

# Bank Customer Churn Analysis

## Identifying \$32.65M in At-Risk Assets Through Data- Driven Retention Strategy

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 PYTHON 3.9+

 POWER BI



Made with GAMMA

# The Business Challenge

Customer churn costs banks **5-7x more** than retention (McKinsey). Without predictive indicators, banks react too late, losing valuable assets and customer relationships.



## Dataset Context

- Source: Kaggle Bank Customer Churn dataset
- Size: 10,000 customers
- Baseline churn rate: 20.37%
- Timeframe: 8-week analysis (Jan-Mar 2025)

# Analytical Approach

Our methodology combined robust data analysis with strategic insights to develop actionable recommendations for customer retention.



## Data Exploration & Quality Validation

- 10,000 records × 14 features
- 0 missing values, 0 duplicates
- Created comprehensive data dictionary



## Feature Engineering

- Built 5 derived features (e.g., BalanceBr, DangerScore)
- Statistical hypothesis testing (t-tests, correlations)



## Risk Model Development

- Designed "Danger Score" (0-4 composite indicator)
- Chose interpretability over black-box ML

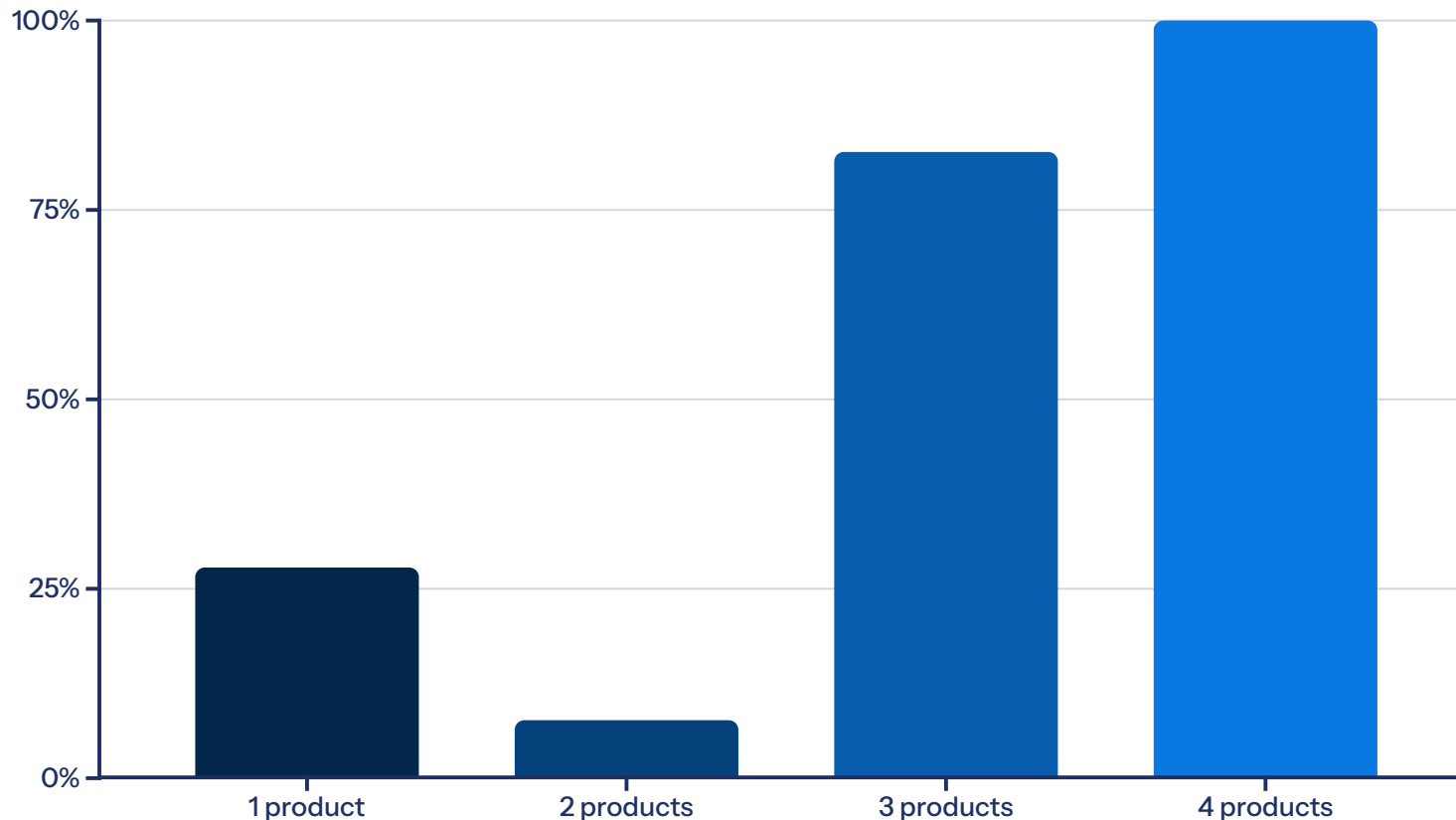


## Dashboard & Recommendations

- Interactive Power BI dashboard (French)
- 5 strategic interventions with ROI calculations

# Key Discovery #1: The Saturation Paradox

Traditional wisdom suggests 'more products = more loyalty'. The data strongly disagrees.



Customers with exactly **2 products** are **3.7×** less likely to churn than those with 1 product.

## Detailed Breakdown:

1 product: 27.71% churn (5,084 customers)

2 products: **7.58% churn** (3,710 customers) Sweet Spot

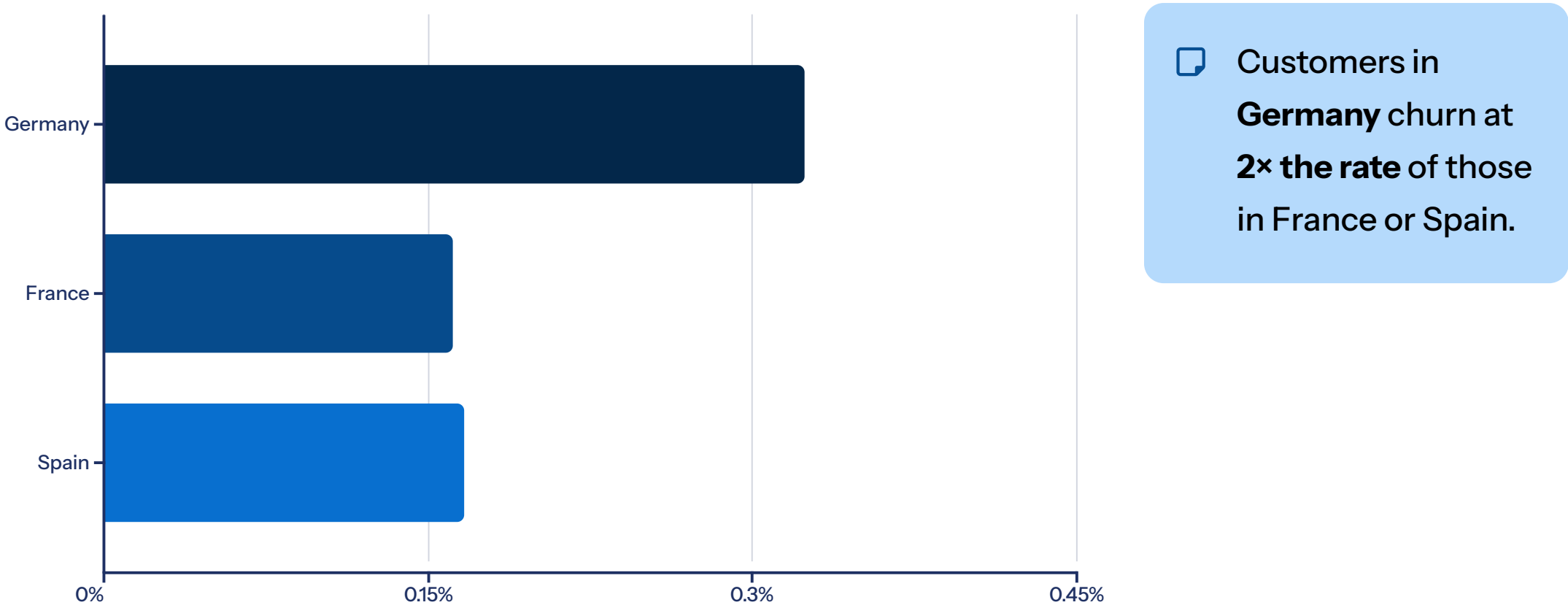
3 products: 82.71% churn (1,005 customers)

4 products: 100.00% churn (201 customers)

**Business Implication:** Stop pushing 3-4 product bundles. Focus retention efforts on moving single-product customers to the critical 2-product threshold.

# Key Discovery #2: The German Anomaly

Geographic location is the **#1 churn predictor**, with significant regional differences.



## Detailed Breakdown:

- **Germany: 32.44% churn** (2,509 customers)
- **France: 16.15% churn** (5,014 customers)
- **Spain: 16.67% churn** (2,477 customers)

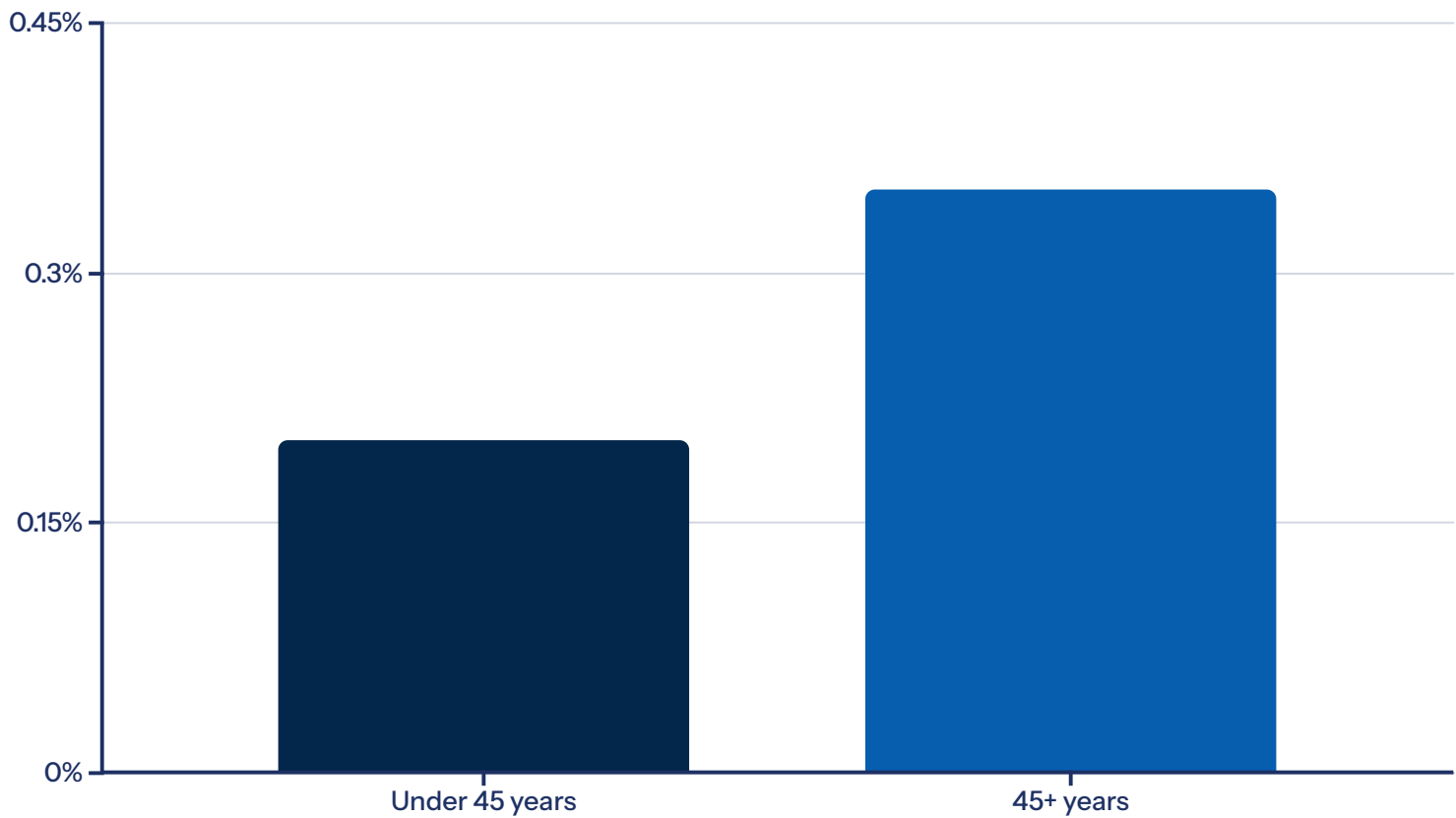
## Validation & Context:

- ✓ Data quality confirmed (no sampling bias)
- ✓ Demographics similar across countries
- ✓ External research: German market has aggressive digital challengers (N26, C24)

**Business Implication:** Requires region-specific retention pilot program targeting German competitive pressures with tailored offerings.

# Key Discovery #3: The Age Cliff

Customer loyalty decays at a specific life stage threshold.



📄 Age **45+** is the inflection point for churn risk.

Customers under 45 years old exhibit a baseline churn rate, while those aged 45 and above show a significantly elevated churn risk.

## Hypotheses

- Retirement planning leading to consolidation of finances elsewhere.
- Switching to specialized private banking services for wealth management.
- Response to competitor offers targeting affluent older customers.

T-test confirmed: Age difference is statistically significant ( $p < 0.05$ ).

**Business Implication:** Target inactive members aged 45+ with personalized re-engagement campaigns and tailored wealth management offers.

# The Danger Score Framework


Transparent Risk Scoring Over Black-Box ML

## The Scoring Model

Each customer receives 0–4 points based on these criteria:


+1 point: Located in Germany

Rationale: 2× churn vs. other markets




+1 point: Age ≥ 45 years

Rationale: Retirement/consolidation cohort



+1 point: NumOfProducts ≠ 2

Rationale: Outside the loyalty sweet spot




+1 point: Inactive member

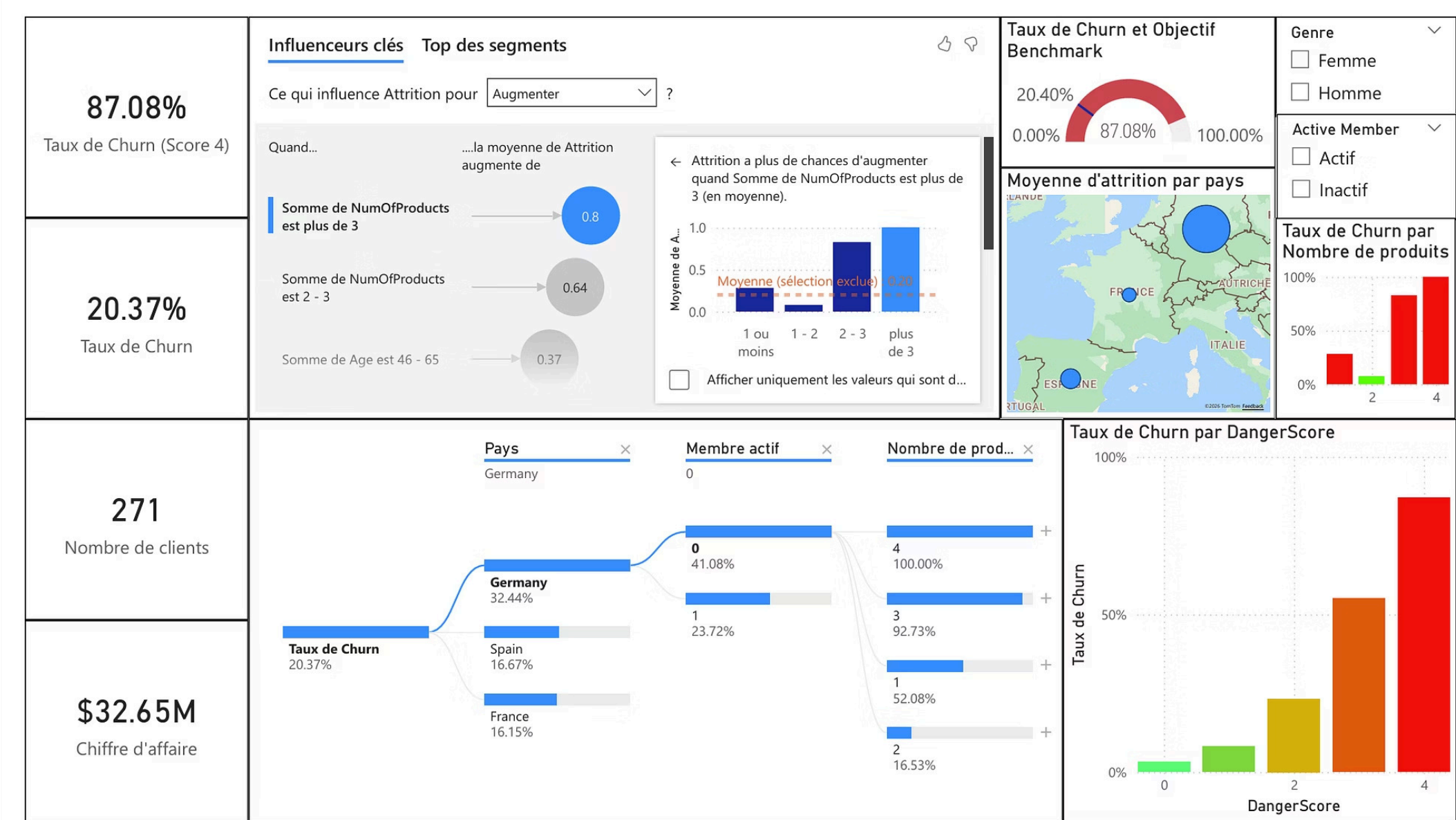
Rationale: Strongest disengagement signal

## Performance Table

Score 4	87.08%	271	\$120,495	\$32.65M
Score 3	55.11%	1,281	\$103,690	\$73.28M
Score 2	23.27%	3,172	\$96,190	\$71.04M
Score 1	8.11%	3,837	\$65,023	\$20.24M
Score 0	3.20%	1,439	\$31,112	\$1.43M

 Score 4 customers have 87.08% churn rate - 4.3× higher than the bank average (20.37%)

Chose interpretability for business adoption - stakeholders need to understand **WHY** someone is high-risk to take action. Each point = specific intervention.



# Executive Dashboard: Real-Time Risk Monitoring

Interactive Power BI Dashboard – French Localized for Romandie Market

## Executive KPIs:

- \$32.65M at risk
- 87% churn rate for highest risk segment
- 271 critical customers

## Geographic Analysis:

- Heatmap highlighting Germany anomaly

## Risk Segmentation:

- Danger Score breakdown with benchmark gauge

## AI-Powered Insights:

- Key Influencers & Decomposition Tree visuals

## Interactive Filters:

- Gender, activity status, product count

Built using DAX calculated columns and Power BI AI visuals. Dashboard enables stakeholders to generate targeted retention lists in real-time.



# 5 Strategic Recommendations with Data-Driven Impact

Actionable strategies derived from key churn drivers, with clear ROI targets and urgency levels.

IMMEDIATE

## 1. Priority Customer Retention

- **Target:** 271 Score 4 customers (\$32.65M at risk, 87% churn probability)
- **Action:** Deploy relationship managers for personal outreach within 48 hours
- **Rationale:** Highest risk × highest value = clearest intervention priority
- **Next Step:** Finance team to calculate fee waiver cost and validate ROI

30 DAYS

## 2. Single-Product Customer Campaign

- **Target:** 5,084 customers with only 1 product (27.71% churn risk)
- **Action:** Incentivize second product adoption
- **Expected Impact:** Converting 25% to 2-product tier prevents ~250 customer exits
- **Rationale:** Move customers from 27.71% risk to 7.58% risk (loyalty sweet spot)

ONGOING

## 3. Inactivity Alert System

- **Target:** Inactive members, especially aged 45+
- **Action:** Automated monitoring + multi-channel re-engagement
- **Rationale:** Inactivity is the #1 controllable risk factor in Danger Score
- **Metric:** Track inactive → active transitions and impact on churn

90-DAY PILOT

## 4. German Market Response

- **Context:** Germany shows 32.4% churn vs. 16% in France/Spain
- **Action:** Competitive analysis of N26/C24 offerings + localized retention test
- **Goal:** Close the gap toward France/Spain performance levels
- **Success Metric:** Reduce German churn rate (target: sub-25% in pilot group)

IMMEDIATE

## 5. Product Portfolio Guardrails

- **Finding:** 3-product customers = 82.71% churn, 4-product = 100% churn
- **Action:** Cap retail customers at 2 products; reserve 3+ for business/private banking
- **Rationale:** Over-servicing creates customer confusion and guaranteed attrition
- **Implementation:** Update product sales policies and CRM rules

# From Analysis to Business Impact: Key Learnings

Bridging technical expertise with strategic business value.

## TECHNICAL SKILLS DEVELOPED

- **Python for production-scale analysis:** Pandas, SciPy, statistical hypothesis testing.
- **Advanced Power BI:** AI visuals (Key Influencers, Decomposition Tree), DAX, French localization.
- **Feature engineering for stakeholders:** Created interpretable brackets and risk scores vs. raw numbers.
- **End-to-end project ownership:** From Kaggle dataset to executive-ready recommendations.

## WHY THESE SKILLS MATTER (BUSINESS CONTEXT)

- **Quantified impact in business language:** **\$32.65M at risk** speaks to CFOs, not just data teams.
- **Stakeholder-first design:** Each Danger Score point = actionable intervention (e.g., Germany → regional pilot, Inactive → re-engagement).
- **Each technical choice served a business goal:**
  - Danger Score (0-4) → Frontline staff can explain WHY customers are high-risk.
  - French dashboard → Localized for Romandie market stakeholders.
  - Bracketing features → Enables non-technical users to filter without SQL.

## WHAT THIS DEMONSTRATES

- **Strategic thinking:** Understood the business problem (retention ROI) before writing code.
- **Cross-functional readiness:** Can translate between technical teams and business stakeholders.
- **Swiss market awareness:** FINMA compliance, competitive landscape (N26/C24), bilingual capabilities.
- **Self-directed learning:** Took a complex 8-week project from concept to completion independently.

**Ready to deliver this analytical rigor and business mindset from day one.**