Banking transactions analysis using SAS software

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Introduction

• Established in 1996
• Full range of banking products for corporate and individual customers
• 5 branches in Moscow and 1 branch in Saint-Petersburg
• Using the SAS® software since 2000
Banking Transactions

What do we call “transactions”?

- Actions that change the state of General Ledger table
- Types of Transactions
  - Automatic Transactions
    (standard operations, deals)
  - Manual Transactions
  - Batch Transactions
Transactions Analysis

The main types of transactions analysis

- Internal Control
- Analytical Reports
  (based on aggregated data)
Internal Control

Daily analysis of the individual transactions put in the banking system

- Commissions charges
- Current Accounts and Deposits Interest rate
- Deals Type/Sub-type
- Money Laundering
- Standing Data check (for the purpose of correct aggregation)
Internal Control

Business Case: Money Laundering

- Daily Reports
  - Suspicious Countries
  - Big Size Deals (more than USD 20,000)
- Requirements of the Central Bank of Russia

Central Bank Satisfaction!!!
Analytical Reports

Daily and monthly analysis of the bank’s departments activity

- Branches Performance
- Risk Analysis
- Plastic Cards Analysis
- Customers Profitability
Branches Performance

Analysis of the operations performed in branches, competition between branches

- Number of operations made
- Amount of commissions charged
- Customer’s deposits and loans presented
- Number of opened accounts for new customers
Branches Performance

Business case: What to do if branch managers want more…

… staff … software … funding …?

- Daily (monthly average) statistics
  - Operations performed by the staff
  - Number of new customers
  - Borrowed amounts
- Comparing statistics taking into account existing staff number
Risk Analysis

Daily analysis of different risks aspects

- Yield of Assets and Liabilities Cost
- Exposure management
- Credit Portfolio Analysis
Plastic Cards Analysis

Consolidated daily and monthly analysis of cardholders activity

- Different cards types statistics
- Top 100 countries, cities, currencies and merchants
- Analysis activity for different merchant types
Plastic Cards Analysis

Business Case: Car Loans

• Car Loans
  • Scheme Development
  • Car Dealers
• Statistics on Plastic Cards usage
  • Usage of cards for buying cars and car accessories
Customers Profitability

Consolidated daily and monthly analysis based on matrix scheme

- Accounts Profit Centers
- Products Profit Centers

<table>
<thead>
<tr>
<th></th>
<th>Product X</th>
<th>Product Y</th>
<th>Product Z</th>
</tr>
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<tbody>
<tr>
<td>Customer X</td>
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<td>Customer Y</td>
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<tr>
<td>Customer Z</td>
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</table>
How it works...

- Computing Environment at Raiffeisenbank
- Types of analysis
  - Internal Control
  - Analytical Reports
- Transactions and their Attributes
- Multidimensional Analysis
- Means of Information Delivery
Computing Environment

Operative Environment

- Main banking system
  - DB2 on AS/400
- Additional applications
  - Securities
  - Cards
  - Retail Banking
  - Payment Operations
  - …
Computing Environment

Analytical Environment

- SAS Software
  - Base SAS
  - SAS/Access to ODBC
  - SAS/MDDDB Server
- Windows NT Server
Transaction Analysis

Types of analysis

- Internal Control
  - Individual transactions
  - Predefined algorithms and rules
  - Static reports generation
- Analytical Reports
  - Aggregated data
  - Arbitrary queries
  - OLAP tools and dynamic applications
Transactions Attributes

- Primary Attributes
  - Can be directly obtained from transaction record
- Derived Attributes
  - Joining transaction records with related reference tables
  - Applying some kind of business logic or transformations to primary attributes
Transactions Attributes

Primary Attributes

- Dates
  - Deal Date (Posting Date)
  - Start Date (Value Date)
  - End Date (Maturity Date)
- Transaction ID
- Transaction Groups and Categories
- Account and Customer Numbers

- Currency
- Branch
- Amounts and Rates
Transactions Attributes

Derived Attributes

• Reference Attributes
  • Customer Type (Banks, Corporate Customers, or Individuals)
  • Customer Branch
  • Currency Type (Hard or Soft)

• Tenor
  • End Date – Start Date = Original Maturity Tenor
  • End Date – Current Date = Remaining Maturity Tenor
Transactions Attributes

Derived Attributes

- Deals Range
  - All active deals
  - Today’s Deals (WHERE clause: Deal Date = Current Date)

- Equivalent Amounts (required for data aggregation)
  - Amount in Rouble Equivalent
  - Amount in US Dollar Equivalent
Multidimensional Analysis

Dimensional Models

- Dimensions (determined by transaction attributes)
- Granularity level
  - Part of Individual Deal (Commissions)
  - Individual Deal
  - Customer
  - Customer Types
- Aggregation
  - Only additive statistics (Sum, Weighted Sum, N)
**Detail Transactions Data**

Example: MoneyMarket Borrowing

- Transaction Group
  - MoneyMarket Borrowing
- Transaction Categories
  - Call Deposits and Term Deposits
- Transactions lasting through time
  - Deal Date, Value Date, and Maturity Date
- Account Number, Customer Number, Currency
- Transaction Amount and Interest Rate
OLAP Considerations

Decisions that should be made

- **Outstanding Maturity and/or Remaining Maturity Tenor Type** (amount of data aggregated each day, processing time)
  - Today’s deals (400 deals)
  - All active deals (20,000 cells)
- **Granularity level** (cube size, 20,000 vs. 300 cells)
- **Historical Data or Time Dimension** (cube size)
  - 300 cell in total or 300 each day
**Data Processing Scheme**

- **Detail Table** (All active deals)
- **Reference Tables**
- **Join, Equivalent Amounts**
- **Original Maturity Tenor Calculation**
- **Remaining Maturity Tenor Calculation**
- **Concatenation**
- **Σ**
- **OLAP**
- **Logical Detail Table**
- **Reporting procedures (ODS)**
SAS Tools for Data Processing

- Access to external data – ODBC
- Joins and calculated variables – PROC SQL
- Data aggregation – PROC MEANS
- Concatenation – DATA step, PROC APPEND
- Building OLAP cubes – PROC MDDB
- Generating Reports – PROC TABULATE / REPORT / PRINT
Means of Information Delivery

SAS/EIS applications

- First stage (4 months)
- Implementing Data Processing Scheme
- Small number of users (2-4)
- SAS/EIS applications used to verify that the calculations done by developed SAS programs are correct
Means of Information Delivery

Static reports sent by E-mail

- Second Stage (1 year)
- Automatically generated reports (HTML, XLS)
- Sent by E-mail
- Number of users have grown up to 120
- Number of reports have grown up to 250
Means of Information Delivery

Web-application for navigating static reports

- Third stage (now)
- Reports are copied to a Web-server
- Web-application for navigating static reports (by date / month)
Means of Information Delivery

Evolutionary Process

- SAS/EIS applications
- Automatically generated reports sent by E-mail
- Web-application for navigating static reports
- What’s coming next? ...

... Dynamic Web-applications!
Contacts

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Thanks for your attention!