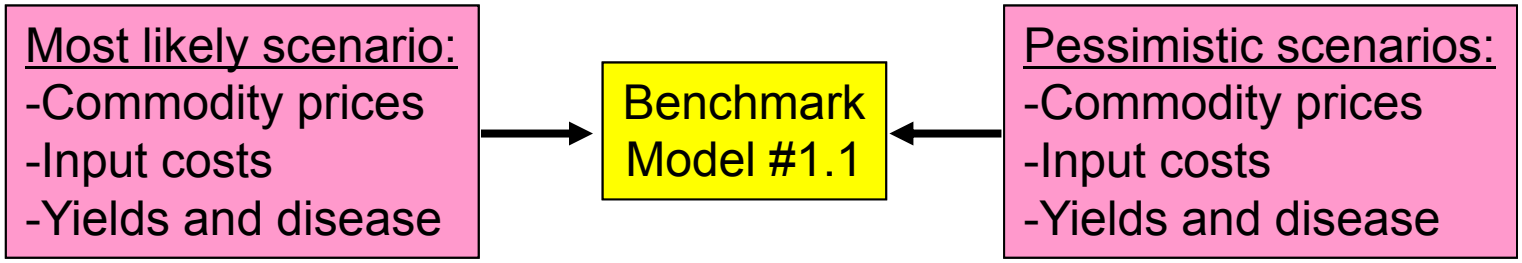
The average borrower is then used as a representative or “benchmark” operation. Its financial position should be compared to the lender’s credit standards.

Segment Stress Testing



This benchmark represents the performance of borrowers in Ararat whose ***primary commodity is tomatoes***.

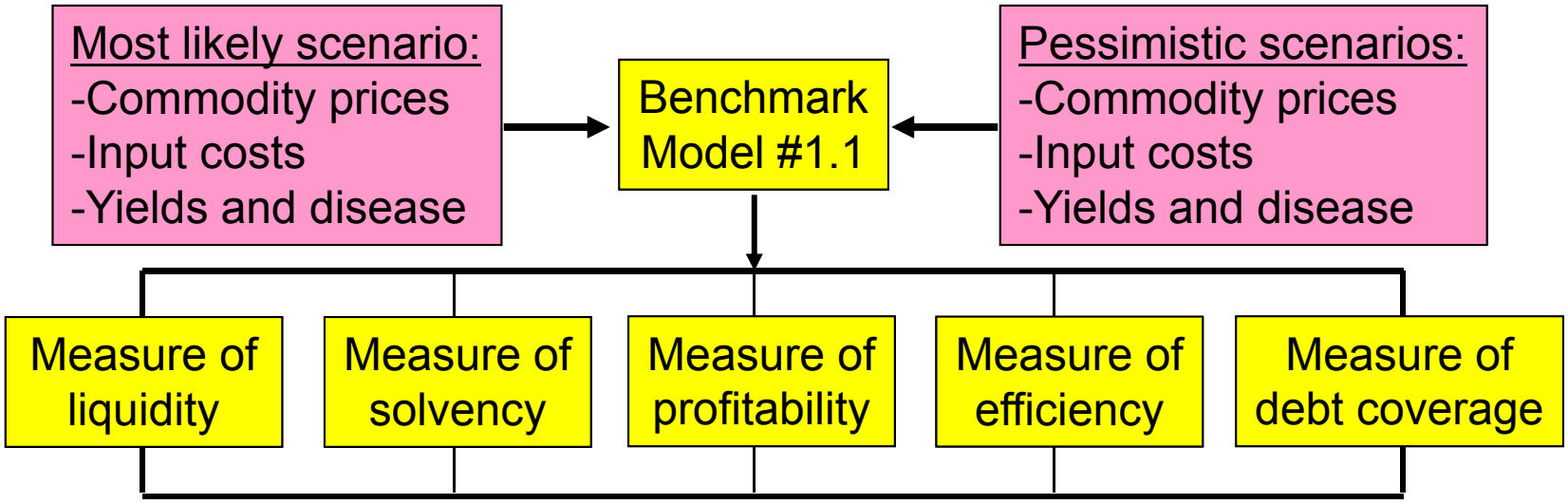
Segment Stress Testing



Option #1:

A generalized whole firm simulation model shell can be developed for a set of benchmark operations in each marz. Once in place, any updates focus almost entirely on the pro forma data base containing alternative trends. All benchmarks can be run simultaneously for both the “most likely” scenario and one or more adverse scenarios.

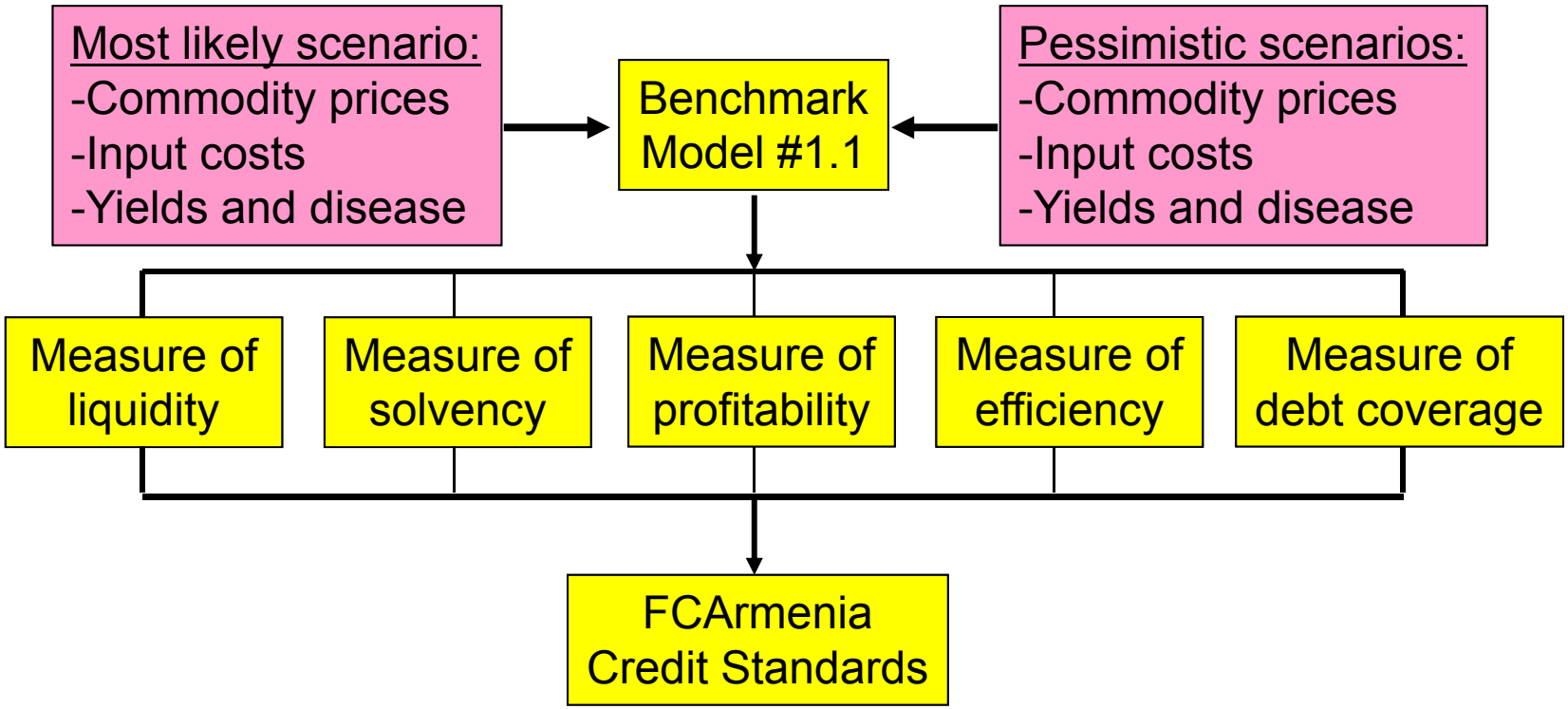
Segment Stress Testing



Option #1:

The model would generate annual trends in key financial indicators for each benchmark over a five-year interval.

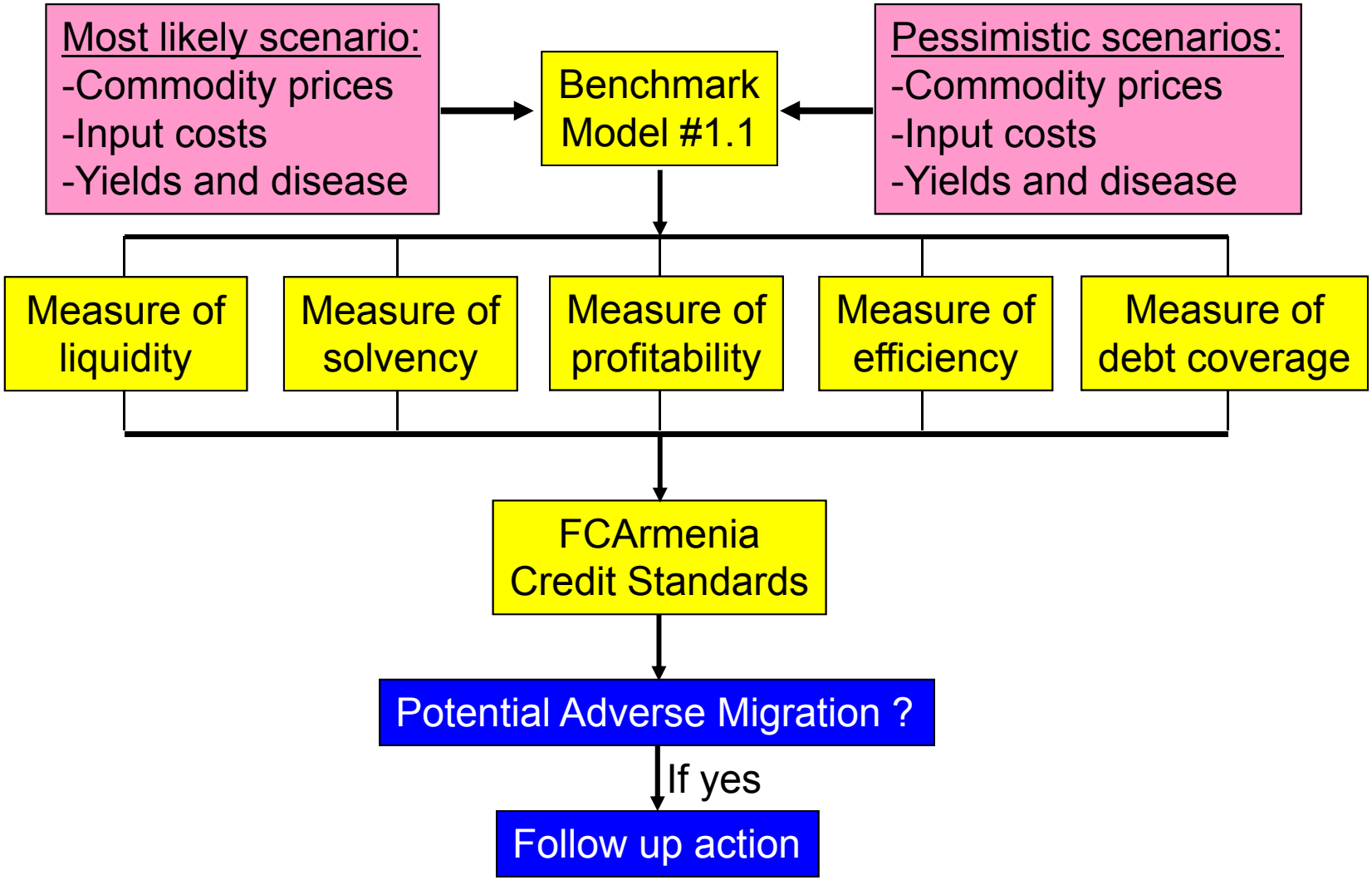
Segment Stress Testing



Option #1 continued:

These indicators would then be compared to the thresholds established for the lender's credit standards.

Segment Stress Testing



Let’s Look at an Example

Case Example

- ✓ Primary commodity is tomatoes.
- ✓ Other commodities grown are onions and cucumbers.
- ✓ Loan for new irrigation equipment.
- ✓ 13 total hectares planted.
- ✓ Current ratio when loan made = 1.25
- ✓ Loan-to-collateral value of assets = 0.35
- ✓ Use available production budgets.

Benchmark Analysis

Commodity: Tomatoes

Costs per hectare:	Quantity	Price ADM	Total Cost ADM	Total Cost USD
Fertilizer:				
Manure (MT)	20	6,500	130,000	$356
Nitrogen (KG)	220	100	22,000	$60
Potassium (KG)	150	100	15,000	$41
Phosphorus (KG)	175	100	17,500	$48
Total			184,500	$505
Land Preparation:				
Soil preparation and cultivation			65,000	$178
Land leveling and weeding			113,000	$310
Total			178,000	$488
Seed			85,000	$233
Plant protection			65,000	$178
Irrigation			85,000	$233
Harvesting			262,500	$719
Labor 1/			180,000	$493
Total cash costs excluding interest			1,040,000	$2,849

Costs can also be treated as random variables.

	Quantity	Price ADM	Revenue ADM	Revenue USD
Expected yield per hectare (MT)	45			
Expected sales price (KG)		40		
Revenue			1,800,000	$4,932
Net cash income (EBIT)			**760,000**	**$2,082**

1/ 177 days; $11.29 wage rate

2/ ADM/USD exchange rate 365

Two random variables

Benchmark Analysis

Commodity: Cucumbers

Costs per hectare:	Quantity	Price ADM	Total Cost ADM	Total Cost USD
Fertilizer:				
Manure (MT)	23	6,500	149,500	$410
Nitrogen (KG)	480	100	48,000	$132
Potassium (KG)	300	100	30,000	$82
Phosphorus (KG)	100	100	10,000	$27
Total			237,500	$651
Land Preparation:				
Soil preparation and cultivation			4,500	$12
Land leveling and weeding			240,000	$658
Total			244,500	$670
Seed			50,000	$137
Plant protection			202,000	$553
Irrigation			55,000	$151
Harvesting			150,000	$411
Labor 1/			105,000	$288
Total cash costs excluding interest			1,044,000	$2,860

	Quantity	Price ADM	Revenue ADM	Revenue USD
Expected yield per hectare (MT)	35			
Expected sales price (KG)		70		
Revenue			2,450,000	$6,712
Net cash income (EBIT)			**1,406,000**	**$3,852**

1/ 180 days; $8.57 wage rate

2/ ADM/USD exchange rate 365

Costs can also be treated as random variables.

Two random variables

Benchmark Analysis

Commodity: Onions

Costs per hectare:	Quantity	Price ADM	Total Cost ADM	Total Cost USD
Fertilizer:				
Manure (MT)	20	6,500	130,000	$356
Nitrogen (KG)	200	100	20,000	$55
Potassium (KG)	100	100	10,000	$27
Phosphorus (KG)	100	100	10,000	$27
Total			170,000	$466
Land Preparation:				
Soil preparation and cultivation			95,000	$260
Land leveling and weeding			100,000	$274
Total			195,000	$534
Seed			70,000	$192
Plant protection			65,000	$178
Irrigation			60,000	$164
Harvesting			105,000	$288
Labor 1/			170,000	$466
Total cash costs excluding interest			835,000	$2,288

	Quantity	Price ADM	Revenue ADM	Revenue USD
Expected yield per hectare (MT)	30			
Expected sales price (KG)		80		
Revenue			2,400,000	$6,575
Net cash income (EBIT)			**1,565,000**	**$4,288**

1/ 134 days; $11.29 wage rate

2/ ADM/USD exchange rate 365

Costs can also be treated as random variables.

Two random variables

Financial Indicators

Assume the benchmark borrower had a current ratio (CR) of ***1.25*** and a debt-to-collateral value (D/CV) was ***0.35*** at the time the loan was made.

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The variable expense ratio, a measure of operation efficiency, was ***0.58*** or 58% for tomatoes, ***0.44*** or 44 % for cucumbers and ***0.35*** or 35% for onions. This excludes interest and all fixed costs.

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Assume the benchmark borrower operates 13 hectares and normally withdraws $15,000 for family living expenses. Further assume that the scheduled principal plus interest expense this year is $8,905. Given this set of assumptions, the term debt and capital lease coverage ratio (TFCLC) would be ***2.25.***

Benchmark Analysis

Crop Commodity	Crop	Planted Hectares	EBIT per hectare	Total EBIT
Primary commodity	Tomatoes	9.0	$2,082	$18,740
Secondary commodity #1	Cucumbers	2.0	$3,852	$7,704
Secondary commodity #2	Onions	2.0	$4,288	$8,575
Secondary commodity #3	None	0.0	$0	$0
Secondary commodity #4	None	0.0	$0	$0
Secondary commodity #5	None	0.0	$0	$0
Secondary commodity #6	None	0.0	$0	$0
		13.0		$35,019

Other relevant data:	
FCA scheduled PI payment	$8,905
Family living expenses	$15,000
Other known debt payments	$0
Data at time of loan:	
Current ratio	1.25
Loan to collateral value ratio	0.35

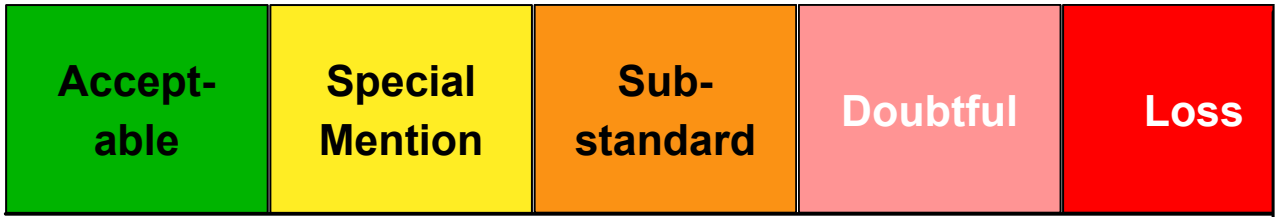
Credit standards:

Current ratio	1.00	Minimum
L/CV ratio	0.50	Maximum
TDCLC ratio	1.00	Minimum

My assumptions about credit standards

Borrower ratios:	
Current ratio	1.25
L/CV ratio	0.35
TDCLC ratio	**2.25**

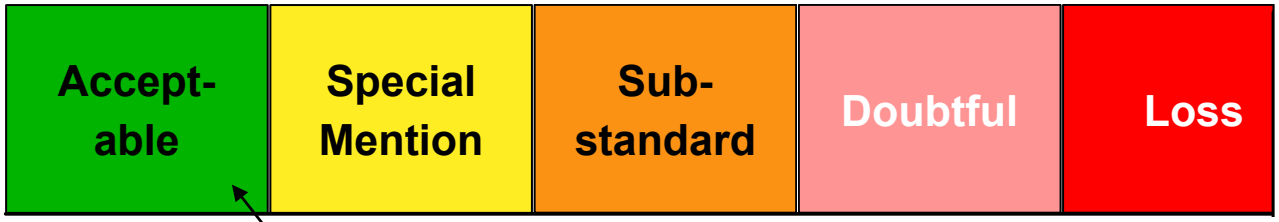
Loan Classification Scheme



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 (CR < 1.10 and D/CV > 0.75)
Doubtful = 0.90 < TDCLC < 1.00 (CR < 1.05 and 0.75 < D/CV $\leq$ 0.80)
Loss = TDCLC < 0.90 (CR < 1.00 and D/CV $\geq$ 0.80)

You can also consider the borrower's present liquidity (CR) and debt to collateral value (D/CV) when classifying loans below the Special mention category.

Loan Classification Scheme



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Accepta[illegible]

Specia[illegible]

Substa[illegible] ≤ 1.10 and D/CV > 0.75)

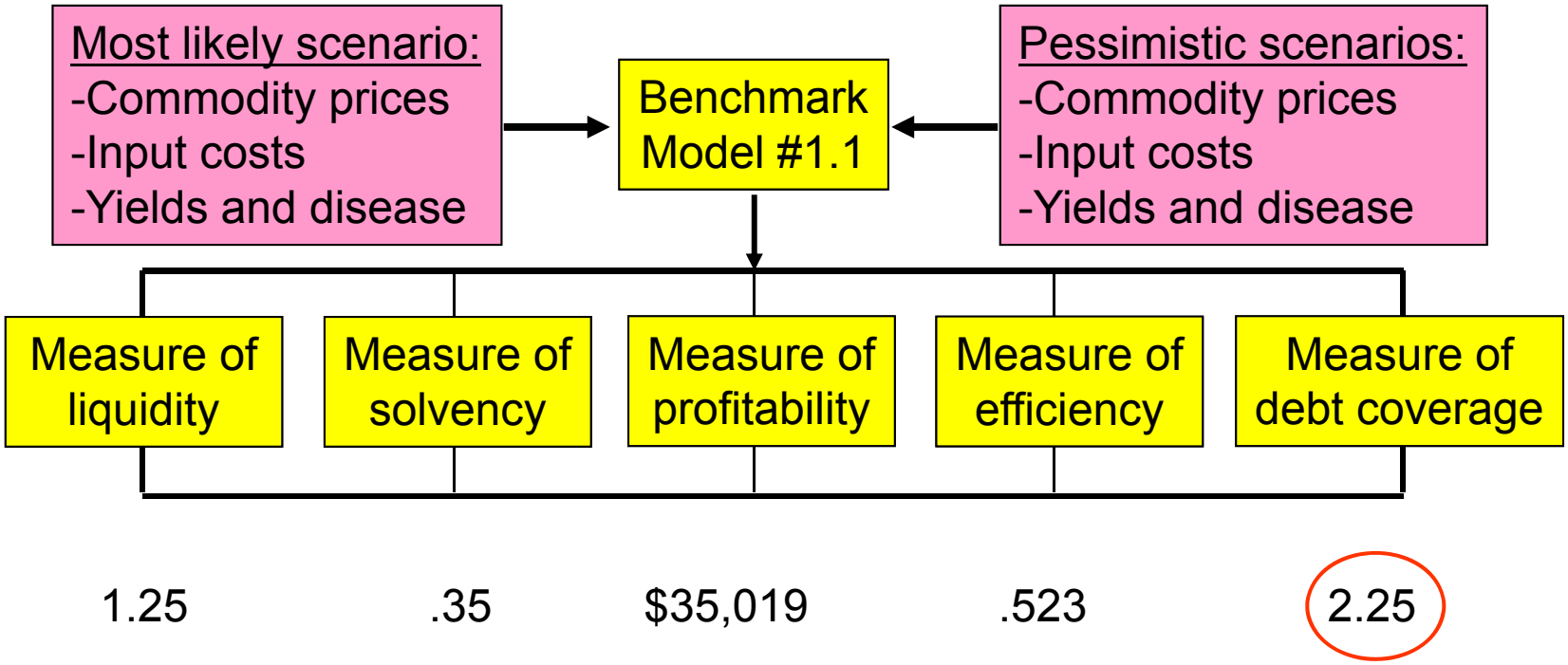
Doubtfu[illegible] and 0.75 < D/CV ≤ 0.80)

Loss = T[illegible] and D/CV ≥ 0.80)

Thus, we would classify this operation as an acceptable or accrual loan.

You can also consider the borrower's present liquidity (CR) and debt to collateral value (D/CV) when classifying loans below the Special mention category.

Segment Stress Testing



Thus we would conclude based on the loan classification thresholds on the previous slide that this benchmark borrower would be considered a ***"acceptable"*** loan.

Let’s Look at the Model and Do Some Stress Testing

Impact of Stress on EBIT

Crop	Baseline
Tomato	$2,982
Cucumber	$3,852
Onion	$4,288
TDCLC ratio	2.25

The column headings represent the percentage change in ***yields, prices and costs, respectively***. 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.

Impact of Stress on EBIT

Crop	Baseline	10↓5↑10↑
Tomato	$2,982	$1,526
Cucumber	$3,852	$3,197
Onion	$4,288	$3,697
TDCLC ratio	2.25	1.41

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Impact of Stress on EBIT

Crop	Baseline	10↓5↑10↑	5↓ 5↑10↑
Tomato	$2,982	$1,526	$1,785
Cucumber	$3,852	$3,197	$3,549
Onion	$4,288	$3,697	$4,042
TDCLC ratio	2.25	1.41	1.82

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Impact of Stress on EBIT

Crop	Baseline	10↓5↑10↑	5↓ 5↑10↑	5↓5↓10↑
Tomato	$2,982	$1,526	$1,785	$1,316
Cucumber	$3,852	$3,197	$3,549	$2,912
Onion	$4,288	$3,697	$4,042	$3,418
TDCLC ratio	2.25	1.41	1.82	1.07

Substandard

The column headings represent the percentage ch[illegible] ***and costs, respectively***. 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.

Impact of Stress on EBIT

Crop	Baseline	10↓5↑10↑	5↓ 5↑10↑	5↓5↓10↑	15↓5↑10↑
Tomato	$2,982	$1,526	$1,785	$1,316	$1,267
Cucumber	$3,852	$3,197	$3,549	$2,912	$2,844
Onion	$4,288	$3,697	$4,042	$3,418	$3,352
TDCLC ratio	2.25	1.41	1.82	1.07	0.99

Doubtful

The column headings represent the percentage change in ***yields, prices and costs, respectively***. 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.

Use of Benchmarks

- ✓ Evaluate all farms falling below benchmark borrower under baseline scenario.
- ✓ Evaluate the impacts of adverse scenarios on the benchmark borrowers based on the assumption that they are representative of a particular segment. This is an alternative to data mining simulation.
- ✓ This can be done by examining the effects of potential adverse trends in key random variables (i.e., commodity prices, yields per hectare and costs of production).