Career for Statisticians in Commercial Banking

Presentation for National Institute of Statistical Sciences

Daniel Tu
Citizens Financial Group

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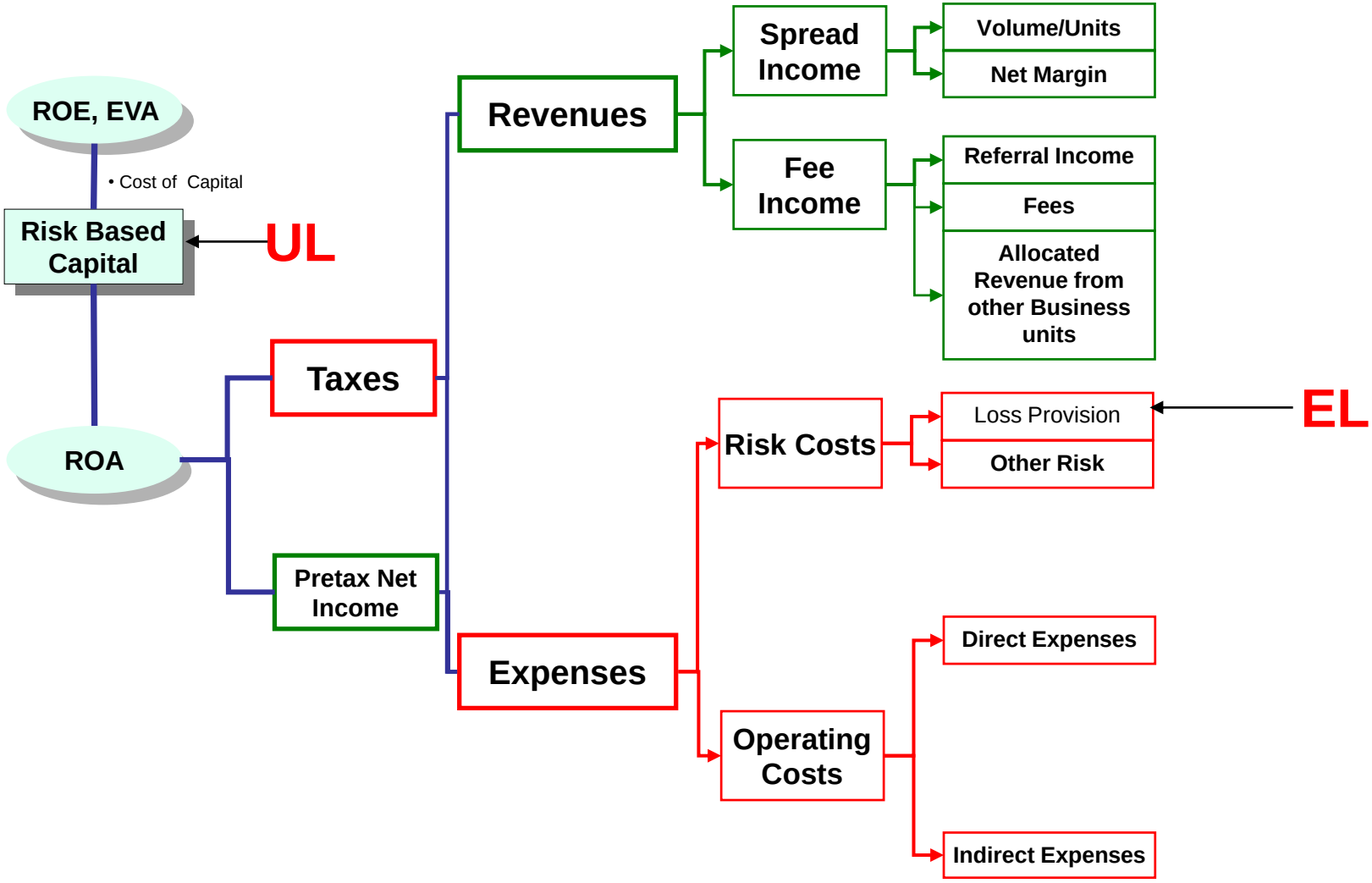
Models Used in Commercial Banks - Overview

- Banks use models in areas such as underwriting, risk measurement, portfolio management, fraud detection, fair lending assessment, market risk valuation, capital management, and product pricing.
- Models in bank setting are quantitative method, system, or approach that applies statistical, economic, financial, or mathematical theories, techniques, and assumptions to process input data into quantitative estimates.
  - ✓ Also covers approaches that that are qualitative and expert judgment based, provided that results are quantitative in nature
  - ✓ Data driven non-model analytical approaches are also used widely
- Statistical techniques include parametric and non-parametric methods, simulation, and decision trees, etc. AI/Machine learning is gaining momentum in certain areas of modeling.
- Bank model are empirical models with high uncertainty related to modeling human behaviors
- Heightened attention on model risk management over past decade

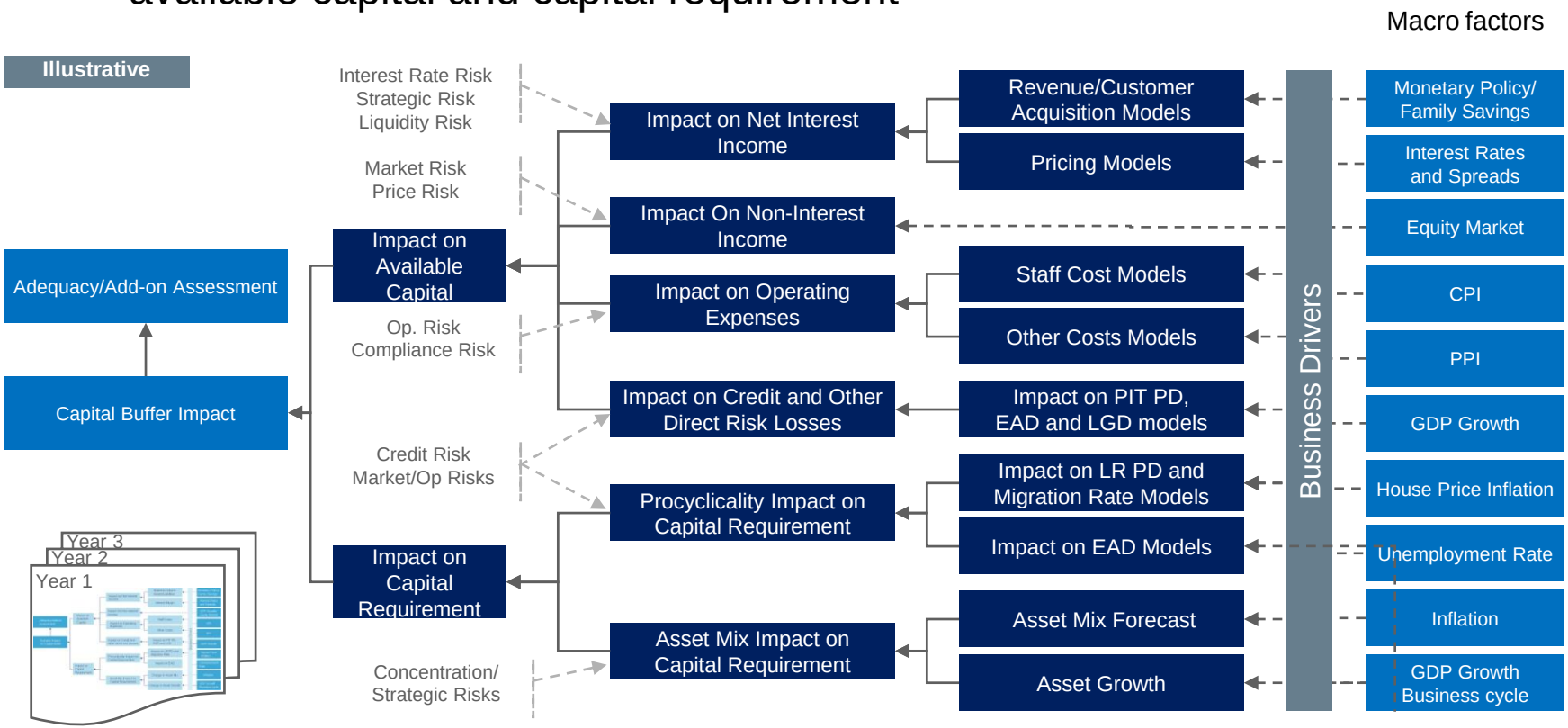
The Basic Banking Profitability Model Illustration

It is important to understand how banking industry survive in a competitive industry.

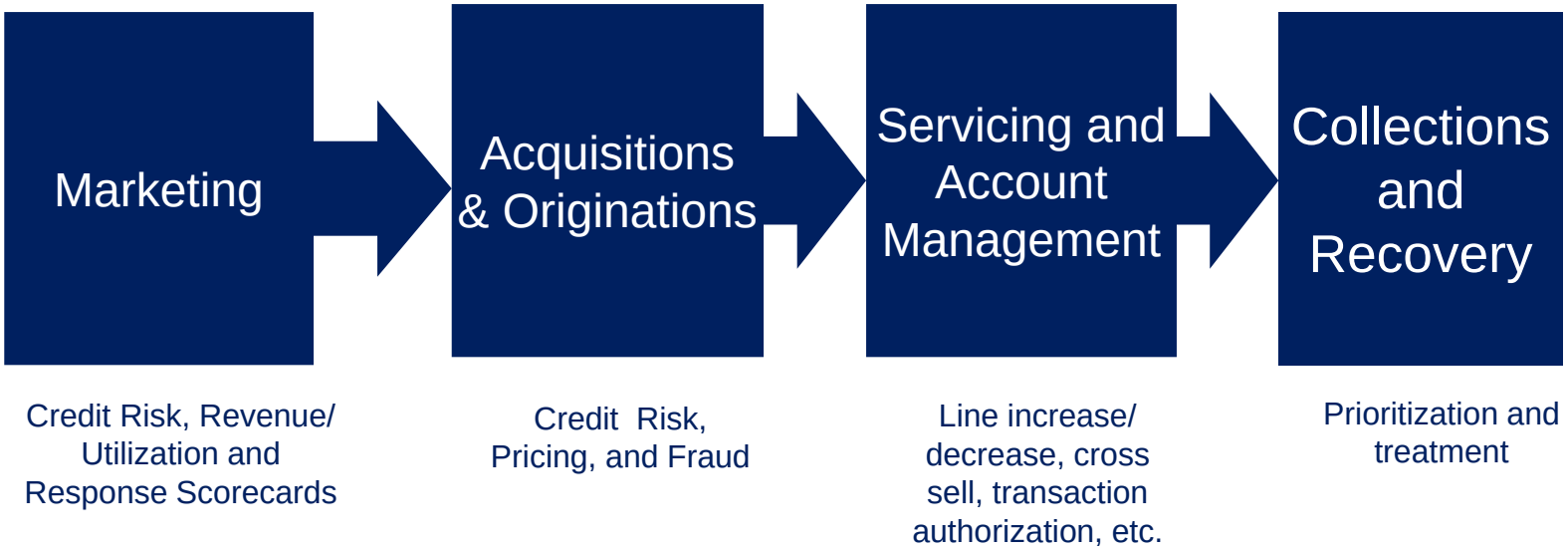


Bank Modeling Framework Illustration

Many models are used to translate macro and micro factors into impacts on available capital and capital requirement



Models Used in Credit Product Lifecycle

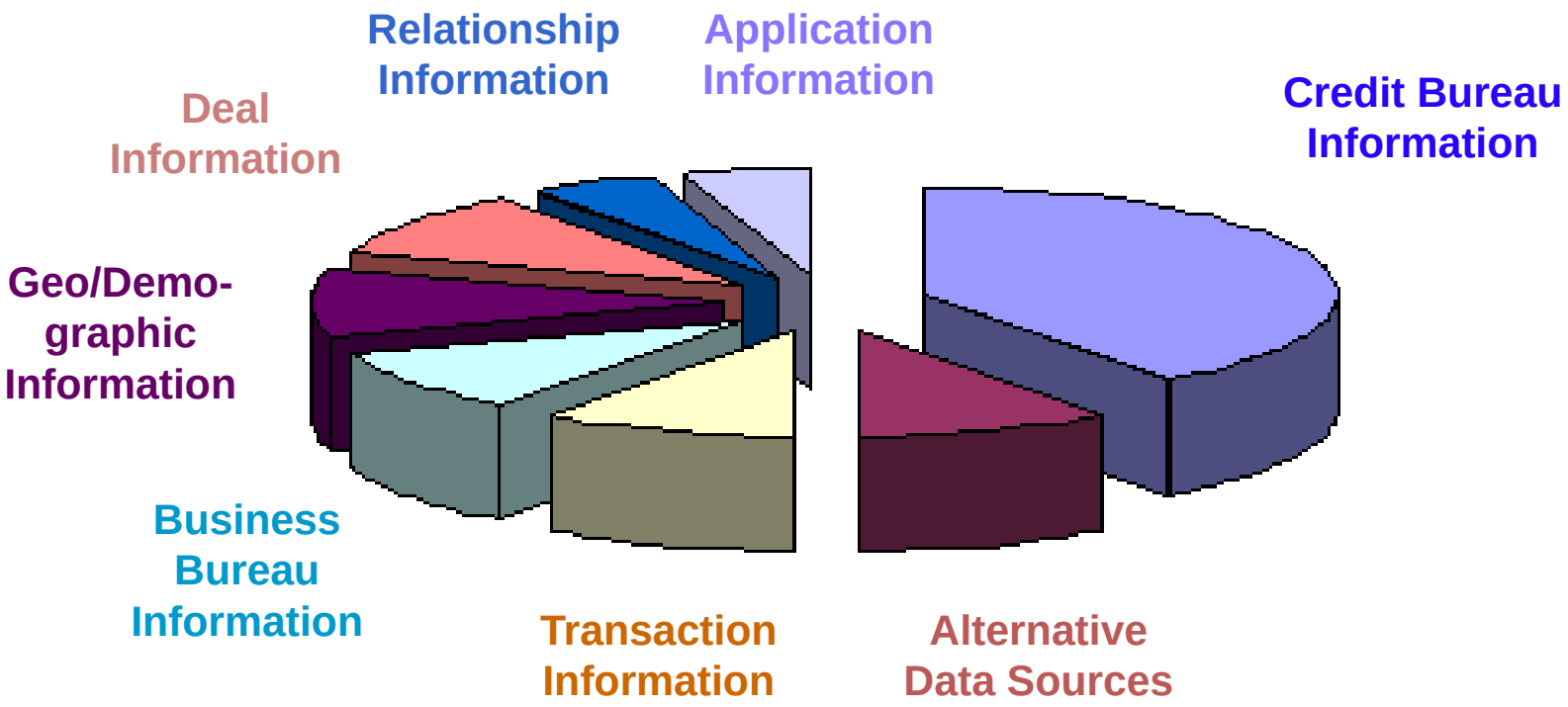


- Models are used throughout the credit lifecycle management process.
- It is gaining increasing influence as financial institutions are facing mounting customer and account performance information.
- It is a competitive advantage for institutions that can effectively use models in assisting decision making.
- Core competence for “Competing on Analytics”.

Other Types of Statistical Models

- Fair Lending models
  - ✓ Detect potential discriminatory behavior in making lending decisions
- Balance models
  - ✓ Deposit balance, credit balance, asset under management balances
- Yield/NIM models
  - ✓ Total yield, cost of fund, net interest margin,
- Fee models
  - ✓ Cash management, debit interchange, overdraft, capital market syndication, asset management fees
- Expense models
  - ✓ Staff expenses, operating expenses, other expenses
- Market Risk, Operational risk, Internal Risk Rating, Investment Risk , mis-conduct and other models tied to evaluate all types of risks

Data Sources



Data Challenges and Lessons in Modeling

- Many data are simply not captured, such as business strategy, marketing campaigns, business officer hiring and product feature changes.
- Limited data history over a particular business environment, heavily relying on recent history and Great Recession experience
- Regulatory changes affect underlying data patterns
- Establish a hypothesis with sound business and economic linkage even before collecting the data
- Understand different sources of data and how the data reconciles
- Understand data risk if derived from alternative sources
- Collecting “soft” data such as key business policy, strategy, product and pricing changes, as well as organizational and acquisition/divestiture points.

Model Risk Management (MRM) Function

- A relatively new and independent function to better manage model risk within a financial institution after last financial crisis
- Model risk increases with the greater model complexity, higher uncertainty about inputs and assumptions, broader use, and larger potential impact.
- Models are abstract and simplifications of real world events, model risk arises from
  - ✓ flaws in data, assumptions, designs and calculation errors
  - ✓ Inappropriate or incorrect usage
- Model risk should not only be managed on individual basis, but also in aggregate taking model interdependency into account
- Effective challenge as a guiding principle for managing model risk
  - ✓ Conducted by competent staff with technical and modeling skills
- Consider multiple tools in managing model risk as it can't be eliminated

Banking Regulator Model Risk Guidance (OCC11-12 or FR 11-7)

Sound model risk management should include three key elements

I. Governance, Policies, Controls

Board of Directors and Senior Management
Policies and Procedures
Roles and Responsibilities
Internal Audit
External Resources
Model Inventory and Documentation

II. Development, Implement, Use

Fit for purpose
Data assessment and assumptions
Model testing
Judgmental and qualitative aspects
IT support systems
Model use and reporting

III. Model Validation

Effective challenge standard
Comprehensive validation requirement
Conceptual Soundness
Ongoing monitoring
Outcome analysis
Validation of vendor models

Hiring in Banking Industry

- Commercial Banks
  - ✓ Mega banks, super regionals, regional banks, large community and credit unions
- Monoline financing companies
- Consulting firms
  - ✓ Big 4, other major consulting firms, boutiques focusing on financial services marketing, model development, and
- Financial System solutions firms
- Financial data providers
- FinTechs serving financial services industry

Variety of job titles, job description is the most important

Research the industry landscape and company strategy/culture to decide what type of firms and culture you want to work in.

Need Talents that Can Link Statistics to Business Intuition and Explain to the Audiences

- A business data driven model is not a scientific one, it is an empirical one
- Need to put models in business action that generate measurable results to drive business success
- Need to interpret the model and results to business managers, defend the model in front of auditors, regulators and validators
- Business intuition should not stop at directional sense, but magnitude sense
- Ready to discard model if it does not make sense from directional and sensitivity intuition and adopt a hybrid or judgmental approach
- Understand strength and weakness of a model and use it in the right context is more important than a complicated solution with marginal statistical power

Recap

- What are the job opportunities for statisticians/data scientists/analysts in your organization?
- Describe the range of skills statisticians/data scientists/analysts need to succeed in your organization?
- What is the career path for statisticians/data scientists/analysts in your organization?
- Is your organization currently hiring statisticians/data scientists/analysts?
- What advice would you give to students based on your experience?