

Using the World Industry Service to Stress Test Credit Portfolios

November 2008



Agenda

- **Outline for for stress-testing the country and industry components of credit portfolios**
- **Introduction to Models, Tools and Methods**
- **Example of the Migration of Credit Quality in a Portfolio under a Custom Scenario**



Framework for Stress Testing Credit Portfolios

Evaluate the impact of stress factors on portfolio credit quality resulting from hypothetical events relating to macroeconomic environments, government policy and industry changes

- Analyze the impact on the portfolio of unlikely but plausible events
- Derive the sector and portfolio impacts of alternate “House Views”
- Calculate the expected migration of credit quality and expected losses
- Assess capital requirements on a country and industry level
- Identify groups of correlated industries that improve/deteriorate together
- Determine which risk factors are driving the change
- Determine the geographical composition of the industry changes

References for Stress Testing of Portfolios:

Lopez, J., 2005 “Stress Tests: Useful Complements to Financial Risk Models”, FRBSF Economic Letter, June 2005, <http://www.frbsf.org/publications/economics/letter/2005/el2005-14.html>

Sorge, M. 2004. "Stress-Testing Financial Systems: An Overview of Current Methodologies." Working paper no. 165, Monetary and Economic Department, Bank for International Settlements. <http://www.bis.org/publ/work165.htm>



Two Common Techniques for Stress Testing of Sectors and Portfolios

1) Scenario Tests

Risk managers identify portfolio's key financial drivers & then formulate scenarios in which these drivers are stressed beyond standard VAR levels

Event-driven approach analysis addresses the manner in which plausible but unlikely events might affect the risk factors relevant to a portfolio

2) Sensitivity Tests

Assess the impact of large movements in financial variables on portfolio, without specifying the reasons for such movements

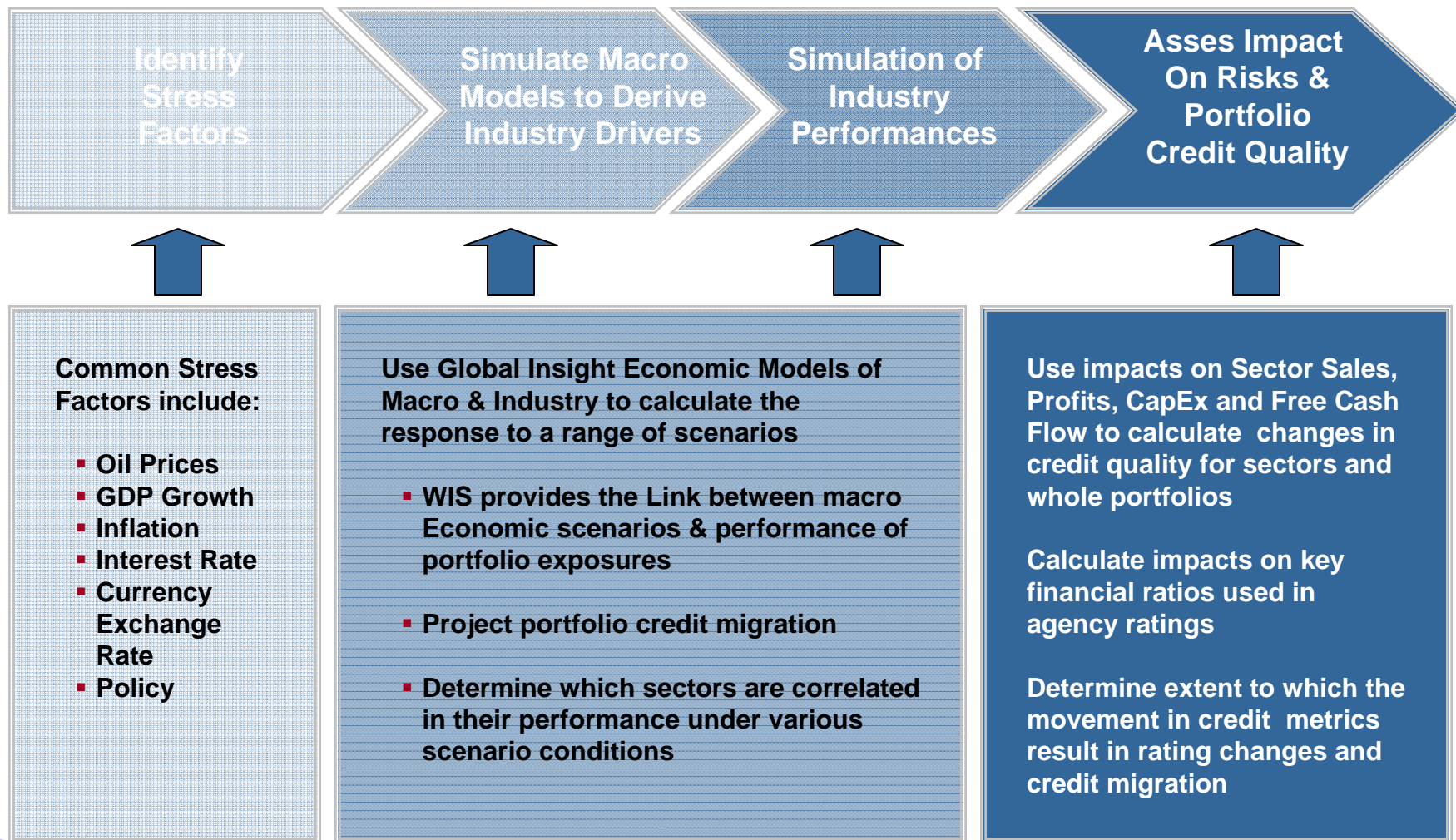
Examples include 100 bps increase across the yield curve, sudden 20% depreciation of currency, \$20/bbl rise in oil prices

- ✓ Develop rationale and design for macro & industry level scenarios & simulations for the purpose of assessing impacts on credit quality in portfolio segments
- ✓ Use analytical tools and economic models to simulate sensitivity tests and macro environments; Derive the sector impacts on sales, pricing, profits, capex; Calculate the changes in Sector Risk Ratings and the credit prospects for sectors, portfolios
- ✓ Quantify likely changes in migration patterns in sector credit quality

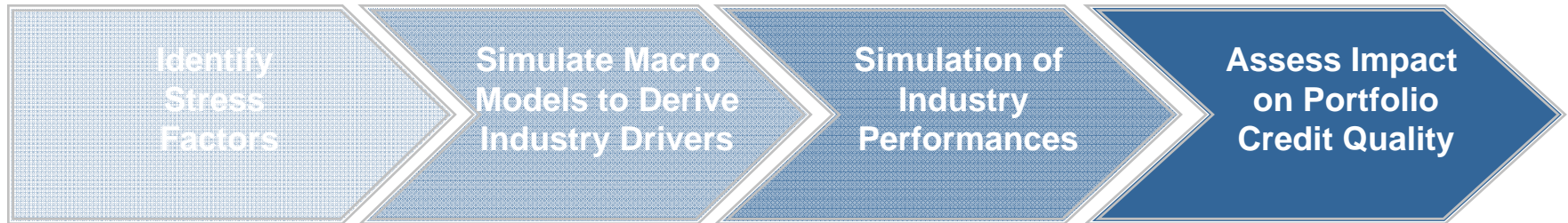


Process for Scenario Stress Testing of Portfolios

Flow Chart of Basic Steps for Stress Testing



Methodology: Identification of Stress Factors



Common Stress Factors:

- Oil prices
- GDP growth
- Inflation
- Interest rate
- Currency
- Policy

Select Stress Factors That Could Threaten Key Industries in The Portfolio Under Review:

- Energy-intensive industries are sensitive to changes in oil prices
- Export-oriented industries are sensitive to changes in currencies, foreign demand
- Timing & magnitude of business cycles in countries / regions around the world drive key client markets and supply links

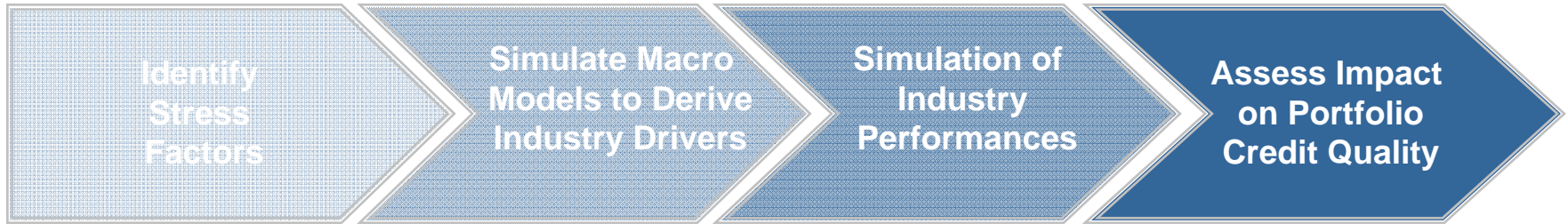
How or Where are You Vulnerable? What Events Are Disruptive to Strategic or Tactical Plans?

Common Examples of Stress Test Factors:

- **Chemical Company** – How will demand migrate geographically, where to source production? But “What If” that demand pattern is disrupted? What could cause the disruption?
- **Economic Development Agency** – Which Technologies or Markets will have the biggest impact on Investments and Employment? But “What if” those technologies or markets do not work out as planned?
- **Bank** – What are the macro economic impacts on credit quality in the Portfolio? But “What if” the macro economy develops in a different manner than planned?



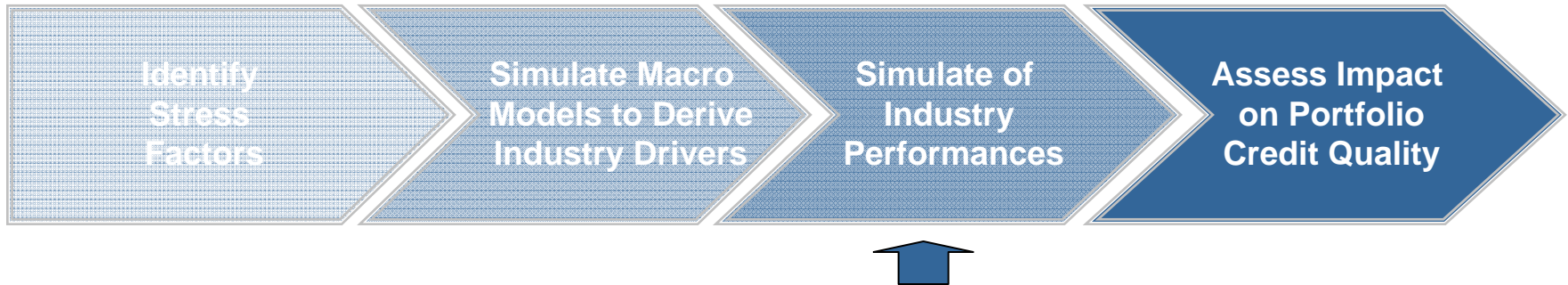
Methodology: Next Step is Macro Simulation



Use Macroeconomic Models to stress-test key macro components that drive industry output:

- Private consumption (household spending)
- Public consumption (government spending)
- Capital expenditures (investment by firms in building, machinery, etc., including construction investment)
- Exports & Imports
- Interest rates & Exchange rates
- Employment & Wages

Methodology: Next Derive Industry Impacts



Simulate effect on industry indicators

- Sales
- Profits
- Operating and Capital Expenditures
- Free Cash Flow
- Pricing Power
- Impact on Domestic final demand vs B2B markets vs Foreign Trade

Industry Impacts on Sales and Profits Are Applied to Directly to the Portfolio Exposures

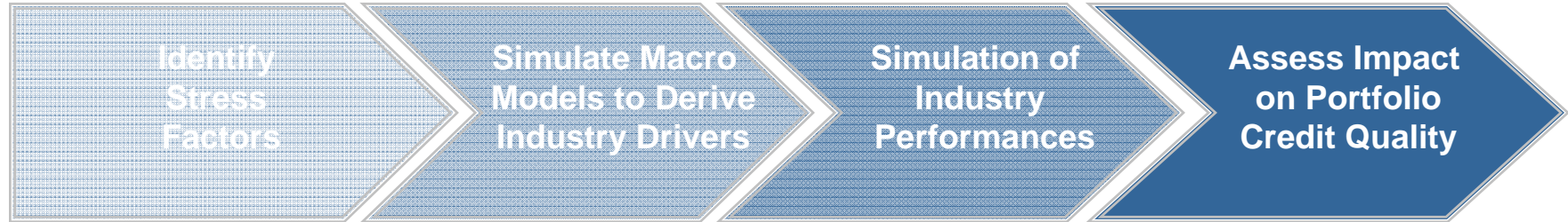


Impact on “Nominal” Industry Profits (Compound Growth 2007-08)	Baseline	Scenario	Difference in Growth Rate
All Private Industries	6.4	1.2	-5.2
Agriculture	4.2	0.0	-4.2
Mining	-0.1	-8.5	-8.4
Manufacturing	5.8	0.7	-5.1
Utilities	5.0	1.0	-4.0
Construction	5.6	-4.0	-9.6
Wholesale & Retail, Restaurants & Hotels	6.3	1.3	-5.0
Transport, Storage & Communication	4.7	-0.3	-5.0
Finance, Insurance, Real Estate & Business Services	7.2	1.9	-5.3
Community, Social & Personal Services	8.6	3.1	-5.5

- Impacts on industry Profits are driven by Sales patterns and costs
- Degree Of Operating Leverage (DOL) for industries is usually > 1
- The higher the DOL, the more volatile are profits relative to sales
- In this example scenario Mining has a high DOL, social services has the smallest DOL



Methodology: Industry Impacts Drive Migration of Portfolio Credit Quality



Use Impacts on Industry Sales, Profits, Capex, Free Cash Flow to Derive Changes in Credit Quality for Industries and Custom Portfolios:

- **Prepare Portfolio:** Aggregate up into industry-level “Peer Group” totals
- **Calculate the Key Financial Ratios for Each Industry that are Used by Rating Agencies to determine rating bucket assignments (e.g. AAA, AA, etc.)**
- **Calculate the impact of WIS stress-tested industry indicators on these Ratios**
- **Determine the extent to which changes in Financial Ratios affect the rating bucket of the different industry-level composites and of the overall portfolio**

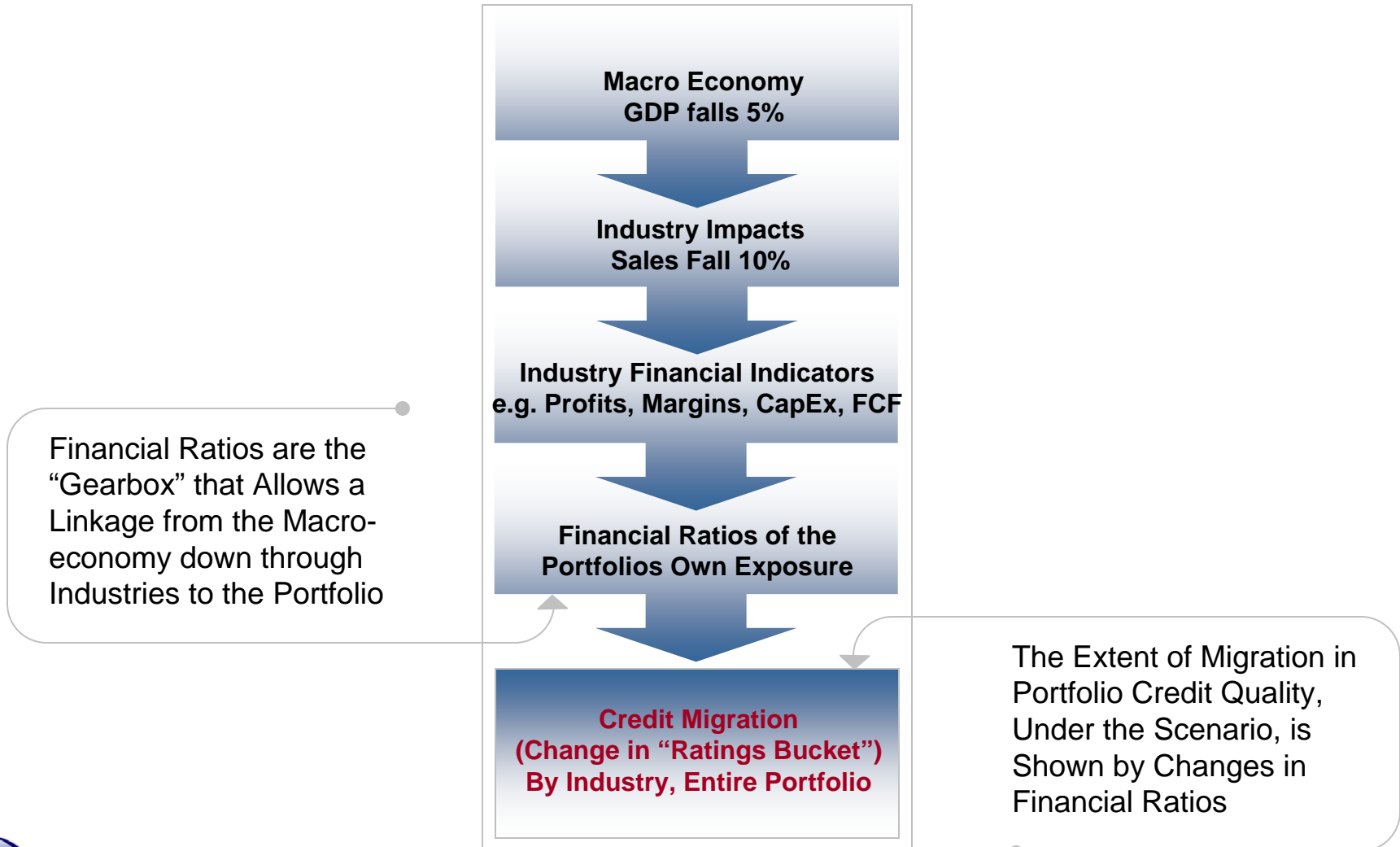
Financial Ratios are the “Gearbox” that Links WIS Industries with Clients’ Portfolios



Financial Ratios are the Conduit to Translate the Macro and Industry Impacts down to Portfolio Credit Migration

- Growth of Sales and Profits
- CapEx and Free Cash Flow
- EBIT, EBITDA Interest Coverage
- Funds From Operations as % of Total Debt
- Weight of Debt
- Return on Capital
- Total Debt as % of EBITDA

Review Of The Process for Stress Testing the Industry Components of a Credit Portfolio (Hypothetical Scenario)



Create Industry Composites of Peer Groups out of Portfolio Exposure to Individual Companies

Financial Ratios of **Energy** Companies in the Portfolio Aggregated into Peer Groups Total

	AAA's	A's			BBB's		
	Exxon	Schlumberger Ltd.	Apache Corp.	Conoco-Phillips	Devon Energy Corp.	Sunoco Inc.	Anadarko Petroleum
Current Credit Rating	AAA	A+	A-	A-	BBB	BBB	BBB-
EBIT Interest Coverage	52.47	22.06	18.99	16.38	8.87	15.72	6.70
EBITDA Interest Coverage	62.11	28.71	27.67	21.10	13.85	20.10	9.41
Funds from Operations (FFO) / Total Debt	6.07	0.88	1.33	0.85	0.78	0.72	0.21
Weight of Debt	0.068	0.365	0.225	0.247	0.308	0.489	0.607
Return on Capital=EBIT / Total Capital	49.98	34.36	27.40	23.67	19.27	37.54	18.51
Total debt / EBITDA	0.11	0.89	0.63	0.83	1.12	0.94	3.35



Key Financial Ratios Describe the Characteristics of Each “Rating Bucket”

Key Financial Ratios Buckets for Energy Companies

- Organize (aggregate) the companies in the portfolio into rating buckets, e.g. single "A" (5), "BBB" (7), "BB"(7), "B"(7)
- Determine, for each rating criteria (financial ratio), the threshold ranges for each of the buckets for each “Peer Group”
- Aggregate the ratings “peer groups” up to a total for the entire industry exposure in the portfolio

	AAA	AA	A	BBB	BB	B	Total Portfolio Exposure
	3-year Median*						
EBIT Interest Coverage	>50	30-50	15-30	10-15	2-10	0-10	25.49=A+
EBITDA Interest Coverage	>50	30-50	20-30	15-20	5-15	0-5	32.01 = AA-
Funds from Operations (FFO) / Total Debt	>5	2-5	1-2	0.5-1	0.3-0.5	<0.3	1.49 = A
Return on Capital=EBIT / Total Capital	>50	40-50	30-40	20-30	10-20	<10	30.76 = A-
Total debt / EBITDA	0-0.2	0.2-0.4	0.4-0.6	0.6-1.6	1.6-2.6	>2.6	0.53=A
Number of companies	1	1	8	13	3	1	A

*weighted (by sales) average value of each financial ratio indicator is calculated for 2004, 2005 and 2006 and median of 3 years is taken



Changes in Key Financial Ratios Are Determined by the Degree of the Industry Model Impacts on Profits and Spending

Key Financial Ratios Buckets for Energy Companies

1. Industry Profits & Spending Impacts are Quantified with WIS Industry Model
2. The Portfolio Peer Groups' EBIT, EBITDA, and FFO are each determined by industry patterns
 - A move from one Bucket to Another represents a Migration in the Credit Quality

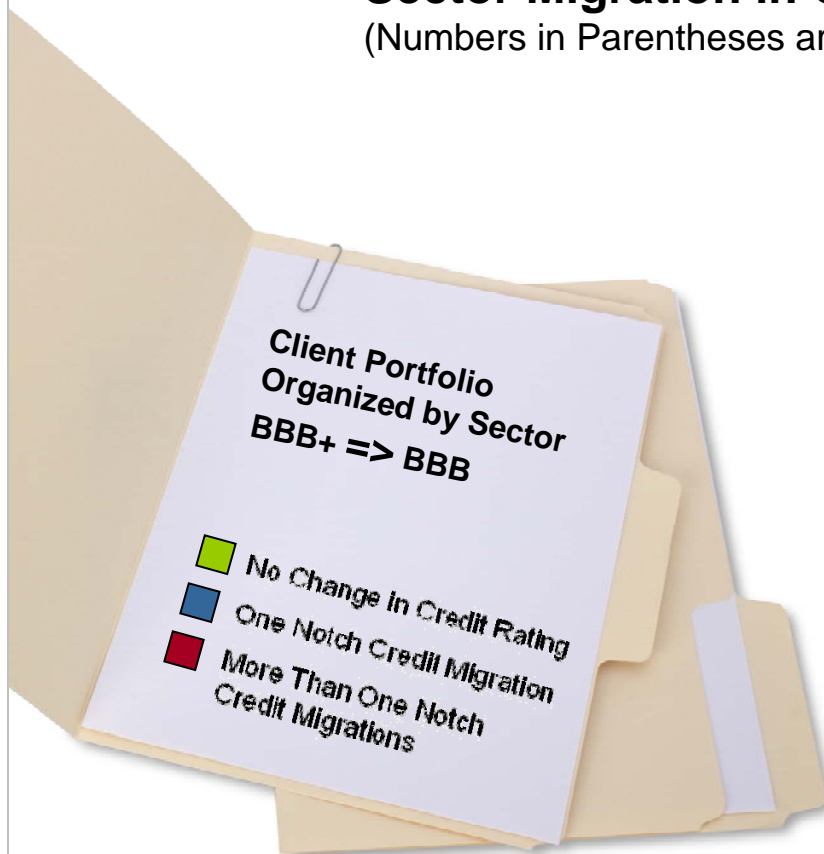
	AAA	AA	A	BBB	BB	B	Baseline Portfolio	Scenario Portfolio	
	3-year Median*								
EBIT Interest Coverage	>50	30-50	25-30	10-25	2-10	0-10	25.49 A+	20.82 BBB+	
EBITDA Interest Coverage	>50	30-50	20-30	15-20	5-15	0-5	32.01 AA-	27.64 A	
Funds from Operations (FFO) / Total Debt	>5	2-5	1-2	0.5-1	0.3-0.5	<0.3	1.49 A	1.19 A-	
Return on Capital= EBIT / Total Capital	>50	40-50	30-40	20-30	10-20	<10	30.76 A-	29.11 BBB+	
Total debt / EBITDA	0-0.2	0.2-0.4	0.4-0.6	0.6-1.6	1.6-2.6	>2.6	0.53 A	0.63 BBB+	
Number of companies	1	1	8	13	3	1	A	BBB+	

*weighted (by sales) average value of each financial ratio indicator is calculated for 2004, 2005 and 2006 and median of 3 years is taken.

Scenario Impact on Portfolio Credit Migration

Sector Migration in Credit Quality

(Numbers in Parentheses are Sector Shares in Portfolio)



- Consumer Discretionary (10.4%)
BBB- => BB+
- Consumer Staples (9.3%)
BBB+ => BBB+
- Energy (9.3%)
A => BBB+
- Financials (22.2%)
A => BBB+
- Healthcare (12.4%)
BBB+ => BBB
- Industrials (11.1%)
A- => BBB+
- Information Technology (15.5%)
BBB- => BBB-
- Materials (2.9%)
A => BBB+
- Telecommunication Services (3.5%)
BBB- => BBB-
- Utilities (3.4%)
BBB+ => BBB+

Thank you

Mark Killion, CFA

Managing Director, World Industry Service

1-610-490-2547

mark.killion@globalinsight.com

Natasha Muravytska

Product Manager – Financial Applications, World Industry Service

1-610-490-2558

natasha.muravytska@globalinsight.com

