# Comparing Bank Risk Indicators

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April 2015

# Contents

1. **Bank credit analysis tools**
    - All investment institutions need to implement credit analysis functions.
    - Practical issue I address here is what tools can be implemented to enhance the effectiveness of bank credit analysis?

2. **Menu of possibilities**
    - Alternative ways of analysing banks:
    a) credit risk indicators,
    b) stress tests,
    c) credit VaR calculations leading to marginal VaRs for banks

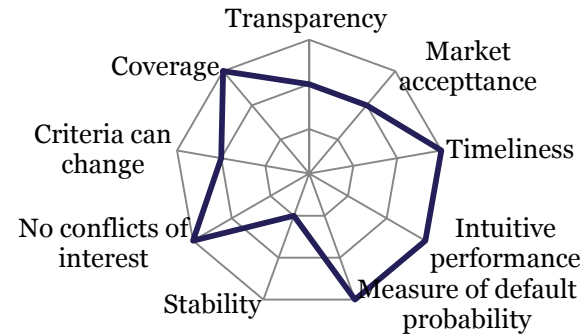3. **My main focus today is on risk indicators**
    - What indicators may be used?
    a) agency ratings,
    b) simple financial ratio combinations,
    c) equity-based estimates of default probability,
    d) CDS spread-based default probabilities

4. **But I also comment on more advanced approaches...**

## Agency ratings
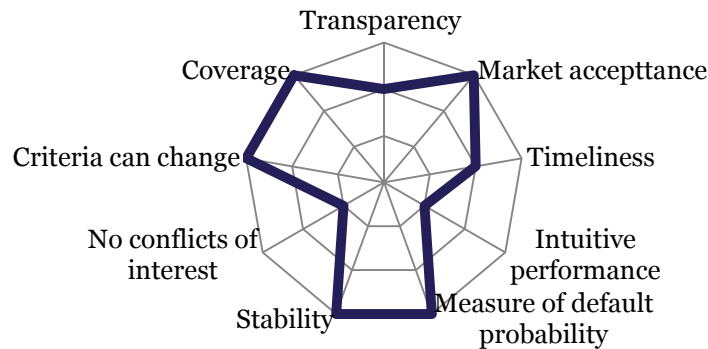


## Equity-based approach
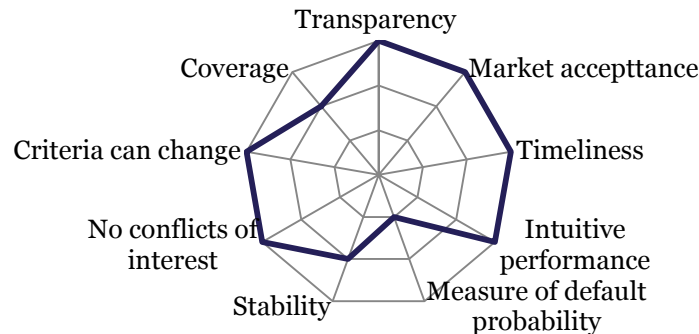


## Risk weights



## CDS spreads



- Risk indicators have advantages and disadvantages

- One may evaluate them in a principles based way
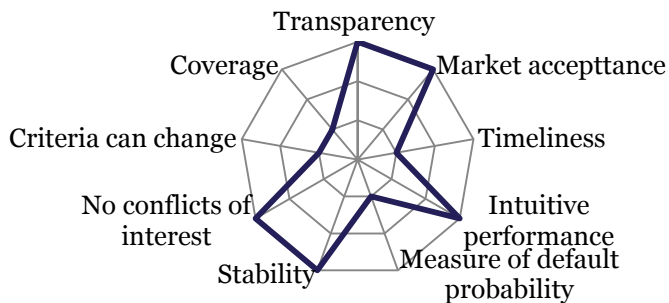
- It is interesting to make direct comparisons of how these measures performed since the crisis...

**RISK CONTROL**

**Issuer credit ratings form S&P**

| AA | AA | AA- | AA- |
| AA | AA | AA- | AA- |
| A | A- | A- | A- |
| AA | AA | AA- | AA- |
| AA- | AA- | A | A |
| AA | A+ | A+ | A+ |

**Equity-based PDs inferred from ratios of mkt cap to total liabilities**

$$Y(k) = k - 1 - (\underline{k} - 1)(k/\underline{k})^{\lambda}$$

$$\underline{\text{with }} \lambda = \frac{\sigma_v^2/2 - \sqrt{\sigma_v^4/4 + 2\sigma_v^2 \delta}}{\sigma_v^2}.$$

**Risk weights from BCBS 307 lookup table from revised credit SA**

| | CET1>=12% | 12%>CET 1>=9.5% | 9.5%>CET 1>=7% | 7%>CET1 >=5.5% | 5.5%>CET 1>=4.5% | CET1>4.5 |
|---|---|---|---|---|---|---|
| NNPA<=1% | 30% | 40% | 60% | 80% | 100% | 300% |
| 1%<NNPA<=3% | 45% | 60% | 80% | 100% | 120% | 300% |
| 3%<NNPA | 60% | 80% | 100% | 120% | 140% | 300% |

**CDS spreads from Reuters adjusted for recovery rates**

$$PD \cong \frac{CDS\ spread}{(1 - Recovery\ rate)}$$

## Agency ratings



- AA- 19%
- A+ 14%
- A 19%
- A- 29%
- BBB+ 9%
- BBB 10%

## Risk weights (%)



- 30 22%
- 40 28%
- 45 5%
- 60 28%
- 80 17%

## Equity-based PDs (%)



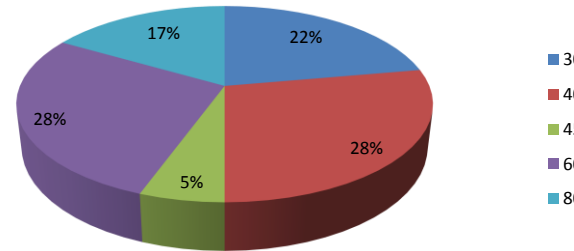| 0-20 | 21-40 | 41-60 | 61-80 | 81-100 | 101-120 | 121-140 |
|------|-------|-------|-------|--------|---------|---------|
| 15   | 3     | 2     | 0     | 0      | 0       | 1       |

## CDS implied PDs (bps)



| 41-60 | 61-80 | 81-100 | 101-120 | 121-140 | 141-160 |
|-------|-------|--------|---------|---------|---------|
| 2     | 3     | 4      | 9       | 1       | 2       |
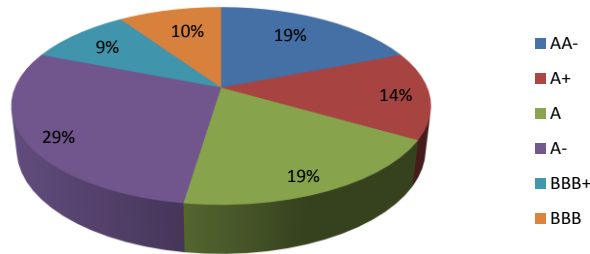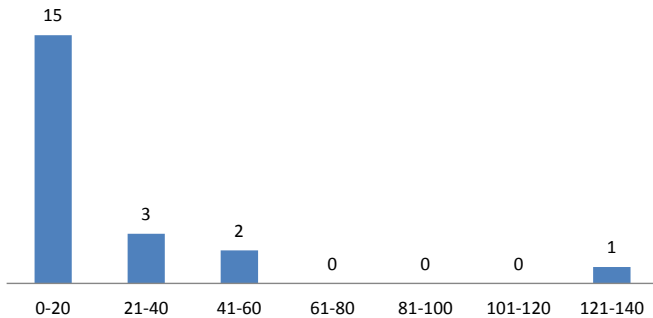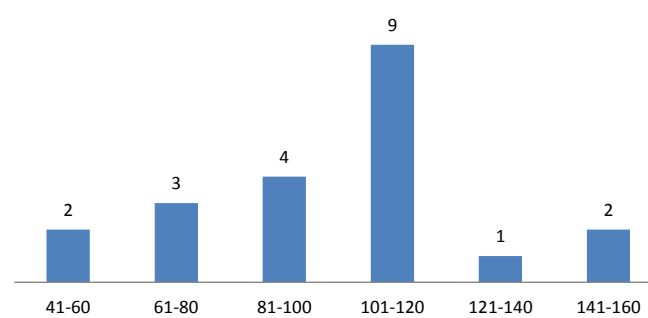
- Consider sample of 20 banks for which the data is available for all four indicators.
- Here are the distributions of indicators at the end of 2014

| | Rating | | | | Risk Weight (%) | | | | PD (bps) | | | | CDS (bps) | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 2008 | 2010 | 2012 | 2014 | 2008 | 2010 | 2012 | 2014 | 2008 | 2010 | 2012 | 2014 | 2008 | 2010 | 2012 | 2014 |
| NATIONAL AUSTRALIA BANK LTD | AA | AA | AA- | AA- | | | | 60 | 384 | 103 | 56 | 26 | | 105 | 105 | 61 |
| AUST AND NZ BANKING GROUP | AA | AA | AA- | AA- | | 80 | 60 | 60 | 339 | 24 | 28 | 22 | | 105 | 103 | 61 |
| COMERICA INC | A | A- | A- | A- | 60 | 60 | 60 | 40 | 474 | 7 | 61 | 8 | 144 | 76 | 81 | 54 |
| WESTPAC BANKING CORP | AA | AA | AA- | AA- | | | 60 | 60 | 142 | 44 | 19 | 16 | | 105 | 105 | 61 |
| CREDIT AGRICOLE SA | AA- | AA- | A | A | | | 100 | 80 | 398 | 151 | 312 | 45 | | 163 | 167 | 71 |
| US BANCORP | AA | A+ | A+ | A+ | 100 | 60 | 60 | 40 | 37 | 19 | 8 | 1 | 161 | 76 | | 60 |
| NATIONAL BANK OF CANADA | A | A | A- | A | | | | 60 | 178 | 6 | 5 | 2 | 68 | 72 | 51 | 41 |
| REGIONS FINANCIAL CORP | A | BB+ | BBB- | BBB | 80 | 80 | 60 | 60 | 782 | 252 | 90 | 7 | | | | 88 |
| BB&T CORP | A+ | A | A- | A- | 60 | 80 | 60 | 40 | 178 | 66 | 44 | 4 | | | 79 | 89 |
| JPMORGAN CHASE & CO | A+ | A+ | A | A | 60 | 40 | 60 | 40 | 310 | 53 | 50 | 8 | 119 | 85 | 87 | 64 |
| KEYCORP | A- | BBB+ | BBB+ | BBB+ | 80 | 100 | 40 | 40 | 529 | 68 | 31 | 3 | | | | 58 |
| WELLS FARGO & CO | AA | AA- | A+ | A+ | 300 | 80 | 60 | 60 | 243 | 30 | 17 | 1 | | 105 | 77 | 48 |
| PNC FINANCIAL SERVICES GROUP | A+ | A | A- | A- | | 60 | 60 | 60 | 473 | 32 | 40 | 3 | | | | 68 |
| BANK OF AMERICA CORP | A+ | A | A- | A- | 100 | 60 | 60 | 45 | 569 | 240 | 206 | 27 | | 177 | 130 | 67 |
| AMERICAN EXPRESS CO | A | BBB+ | BBB+ | BBB+ | | 40 | 40 | 30 | 188 | 11 | 2 | 1 | | 80 | 74 | 41 |
| CAPITAL ONE FINANCIAL CORP | BBB+ | BBB | BBB | BBB | | 60 | 40 | 30 | 529 | 210 | 129 | 19 | 264 | 125 | 94 | 49 |
| BNP PARIBAS | AA+ | AA | A+ | A+ | 120 | 80 | 80 | 80 | 421 | 29 | 28 | 20 | | 110 | 144 | 69 |
| UNITED OVERSEAS BANK LTD | A+ | A+ | NR | AA- | | | | 30 | 91 | 19 | 14 | 8 | | | 64 | 59 |
| SOCIETE GENERALE SA | AA- | A+ | A | A | | | 80 | 80 | 422 | 114 | 247 | 137 | 108 | 155 | 171 | 94 |
| CITIGROUP INC | A | A | A- | A- | 300 | 40 | 30 | 30 | 925 | 86 | 93 | 10 | 185 | 144 | 127 | 74 |

## Rank correlations for end 2014

|  | Agency ratings | Risk weights | Equity-based PDs | CDS spreads |
|---|---|---|---|---|
| Agency ratings | 1.00 | -0.38 | -0.23 | 0.05 |
| Risk weights | -0.38 | 1.00 | 0.40 | 0.38 |
| Equity-based PDs | -0.23 | 0.40 | 1.00 | 0.51 |
| CDS spreads | 0.05 | 0.38 | 0.51 | 1.00 |

## Rank correlations for pooled data from year ends 2008, 2010, 2012 & 2014

|  | Agency ratings | Risk weights | Equity-based PDs | CDS spreads |
|---|---|---|---|---|
| Agency ratings | 1.00 | -0.48 | -0.09 | -0.12 |
| Risk weights | -0.48 | 1.00 | 0.45 | 0.49 |
| Equity-based PDs | -0.09 | 0.45 | 1.00 | 0.79 |
| CDS spreads | -0.12 | 0.49 | 0.79 | 1.00 |

1. Agency ratings cannot be ignored but they should be combined with other data sources in evaluating bank credit quality
2. Particularly since the crisis, bank ratings have shown too much inertia
3. In more normal times they may be more reliable but in post crisis situations, their dynamics are questionable
4. It is concerning that the rank order of ratings has recently been so little related to those of the other indicators
5. The other measures are not fully convincing alternatives as they appear too volatile (equity-based measures), limited by illiquidity, availability and risk premia (CDS-based measures) and are not plausible discriminators of risk (in case of risk weights).
6. The lesson is that multiple indicators should be combined and used as inputs to internal rating processes

1. What credit analysis tools may be helpful beyond simple indicators and internal ratings frameworks?
2. Some central banks employ capital modelling as a discipline for activities that entail taking on credit risk
3. In this, their approach to risk comes closer to that of private sector financial institutions
4. Calculating the capital demands of particular actions provides a valuable discipline for unregulated institutions like multilateral banks and central banks
5. Doing so increases the visibility of risk taking in a way that is useful to senior management
6. Also, helpful is formal stress testing based on macro scenarios
7. Stress testing may be used by central banks in multiple ways including long term financial planning, stressing internal ratings of positions and stressing capital calculations

- Detailed data templates
- Exportable intermediate outputs

- Results at different points in the calculation flow
- Rich and customisable reports

| Position Data |
| Historical Data |
| Statistical Inputs |
| Macro Scenarios |

**Stressed**

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Ratings,
Recovery rates,
Risk factors,
Financial
Statements

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# Portfolio VaR modelling for a CB
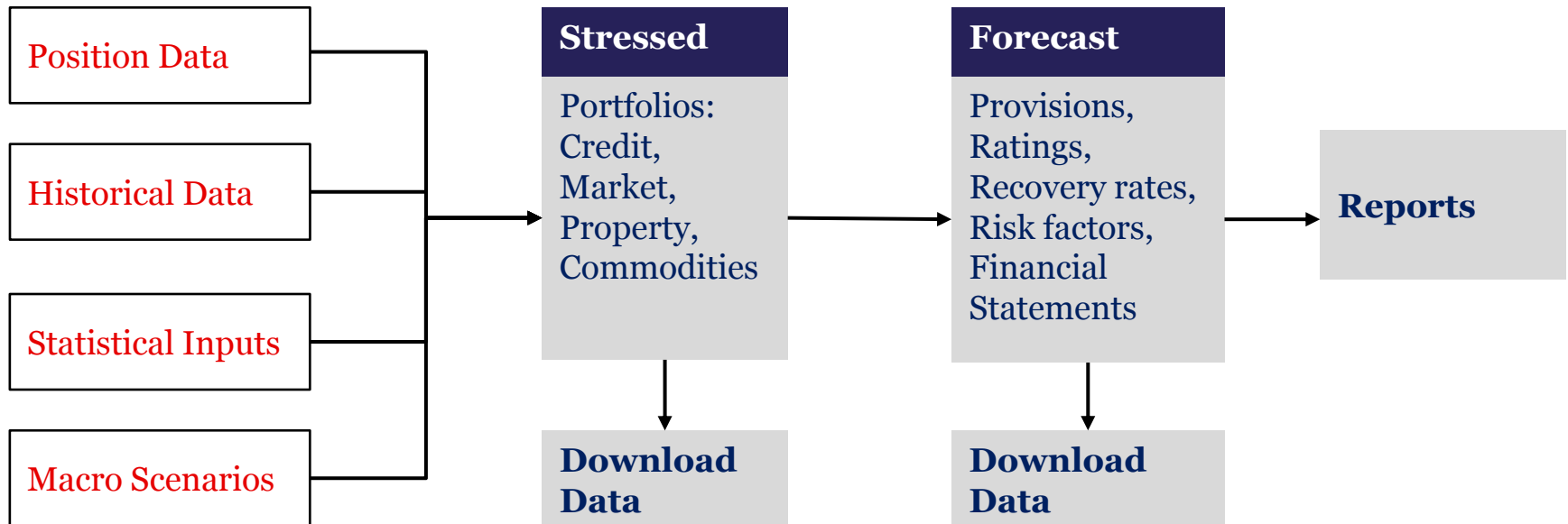
1. Portfolio modelling converts complex dimensions of risk into a simple contribution-to-capital metric
2. It goes far beyond simple limit setting by combining information on exposure size, credit quality and correlation to give a coherent guide to risk mitigation and management actions
3. Combining market and credit risks within the same model allows one to reflect in decision-making the interactions of these two main drivers of CB risk
4. Properly implemented systems offer a workflow of daily risk reports, more detailed longer term analysis and quasi real time capital numbers to guide portfolio managers and traders

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