Session 1.B: Dealing with Uncertainty and Change in Projecting Non-interest Income and Expense in Stress

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Modeling Non Interest Income and Expense

Benefits of Statistical Modeling

- Easy to understand and explain
- Easily fits into established processes
- Directly ties to historical information
- Math is defendable
- Has a direct tie in to macro economics
- Easier to tie in to 14A line items

Limitations of Statistical Modeling

- Factors other than macroeconomics have larger impacts to some of the line items
  - Mergers, regulatory changes – Durbin,
  - Business strategies – free checking
  - Lawsuits, marketing rollouts, divestitures
- Meaningful correlations difficult to find
- Historical Data not always available
Modeling Non Interest Income and Expense

Evolution of non interest income and expense forecasting at BBVA

- Initial approach – 2014 filing to model all non interest income plus salaries using linear regression
  - Developed models at the CCAR 14A line item level
  - Numerous validation issues raised on these models
  - Governance and challenge was difficult as the CCAR level not the level reviewed by management making it difficult to incorporate in Business as Usual processes.
  - Model results in some cases yielded counterintuitive results
  - Had to develop alternate forecasting methodologies to effectively challenge model results

- Revised approach – 2015 filing developed models from the alternative forecasts used in 2014 in addition to linear regression models that do work efficiently
  - Relate income/expense levels to appropriate metrics (i.e. NSFs to deposit levels) with extensively documented assumptions
  - Approach salaries expense through “scenario” discussions with Lines of Business with HR oversight.
  - Run sensitivity analysis on aggregated non interest income and expense results
Evolution of Statistical Modeling – Salaries

Jan 2014 filing – linear regression model

Salaries Model Residual Test

Variants Used:

- CPI
- Fed funds

Summary of Fit:

- Rsquare: 0.873594
- Rsquare Adj: 0.803369
- Root Mean Square Error: 0.018925
- Observations (or Sum Wgts): 43

Durbin Watson:

- DW: 2.0227154
- Autocorrelation: -0.0151
- Prob<DW: 0.03816

Summary Statistics:

- Mean: -8.01e-15
- Std Dev: 0.0151735
- Std Eff Mean: 0.0023139
- Upper 95% Mean: 0.0046697
- Lower 95% Mean: -0.0467
Challenges with results

- Results do not include strategic initiatives.
- Results do not include recent increases in average salaries per FTE – increase in more specialized employees and decrease as operational efficiencies from previous mergers.
- Model results decline immediately as indices drop – question whether Management could respond with HR reductions that quickly. Governance questions need for conservatism.
- Model is run at aggregate level and not by Line of Business whereas some groups (Risk) may need to add expense and others (Sales) may reduce expense.
- Results not consistent with actual management decisions in 2007/2008 time frames.
## Alternative Forecasting Methodologies Considered

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<thead>
<tr>
<th>Salaries - 2014 filing</th>
<th>Salaries Enhancements – 2015 filing</th>
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<tbody>
<tr>
<td>• Used management overlays in the stress to remove the forecasted immediate reduction in salary related to reductions in headcount.</td>
<td>• Developed a qualitative model to analyze salaries expense by line of business and key staff area.</td>
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<td>• Factored in severance costs and delayed execution of any reduction actions.</td>
<td>• Held meetings with the appropriate areas and discussed in detail the stress scenario and what it would mean for their respective area. All discussions are documented in detail.</td>
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<td>• Used overlays to freeze merit increases for one year consistent with historical actions.</td>
<td>• After all groups forecasted the results, the aggregate was reviewed by the Capital Planning Team and Human Resources for reasonableness.</td>
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<td>• Discussed additional salary expenses with those groups who may need to add resources as indicated by the recent financial crisis.</td>
<td>• Qualitative model taken through all model governance processes.</td>
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<td>• Documented impact of workforce reduction in narrative but did not include in results.</td>
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Alternative Forecasting Methodologies Considered

Other non interest items

- Continue to try linear regression correlations where they will work and are practical. Don’t force it.

- Model at levels that management understands and can effectively challenge.

- Use Line of Business expert judgment to determine how to model or alternatively forecast items in a stress situation.

- Use current model governance processes to ensure effective challenge and independent review regardless of methodology used.

- Determine metrics that can be used to forecast items – i.e. number of checking accounts, income per account, transactions per account

- Relate income and/or expense to balance sheet accounts that are tied to macroeconomic models – i.e. loan related legal expense relates to forecasted levels of non performing loans.

- Tie expenses associated with credit to the credit modeling processes – OREO expense relates to forecasted balances for OREO.

- Look for triggers for expense cuts in certain expenses under stress situations – janitorial, repairs, etc.