Banking Client Analysis

Transforming Data into Strategic Insights

A comprehensive analysis of 3,000 banking clients to understand customer profiles, product usage, and financial behavior patterns for improved engagement and profitability.

Project Roadmap

01

Data Preparation

Merged 4 sheets into unified dataset with 3,000 rows and 25 columns
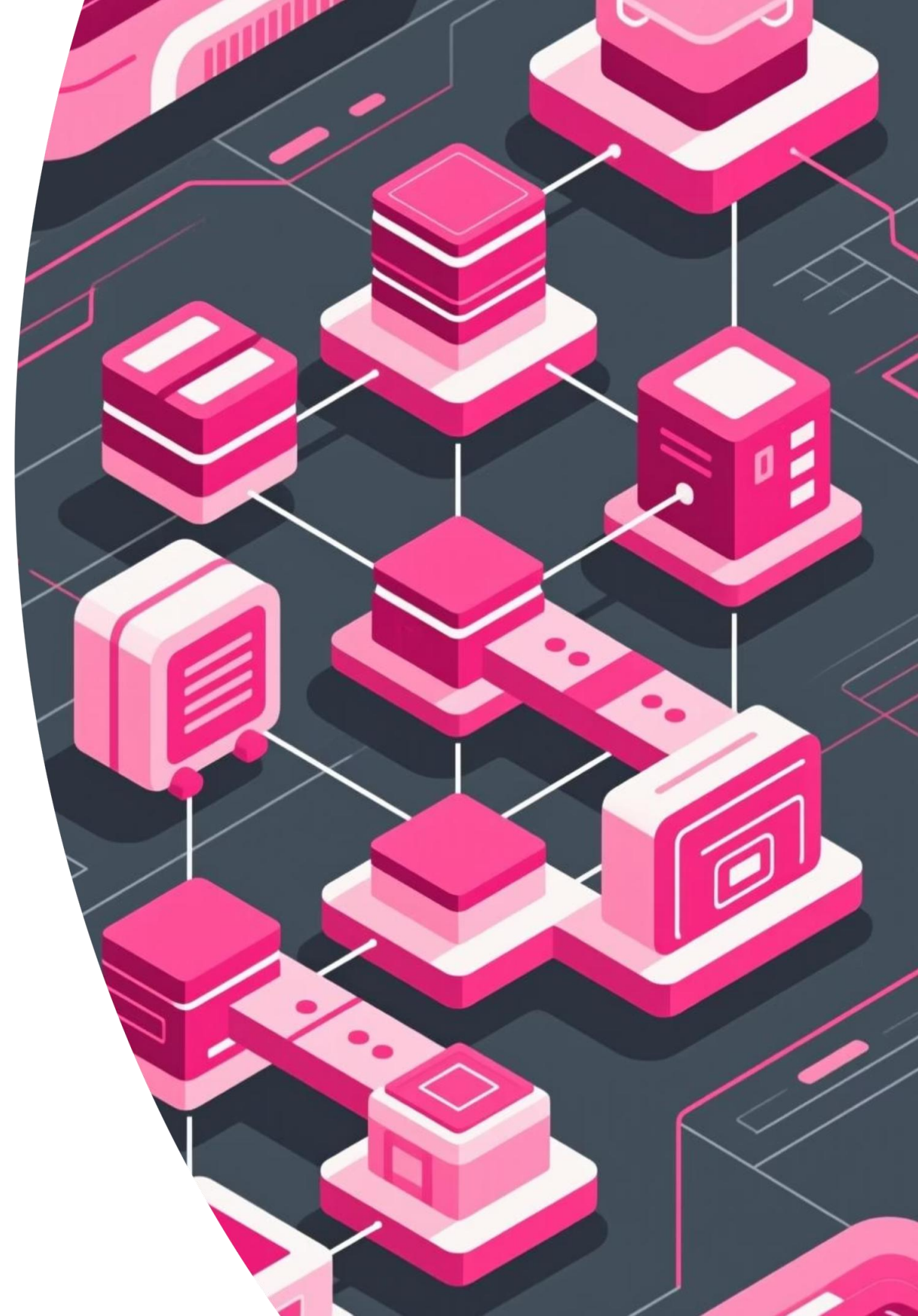
02

Exploratory Analysis

Python-based EDA using Pandas, Matplotlib, and Seaborn in Jupyter Notebook

03

Interactive Visualization

Power BI dashboards for business insights and decision-making

Data Foundation

Raw Data Sources

- Clients sheet
- Gender demographics
- Banking Relationship details
- Investment Advisor mapping

Integrated into MySQL for seamless analysis with Python and Power BI using SQLAlchemy.

Data Cleaning

- Missing values checked and column renamed as per required
- Gender, Branch, and IA IDs replaced with meaningful labels
- Standardized categorical values
- Verified numerical accuracy

```python
# Rename the columns as required
df = df.rename(columns = {"ï»¿Client ID":"Client ID","BRId":"Banking Relationship","GenderId":"Gender","IAId":"Investment Advisor Id"})

df.head()
```

	Client ID	Name	Age	Location ID	Joined Bank	Banking Contact	Nationality	Occupation	Fee Structure	Loyalty Classification	...	Checking Accounts	Saving Accounts	Foreign Currency Account	Business Lending	Properties Owned
0	IND81288	Raymond Mills	24	34324	06-05-2019	Anthony Torres	American	Safety Technician IV	High	Jade	...	603617.88	607332.46	12249.96	1134475.30	1
1	IND65833	Julia Spencer	23	42205	10-12-2001	Jonathan Hawkins	African	Software Consultant	High	Jade	...	229521.37	344635.16	61162.31	2000526.10	1
2	IND47499	Stephen Murray	27	7314	25-01-2010	Anthony Berry	European	Help Desk Operator	High	Gold	...	652674.69	203054.35	79071.78	548137.58	1
3	IND72498	Virginia Garza	40	34594	28-03-2019	Steve Diaz	American	Geologist II	Mid	Silver	...	1048157.49	234685.02	57513.65	1148402.29	0
4	IND60181	Melissa Sanders	46	41269	20-07-2012	Shawn Long	American	Assistant Professor	Mid	Platinum	...	446644.25	128351.45	30012.14	1674412.12	0

5 rows × 26 columns

```
Client ID                  0
Name                       0
Age                        0
Location ID                0
Joined Bank                0
Banking Contact            0
Nationality                0
Occupation                 0
Fee Structure              0
Loyalty Classification     0
Estimated Income           0
Superannuation Savings     0
Amount of Credit Cards     0
Credit Card Balance        0
Bank Loans                 0
Bank Deposits              0
Checking Accounts          0
Saving Accounts            0
Foreign Currency Account   0
Business Lending           0
Properties Owned           0
Risk Weighting             0
BRId                       0
GenderId                   0
IAId                       0
Income Band                0
dtype: int64
```

```python
# Generating rows and columns
df.shape
```

```
(3000, 25)
```

```python
# Generating descriptive statistics for the dataframe
df.describe()
```

	Age	Location ID	Estimated Income	Superannuation Savings	Amount of Credit Cards	Credit Card Balance	Bank Loans	Bank Deposits	Checking Accounts	Saving Accounts	Foreign Currency Account
count	3000.000000	3000.000000	3000.000000	3000.000000	3000.000000	3000.000000	3.000000e+03	3.000000e+03	3.000000e+03	3.000000e+03	3000.000000
mean	51.039667	21563.323000	171305.034263	25531.599673	1.463667	3176.206943	5.913862e+05	6.715602e+05	3.210929e+05	2.329084e+05	29883.529993
std	19.854760	12462.273017	111935.808209	16259.950770	0.676387	2497.094709	4.575570e+05	6.457169e+05	2.820796e+05	2.300078e+05	23109.924010
min	17.000000	12.000000	15919.480000	1482.030000	1.000000	1.170000	0.000000e+00	0.000000e+00	0.000000e+00	0.000000e+00	45.000000
25%	34.000000	10803.500000	82906.595000	12513.775000	1.000000	1236.630000	2.396281e+05	2.044004e+05	1.199475e+05	7.479440e+04	11916.542500
50%	51.000000	21129.500000	142313.480000	22357.355000	1.000000	2560.805000	4.797934e+05	4.633165e+05	2.428157e+05	1.640866e+05	24341.190000
75%	69.000000	32054.500000	242290.305000	35464.740000	2.000000	4522.632500	8.258130e+05	9.427546e+05	4.348749e+05	3.155750e+05	41966.392500
max	85.000000	43369.000000	522330.260000	75963.900000	3.000000	13991.990000	2.667557e+06	3.890598e+06	1.969923e+06	1.724118e+06	124704.870000

```python
gender_map = {1:"Male",2:"Female"}

branch_map = {1:"Retail",2:"Institutional",3:"Private Bank",4:"Commercial"}


df['Gender'] = df['Gender'].map(gender_map)

df['Banking Relationship'] = df['Banking Relationship'].map(branch_map)
```
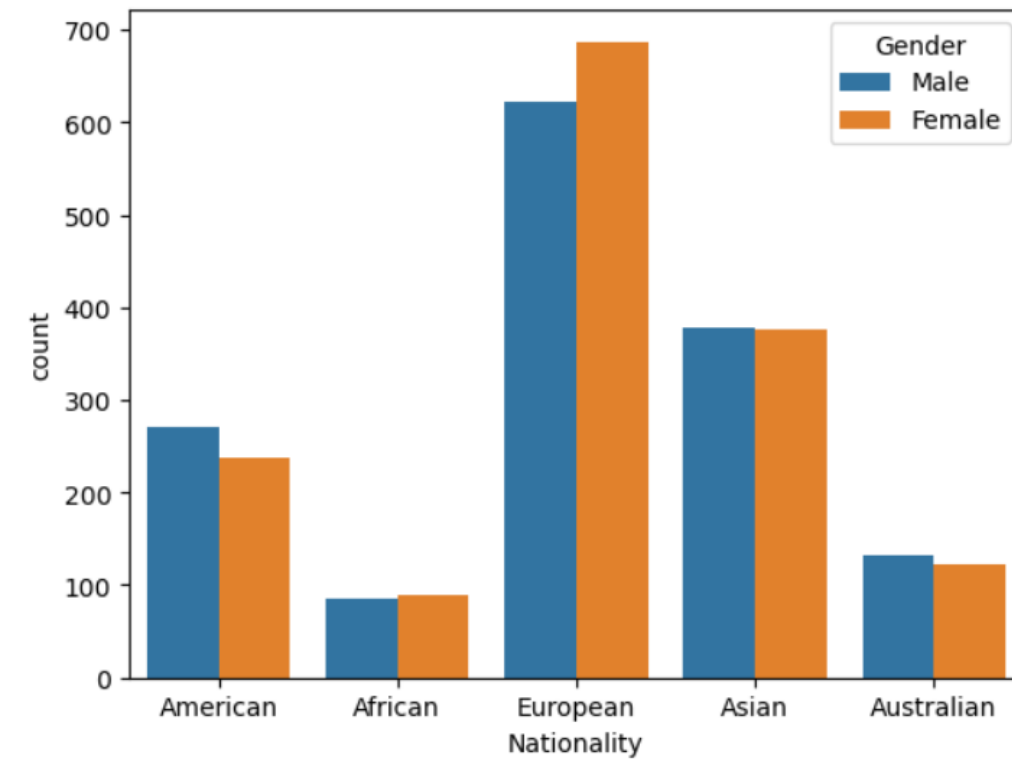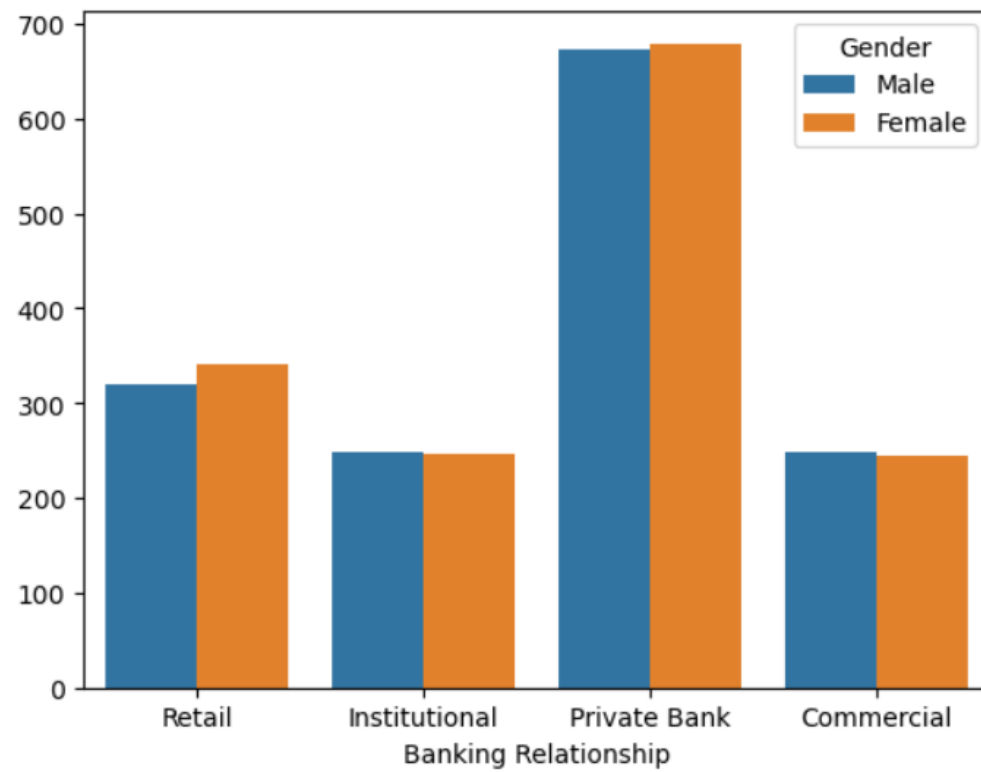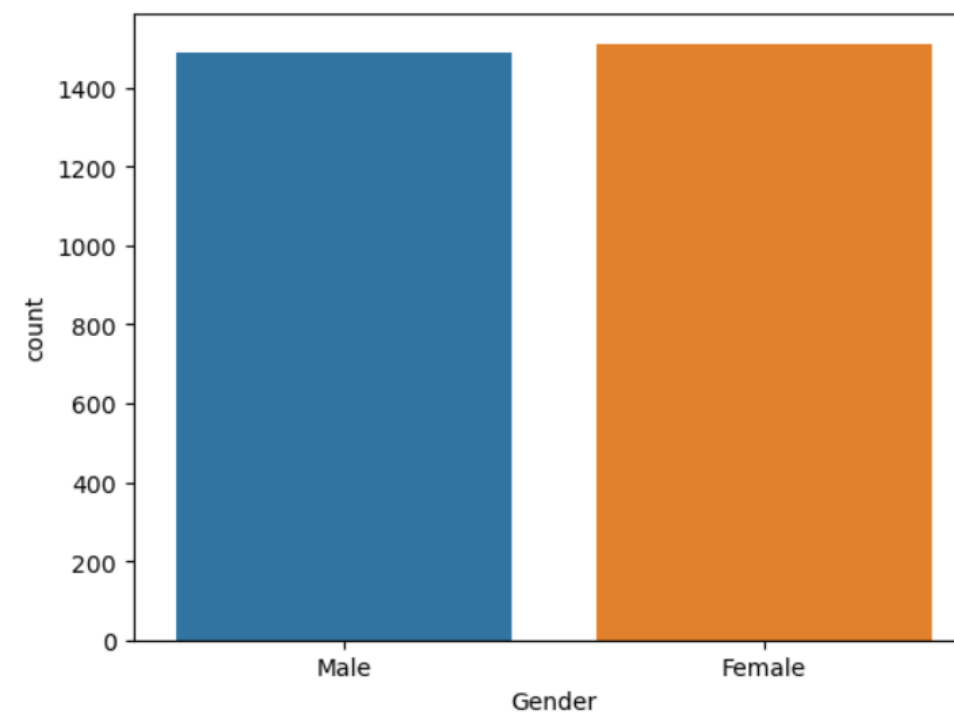
Customer Demographics

Gender Distribution

Males slightly outnumber females, showing fairly even balance with no major bias in financial behavior.

Banking Relationships

Private banking clients form the majority, representing the most valuable segment.

Nationality Mix

European and Asian clients dominate the customer base across 5 nationalities.

Income & Client Segmentation

Medium-Income Segment

Largest client group driving 53% of total lending and 54% of deposits

22 Investment Advisors

Managing diverse client portfolios with varying value levels

195 Occupations

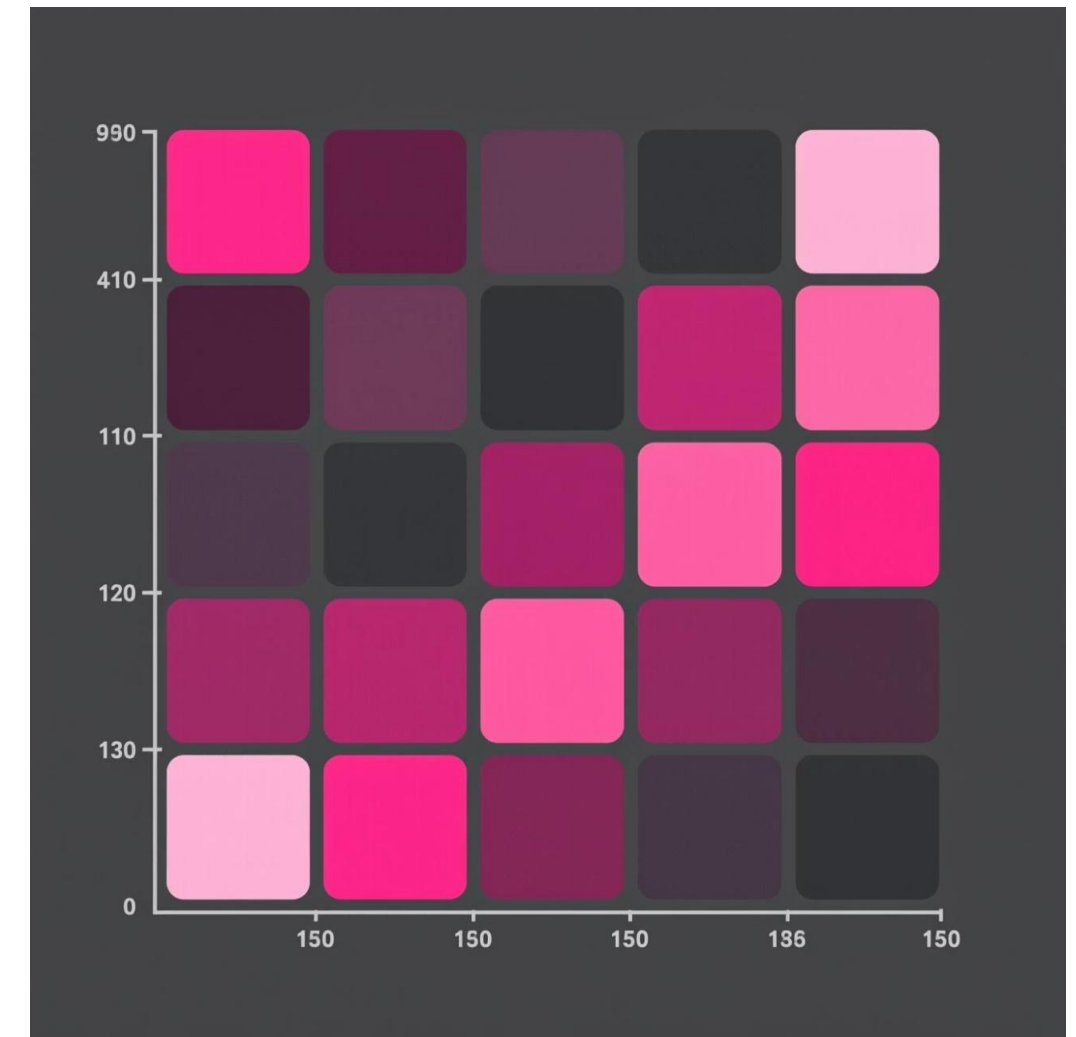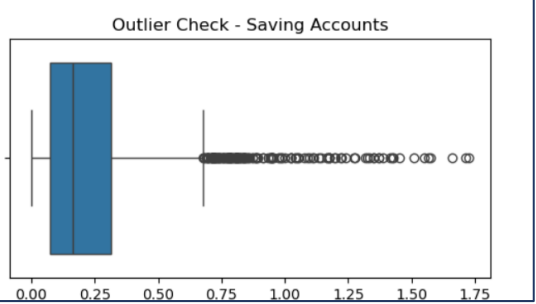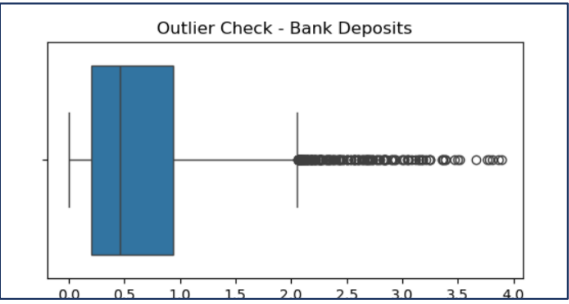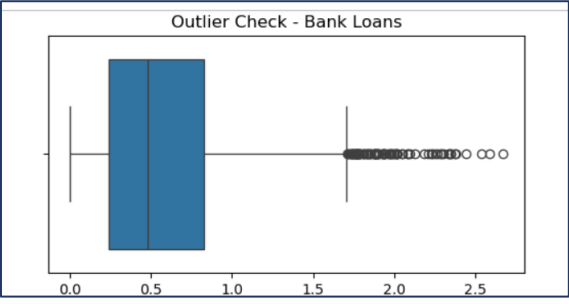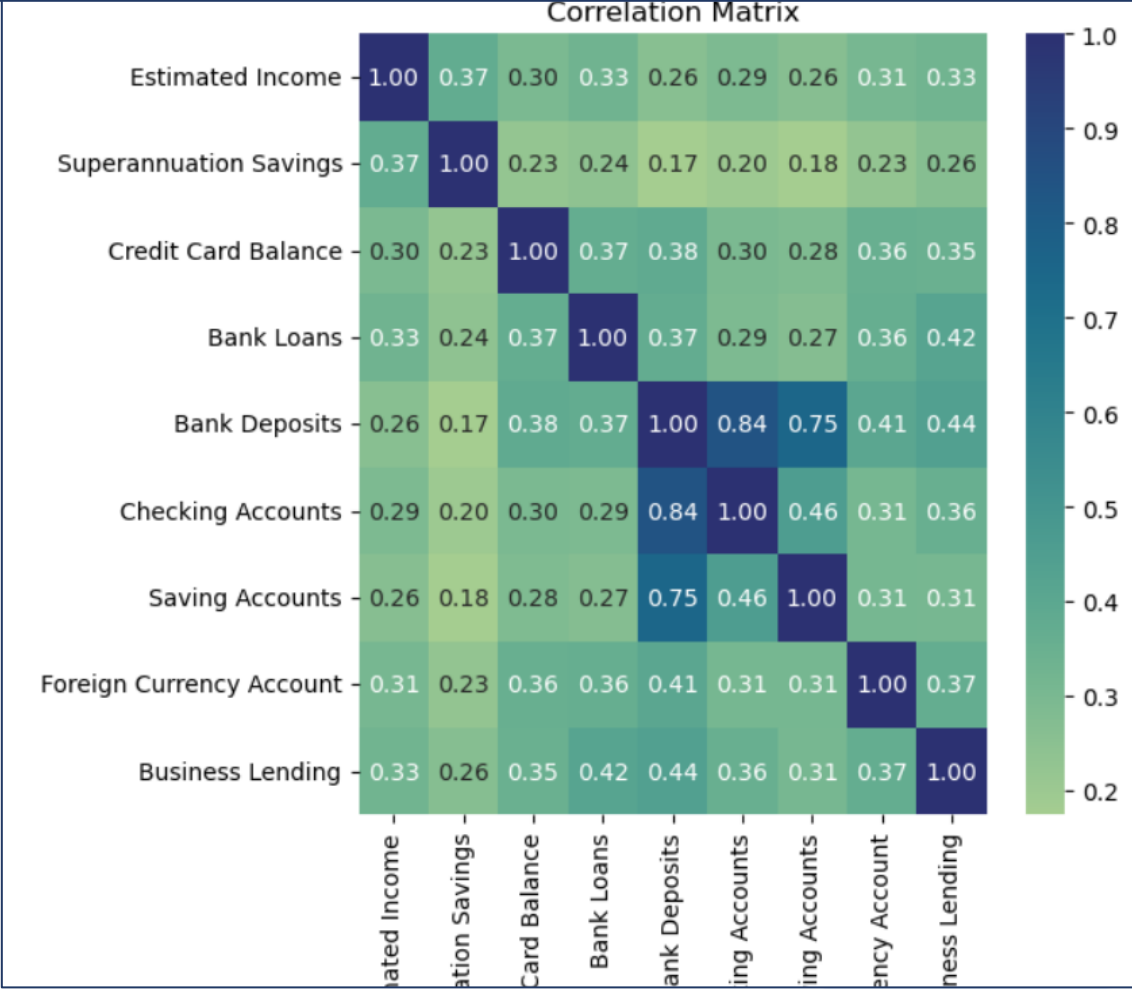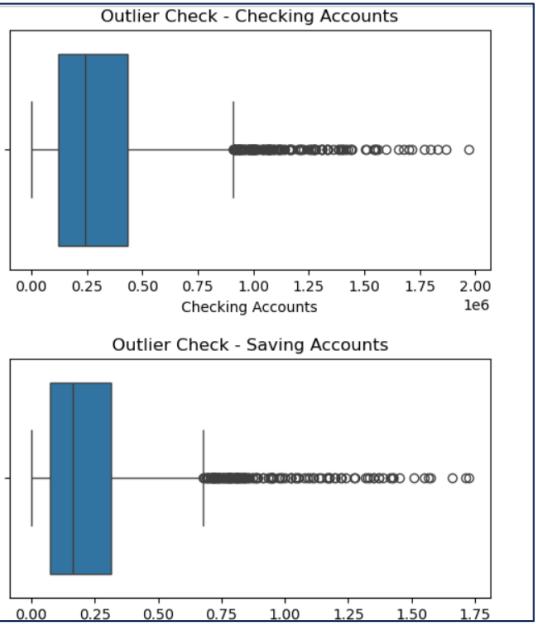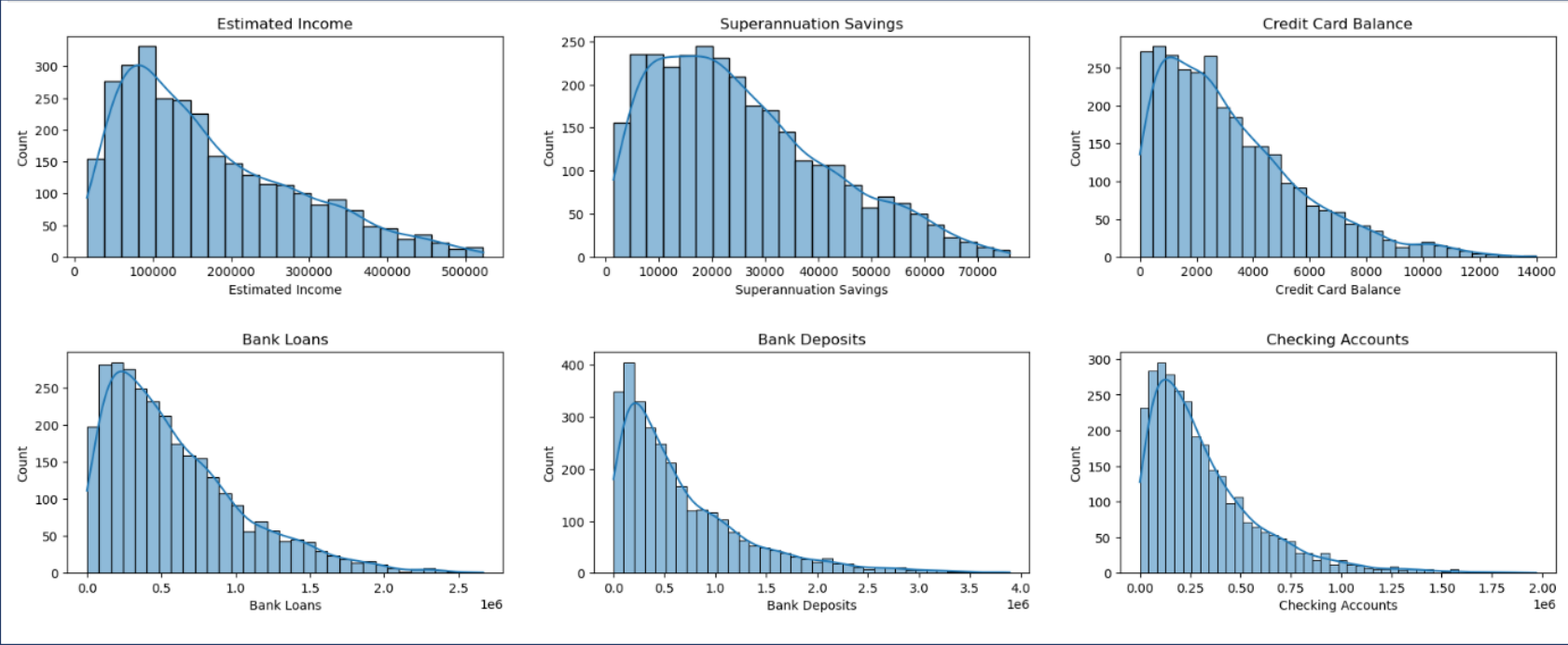Top roles: Account Coordinators, Database Admins, Office Assistants
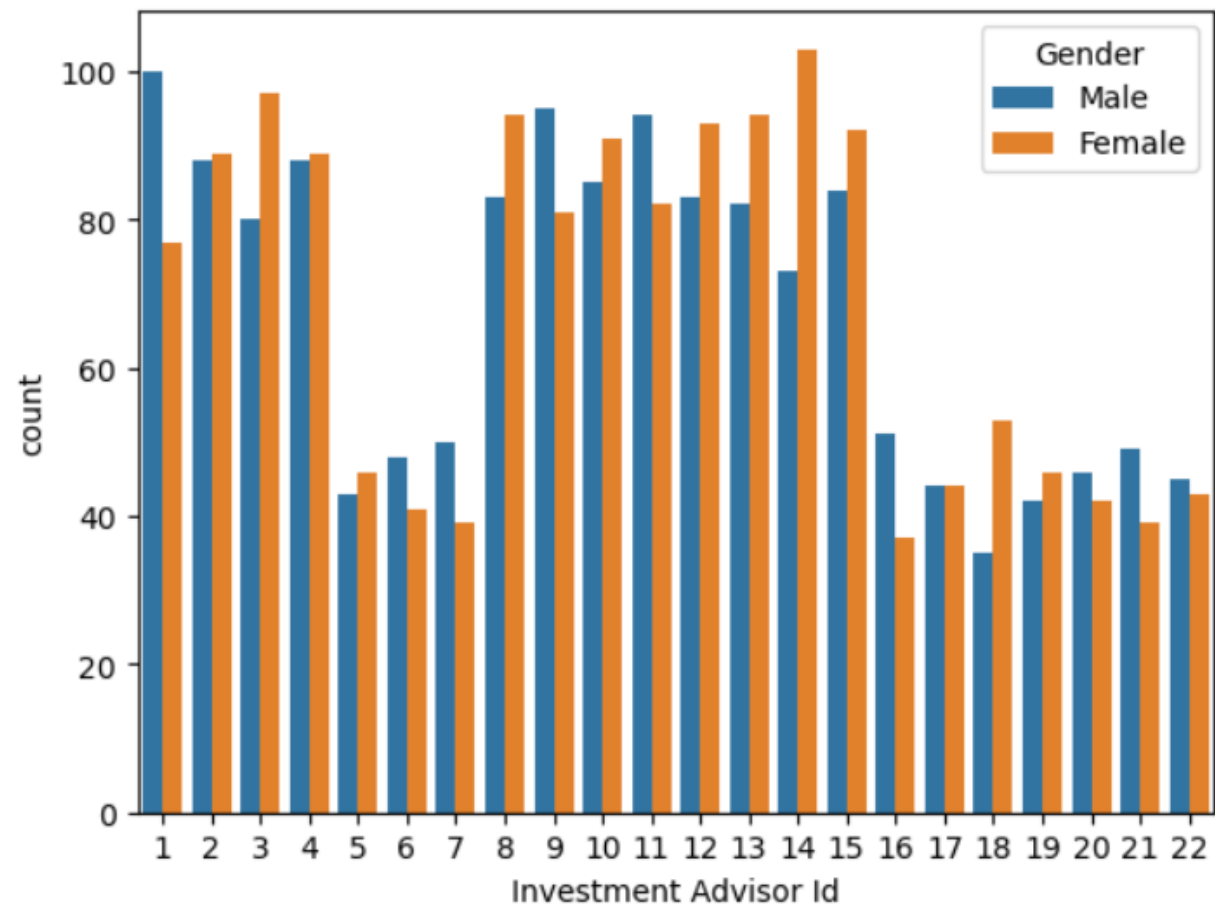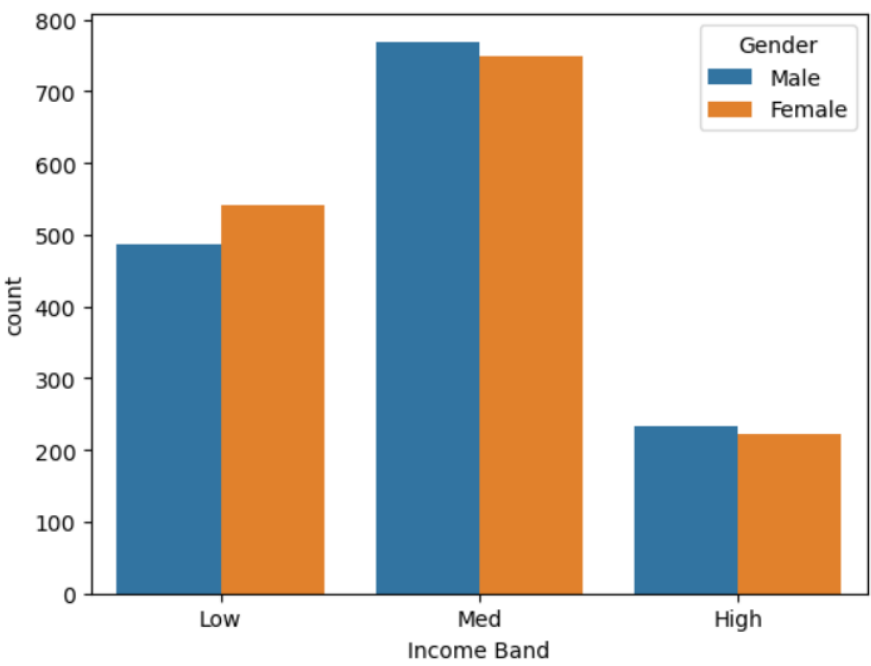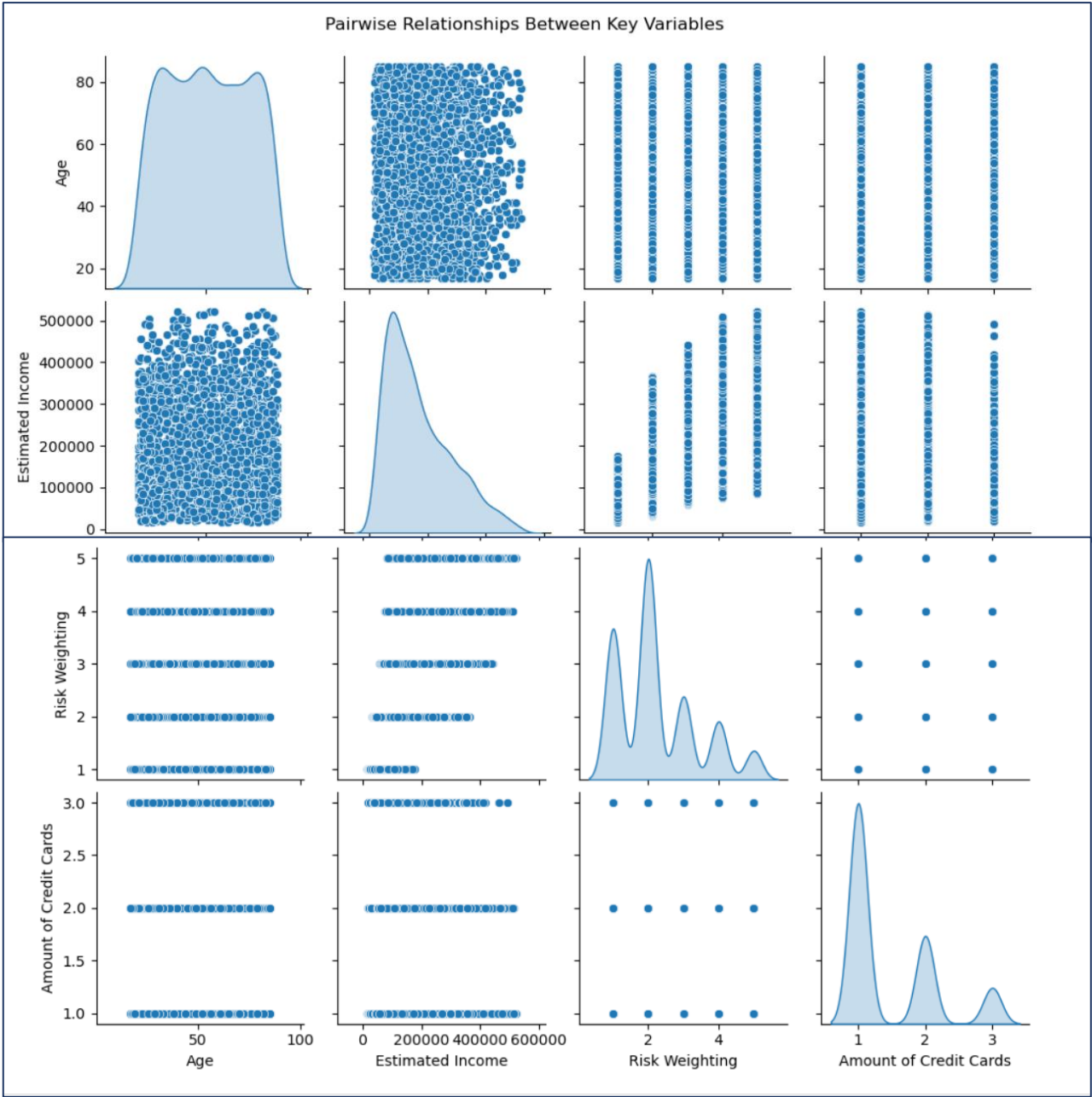
Financial Behavior Patterns

Key Correlations Discovered

- Strong positive correlation between Estimated Income and Bank Deposits

- Superannuation Savings correlate with Deposits

- Credit Card Balance moderately relates to Bank Loans

- Weak correlation between Savings Accounts and Business Lending

Insight: Financial behavior is shaped more by income than demographics.

Pairwise Relationships Between Key Variables

Estimated Income, Superannuation Savings, Credit Card Balance, Bank Loans, Bank Deposits, Checking Accounts

Correlation Matrix

	Estimated Income	Superannuation Savings	Credit Card Balance	Bank Loans	Bank Deposits	Checking Accounts	Saving Accounts	Foreign Currency Account	Business Lending
Estimated Income	1.00	0.37	0.30	0.33	0.26	0.29	0.26	0.31	0.33
Superannuation Savings	0.37	1.00	0.23	0.24	0.17	0.20	0.18	0.23	0.26
Credit Card Balance	0.30	0.23	1.00	0.37	0.38	0.30	0.28	0.36	0.35
Bank Loans	0.33	0.24	0.37	1.00	0.37	0.29	0.27	0.36	0.42
Bank Deposits	0.26	0.17	0.38	0.37	1.00	0.84	0.75	0.41	0.44
Checking Accounts	0.29	0.20	0.30	0.29	0.84	1.00	0.46	0.31	0.36
Saving Accounts	0.26	0.18	0.28	0.27	0.75	0.46	1.00	0.31	0.31
Foreign Currency Account	0.31	0.23	0.36	0.36	0.41	0.31	0.31	1.00	0.37
Business Lending	0.33	0.26	0.35	0.42	0.44	0.36	0.31	0.37	1.00

Outlier Check - Checking Accounts

Outlier Check - Saving Accounts

Outlier Check - Bank Loans

Outlier Check - Bank Deposits

Portfolio Overview

3K

Total Clients

$4.38B

Total Loans

$3.77B

Total Deposits

$2.6B

Business Lending

4,391

Credit Cards

4,556

Properties Owned

| 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | ❯ |

BANKING DASHBOARD

Loan Analysis   Deposit Analysis

Summary

Gender

| Female | Male |

Total Clients	Total Loan
3000	$4.38bn

Total Deposit	Checking Accounts
$3.77bn	$963.28M

Savings Accounts	Business Lending
$698.73M	$2.6bn

Loan & Deposit Analysis

Private Bank Dominance

Private Bank clients hold $814M in loans and $925M in deposits, making them the most valuable segment.

European Leadership

European clients contribute $778M in loans and $874M in deposits, forming the bank's core customer base.

Consistent Contributors

Top occupations show consistency between loans and deposits, suggesting stable, loyal client relationships.

Banking Relationship

| Commercial | Institutional | Private Bank | Retail |

Gender

| Female | Male |

Investment Advisor

All ▾

$3.77bn
Total Deposit

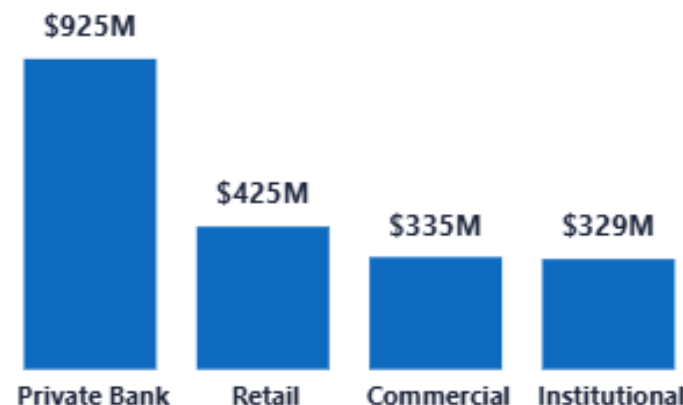# $2.01bn
Bank Deposits

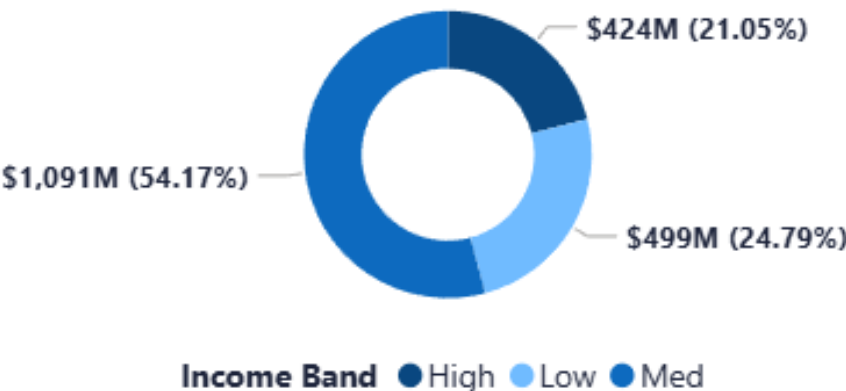# $698.73M
Saving Accounts Amt

$963.28M
Checking Accounts Amt

Bank Deposits by Banking Relationship

- Private Bank: $925M
- Retail: $425M
- Commercial: $335M
- Institutional: $329M

Bank Deposits by Occupation

- Structural Analysis E...: $23M
- Database Adminis...: $21M
- Office Assistant III: $19M
- Software Consultant: $17M
- Automation Spe...: (value)
- General Mana...: (value)
- Accountant II: $17M
- $17M
- $16M
- Account Coordinator: $14M
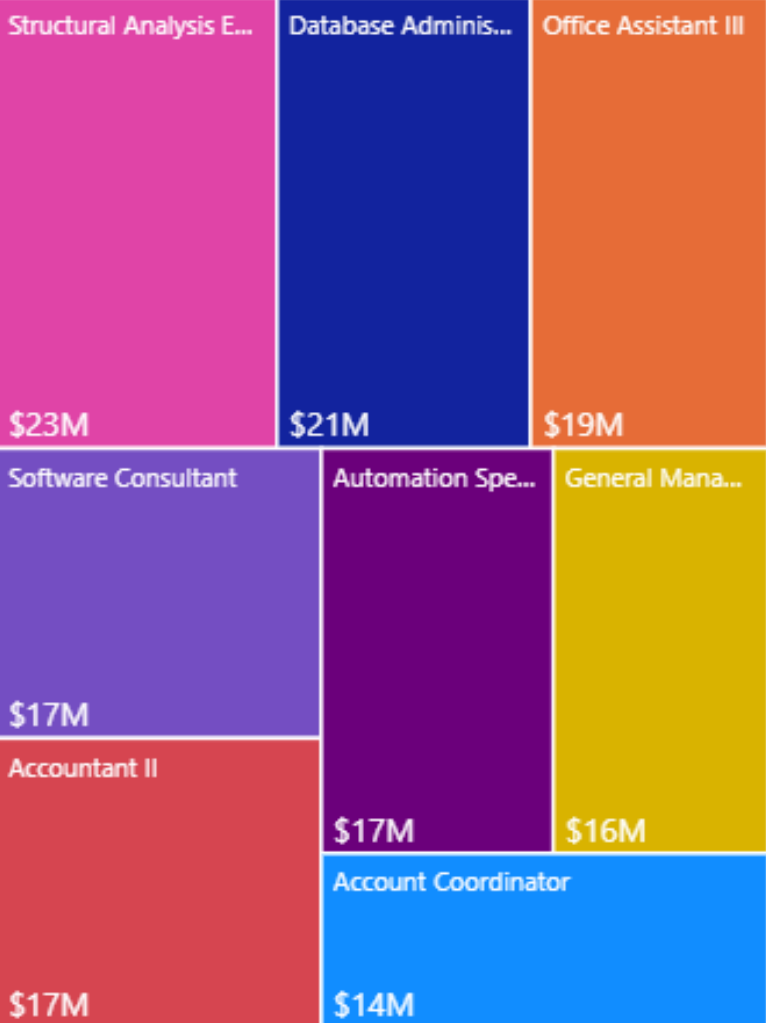
Bank Deposits by Income Band

- $424M (21.05%)
- $1,091M (54.17%)
- $499M (24.79%)

Income Band ● High ● Low ● Med

Bank Deposits by Nationality

- European: $874M
- Asian: $515M
- American: $335M
- Australian: $169M
- African: $121M
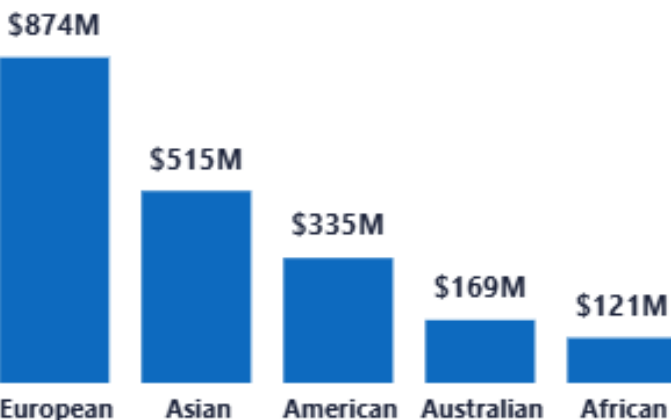
Technology Stack

Excel

Data merging and initial sheet combination

Python

EDA and cleaning with Pandas, Seaborn, Matplotlib

MySQL

Centralized data storage and integration

Power BI

Interactive dashboard creation and visualization

Strategic Recommendations

Focus on Private Banking

Private Banking clients are the most valuable segment. Prioritize retention and personalized service for this group.

Target European High-Income Clients

High-income European clients form the core base. Develop targeted marketing campaigns for this demographic.

Cross-Selling Opportunities

Credit card and business lending growth present opportunities. Leverage advisor relationships to expand product adoption.

Advisor Performance Tracking

Investment Advisors manage varying client values. Implement performance metrics to optimize client-advisor matching.