Pre-Provision Net Revenue (PPNR): Research and Development

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The views expressed in this paper are those of the authors and do not necessarily reflect the position of the Board of Governors, the Federal Reserve Bank of New York, or the Federal Reserve System.
Introduction

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1. Define PPNR as it pertains to stress tests
2. Describe the current modeling approach
3. Discuss a possible innovation to firm fixed effect calculations
**Pre-Provision Net Revenue (PPNR)**

- PPNR is the sum of:
  - Net interest income
  - Noninterest income less noninterest expense

- Overall PPNR includes losses from operational risk events and OREO expenses, but these are modeled separately

- PPNR does not include provisions for credit losses on loans or gains and losses on securities
PPNR is a significant portion of projections

<table>
<thead>
<tr>
<th>Item</th>
<th>Billions of dollars</th>
<th>Percent of average assets¹</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre-provision net revenue²</td>
<td>492.3</td>
<td>3.0</td>
</tr>
<tr>
<td>Other revenue³</td>
<td>0.0</td>
<td></td>
</tr>
<tr>
<td><strong>less</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Provisions</td>
<td>481.7</td>
<td></td>
</tr>
<tr>
<td>Realized losses/gains on securities (AFS/HTM)</td>
<td>10.0</td>
<td></td>
</tr>
<tr>
<td>Trading and counterparty losses⁴</td>
<td>113.0</td>
<td></td>
</tr>
<tr>
<td>Other losses/gains⁵</td>
<td>26.1</td>
<td></td>
</tr>
<tr>
<td><strong>equals</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Net income before taxes</td>
<td>-138.5</td>
<td>-0.8</td>
</tr>
</tbody>
</table>

**Memo items**

| Other comprehensive income⁶                              | -31.8               |                           |

**Other effects on capital**

<table>
<thead>
<tr>
<th>Actual 2017:Q4</th>
<th>2020:Q1</th>
</tr>
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<tbody>
<tr>
<td>AOCI included in capital (billions of dollars)⁷</td>
<td>-53.2</td>
</tr>
</tbody>
</table>

PPNR above includes operational risk losses of $135bn
The PPNR models 24 components of revenue

- **Interest income**: Loans, interest bearing balances, UST, MBS, fed funds and repo, trading, securities, other

- **Interest expense**: Domestic time deposits, other domestic deposits, foreign deposits, fed funds and repo, trading and other borrowed money, subdebt, other

- **Noninterest income**: service charges on deposits, servicing fees, i-banking, fiduciary and insurance fees, other, trading

- **Noninterest expense**: Compensation, fixed assets, other
The PPNR model contains various approaches

Current modeling approaches differ among components:

1. **Autoregressive models** relate PPNR component ratios to historical ratios, BHC characteristics and macroeconomic variables

2. **Instrument level models** calculate expenses from granular information on yields and maturities (subordinated debt expense)

3. **Simple models** based on recent firm level performance
Estimation data is the panel of stress-tested banks

- Panel data constructed using public bank and regulatory filings (Y9C)
  - Critical advantage of this data is a long consistent time-series

- Estimation panel uses pro forma data which assumes merged entities are part of the ultimate acquirer as of the beginning of the sample (~1991Q1)

- Estimation and projections use a “top down” approach, rather than “bottoms up” approach
  - Emphasizes consistent treatment of components across banks
Pro Forma PPNR ratio over time

Aggregate PPNR/Total Assets

Pro forma Y-9C data including unbalanced panel of 38 DFAST BHCs excluding PPNR items modelled by other teams (op. risk, OREO) and DVA.
Autoregressive models with firm fixed effects

- PPNR components are modeled as ratios, expressed as a share of a relevant asset or liability balance
  - Projections converge towards the firm’s own post-crisis average
  - The post-crisis period in here is 2009:Q4 onwards
  - Projections also vary in response to macroeconomic conditions

- The convergence to firm-specific post-crisis averages was phased-in during DFAST 2017 and fully implemented in DFAST 2018

- Some components are split into two groups of firms and sensitivities to macrovariables can vary across groups
The firm fixed effect model improves performance

Figure A. Hypothetical revenue projections from the original and enhanced PPNR models

Source: DFAST 2017 disclosure
Implications of the current fixed effect approach

- As more post-crisis data is added, historical firm performance is estimated over a longer time span
  - Improves stability
  - But new data becomes less impactful due to an ever larger estimation window

- Firm averages maybe less sensitive to recent developments in firm performance and underlying changes in business models
Under a “rolling-window” approach, projections converge towards recent average performance (e.g. past 5 or 8 years) rather than the post-crisis average.

Advantages
- Increases sensitivity of results to recent performance
- Incorporates changes in business models more quickly

Disadvantages
- Increases year-to-year variability in projections
- May extrapolate more temporary changes in performance into projections
- Transition will impact projections for individual firms
Impact of long vs. short rolling windows

Hypothetical Revenue Projections From Models With Short and Long Windows

Firm A
- Long
- Short

Firm B
- Short
- Long

Historical → Projection

Dashed vertical line denotes separation between historical data and projection. Dotted vertical line signifies end of short window informing projections.
Evaluating the rolling-window approach

- Conduct performance testing to identify optimal window size and compare to current model
  - Out-of-sample errors
  - In-sample errors

- Respecify components models with the new structure to identify optimal specification
  - Bank characteristics
  - Lag structure
  - Macrovariables