The views expressed here are my own and not necessarily those of the Federal Reserve or its staff.
An econometric approach to PPNR modeling

• **Begin with a historical time series** of actual or pro forma data assuming that all merged entities were part of the ultimate acquirer as of the beginning of the sample
  – Pro forma allows for firm fixed effects and autoregressive model

• **Macro variables** based on those forecast in scenario
  – Can add other variables, but then you need to know how they vary with those forecast in scenario

• **Historical relationship** between macro variables and revenue components (normalized by asset balances) is estimated and projected into the future for a panel of banks

• **Firm specific differences** arise in model by: controlling for bank asset allocation, fixed effects, allowing coefficients to differ with bank or bank type
Predicting PPNR

Model specification overview

• **Macro variables**
  – Different variables matter for different components of PPNR

What can make this approach firm specific?

• **Lagged dependent variable** i.e. the dependent variable in question for the same firm in the previous calendar quarter

• Controls for firm characteristics: *size* and the **composition of assets**

• Can include **BHC dummies** or fixed effects

• Can separately estimate for different firms or firm types
How to capture acquisitions? Pro forma

**Pros**
- Accounts for current geographic reach and diversification of business
- Does not confuse trends generated by acquisitions with organic business trends

**Cons**
- Summation of separate businesses does not allow for economies of scale or changes to integrated businesses
- Data can be difficult to get
How to capture business changes? Ratios

• Pros
  – Smooths acquisitions
  – Does not confuse trends generated by acquisitions with organic business trends
  – Allows for revenues to be associated with appropriate asset investment
  – Captures changes in business focus

• Cons
  – Some revenue streams may not vary with balance sheet assets (i-banking, asset management)
  – Requires link between PPNR and balance sheet models for internal consistency
Model choices – Levels of ratios

• Pros
  – AR captures persistence of revenue
  – Prevents model from generating unrealistic results because model is grounded in historical level rather than change
  – Can converge to historical mean (bank level or industry level)

• Cons
  – False sense of security from high r-squared

• Other choices: changes in levels, changes in levels of ratios
What’s a good model?

• Based on data
  – When judgment replaces data, should be a good reason
• Consistent with historical performance
• Consistent with recent trends in industry and bank-specific
• Consistent with economic intuition – revenue should not increase in a crisis, recent bad trends should not become good in a crisis, etc.
• Good budgeting for normal times may not be a good framework for predicting stress outcomes
## What’s a good model?

<table>
<thead>
<tr>
<th>Test</th>
<th>Pros</th>
<th>Cons</th>
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<tbody>
<tr>
<td>Adj-R squared</td>
<td>• Methodologically sound</td>
<td>• Easy to over fit with limited data</td>
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<td></td>
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<td>• May produce odd results if macro variables are correlated</td>
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<tr>
<td>vs. actual realizations (1Q ahead)</td>
<td>• Traditional forecasting test</td>
<td>• Good performance in baseline ≠ good performance in stress</td>
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<tr>
<td>vs. 2007-8 actual realization</td>
<td>• Relevant stressed data</td>
<td>• Business may have changed</td>
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<tr>
<td>vs. actual in recession</td>
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</tr>
<tr>
<td>Base vs. Stress</td>
<td>• Reality check</td>
<td>• Hard to know what the absolute level of difference should be</td>
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