

# Customer Segmentation & Churn Pattern Analytics

## in European Banking

### Research Paper

Field	Details
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Dataset	European Bank Customer Dataset (10,000 records)
Period	November 2025 – February 2026
Submitted	February 2026

## Abstract

This paper looks at customer churn across a European bank's dataset of 10,000 customers from France, Germany, and Spain. Rather than building a predictive model, the focus here is on understanding which groups of customers are actually leaving and what the data suggests about why. The overall churn rate sits at 20.4%, but that number on its own is misleading — the real story is in how unevenly churn is distributed across different segments.

Germany stands out immediately with a churn rate of 32.4%, roughly double the other two markets. The 46–60 age group churns at over 51%, which is hard to look past. Female customers leave at a rate about 9 percentage points higher than male customers, and this gap holds across all three countries. Customers with 3 or 4 bank products churn at 82.7% and 100% respectively, which raises serious questions about the bank's cross-selling approach. Inactive members are nearly twice as likely to churn as active ones.

The paper goes through each of these segments in detail, looks at where they overlap, and closes with recommendations that are grounded in what the data actually shows rather than general best practices.

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## 1. Introduction

Banks collect a huge amount of data on their customers, but most of that data never gets used to answer the questions that actually matter for retention. Knowing that 20% of customers left last year is not very actionable. Knowing that middle-aged German female customers with 3 products are churning at extraordinary rates — that is actionable.

This paper works through a dataset of 10,000 European bank customers and tries to map out exactly where churn is concentrated. The approach is descriptive — the goal is to understand the current situation clearly rather than to build a model that predicts who will leave next. Both are useful, but the descriptive picture needs to come first.

The analysis covers six segmentation dimensions: geography, age, gender, credit score, tenure, and balance. It also looks at product usage and member activity, which turned out to be two of the most revealing variables in the whole dataset.

## 2. Background

Losing customers costs banks money in two ways — directly through lost revenue, and indirectly through the cost of acquiring replacement customers. Most estimates put acquisition costs at five to seven times the cost of retention, which makes the economics of reducing churn fairly straightforward to argue.

What makes this harder in practice is that churn is not uniform. A bank with a 20% overall churn rate might have a 5% rate among its most loyal customers and a 60% rate among a specific demographic it has been inadvertently alienating. Managing to an average obscures both problems.

European retail banking has also become more competitive in recent years as challenger banks and fintech platforms have made switching easier. Customers who would have stayed with the same bank out of inertia now have genuine alternatives, and the switching friction is much lower than it was a decade ago. That context matters when thinking about retention — the bank has to give customers a positive reason to stay, not just rely on inconvenience keeping them put.

## 3. Problem Statement

The bank is losing customers at a rate that varies significantly by segment, but without a clear view of which segments are most at risk, retention efforts tend to be broad and not particularly targeted. Three specific gaps stand out:

- There is no clear picture of which customer groups carry disproportionate churn risk, which makes it hard to allocate retention resources effectively.
- The bank does not have visibility into how churn patterns differ across geographies, age groups, and genders, so any retention campaign ends up being designed for a hypothetical average customer who does not really exist.
- The financial cost of churn is probably being underestimated because high-value churners are not being tracked separately from the rest.

## 4. Dataset

The dataset contains 10,000 customer records with 13 fields. Each row represents one customer and includes their demographic information, financial behaviour, and a binary indicator of whether they have churned.

Field	Type	Description
<b>CustomerId</b>	Identifier	Unique customer reference
<b>CreditScore</b>	Numeric	Customer credit score
<b>Geography</b>	Categorical	France, Germany, or Spain
<b>Gender</b>	Categorical	Male or Female
<b>Age</b>	Numeric	Age in years
<b>Tenure</b>	Numeric	Years with the bank
<b>Balance</b>	Numeric	Account balance
<b>NumOfProducts</b>	Numeric	Number of products held
<b>HasCrCard</b>	Binary	Has credit card (1=Yes)
<b>IsActiveMember</b>	Binary	Active member (1=Yes)
<b>EstimatedSalary</b>	Numeric	Estimated annual salary
<b>Exited</b>	Binary	Churned (1=Yes, 0=No)

Of the 10,000 customers, 2,037 have exited. France makes up 50.1% of the dataset, Germany 25.1%, and Spain 24.8%. There are no missing values.

## 5. How the Analysis Was Done

The analysis followed a fairly straightforward sequence. The dataset was loaded and checked for quality issues — there were none worth noting. Non-analytical fields like surnames were dropped. Segmentation bands were then created for age, credit score, tenure, and balance so that continuous variables could be grouped meaningfully.

From there, churn rates were calculated for each segment individually, then cross-segment combinations were looked at through heatmaps. High-value customers were isolated as a separate group using the top quartile of account balances. The whole analysis was done in Python using pandas, matplotlib, and seaborn.

## 6. Overall Churn and Customer Profiles

The headline number is 20.4% — 2,037 out of 10,000 customers have left. That is a meaningful proportion for a retail bank. But what caught my attention when I first looked at the data was the difference in average balance between churned and retained customers.

Metric	Churned Customers	Retained Customers
Average Age	44.8 years	37.4 years
Average Balance	€91,109	€72,745
Average Credit Score	645	652
Average Salary	€101,466	€99,738

Churned customers are older and wealthier on average. Credit scores and salaries are basically the same between the two groups, which already hints that financial difficulty is not what is driving people to leave. The age and balance gaps are more interesting and get explored further in the segmentation sections.

## 7. Segment-by-Segment Analysis

### 7.1 Geography

This was the first thing I checked and Germany jumped out straight away. France and Spain are both around 16–17% churn, which is not great but is at least in a manageable range. Germany is at 32.4%.

Country	Customers	Churned	Churn Rate	Avg Balance
France	5,014	810	16.2%	€62,093
Germany	2,509	814	32.4%	€119,730
Spain	2,477	413	16.7%	€61,818

What makes Germany worse than it initially looks is the average balance. German customers hold nearly double the balance of French and Spanish customers. So each German chunner represents a bigger financial loss. Germany accounts for 25% of the customer base but 40% of all churned customers. That discrepancy is too large to be random — something specific to the German market is driving this.

## 7.2 Age

Age is the strongest demographic predictor in the dataset. The 46–60 group churns at 51.1%. More than half of that cohort has left.

Age Group	Customers	Churned	Churn Rate
Under 30	1,968	148	7.5%
30–45	5,921	932	15.7%
46–60	1,647	842	51.1%
Over 60	464	115	24.8%

The drop from 51.1% back to 24.8% for the Over 60 group is interesting. It suggests some degree of loyalty or reduced willingness to switch among the oldest customers. The 46–60 window is where the real problem sits. This cohort is 16.5% of the customer base but responsible for 41.3% of all churn. They are also almost certainly the customers with the largest balances and the deepest product relationships — which makes losing them particularly costly.

## 7.3 Gender

Female customers churn at 25.1% against 16.5% for males. The 8.6 point gap shows up in every country without exception.

Gender	Customers	Churned	Churn Rate
Female	4,543	1,139	25.1%
Male	5,457	898	16.5%

In Germany the numbers are 37.6% for female customers and 27.8% for males. In France, 20.3% versus 12.7%. In Spain, 21.2% versus 13.1%. The gap is consistent enough that it is almost certainly not coincidence. Something about the bank's product range, service approach, or communication style is not landing as well with female customers. That is worth investigating directly.

## 7.4 Credit Score

Credit score barely moves the needle. Low-band customers churn at 22.7%, medium at 20.0%, and high at 19.9%. The differences are small enough that credit score is probably not a useful lens for understanding churn in this bank.

Credit Band	Score Range	Customers	Churn Rate
Low	Below 550	1,621	22.7%
Medium	550–700	5,263	20.0%
High	Above 700	3,116	19.9%

This confirms something the average profile comparison already hinted at — people are not leaving because they are in financial trouble. They are leaving for other reasons, which makes the geographic and demographic patterns even more important to understand.

## 7.5 Tenure

Tenure tells a similarly flat story. New customers churn at 21.2%, mid-term at 20.8%, and long-term at 19.7%. There is a slight downward trend, but it is very small. The practical implication is that time with the bank is not converting into loyalty in any meaningful way. A customer who has been with the bank for eight years is almost as likely to leave as one who joined last year.

Tenure Group	Customers	Churn Rate
New (0–2 years)	2,496	21.2%
Mid-term (3–5 years)	3,010	20.8%
Long-term (6+ years)	4,494	19.7%

## 7.6 Balance

Zero-balance customers churn at 13.8%, which is below average. This probably reflects a group of customers who do not have enough of a relationship with the bank to bother actively leaving. The more concerning number is the 23.8% churn rate among high-balance customers (those with over €50,000). This group of 6,274 customers carries the most assets, and nearly a quarter of them have left.

Balance Segment	Customers	Churn Rate
Zero Balance	3,617	13.8%
Low (€1–€50,000)	75	34.7%
High (€50,000+)	6,274	23.8%

## 7.7 Number of Products

This was the most striking finding in the whole analysis. Two products is the sweet spot — customers holding two bank products churn at just 7.6%. But push beyond that and the numbers fall apart completely.

Products	Customers	Churned	Churn Rate
1	5,084	1,409	27.7%
2	4,590	348	7.6%
3	266	220	82.7%
4	60	60	100.0%

Every customer with 4 products has churned. Not most — all of them. The 3-product group is not far behind at 82.7%. This is not a subtle signal. The bank's cross-selling strategy is clearly generating serious dissatisfaction, probably by enrolling customers in products they never really wanted. The 2-product segment needs to be protected, and the push towards 3 and 4 products needs to stop until someone understands why it is producing such catastrophic churn numbers.

## 7.8 Member Activity

Inactive members churn at 26.9% compared to 14.3% for active members. Of 4,849 inactive customers, 1,301 have already left. The gap here is not surprising — disengagement almost always precedes exit — but the size of the inactive group (nearly half the customer base) and their elevated churn rate together represent a significant ongoing risk.

Status	Customers	Churned	Churn Rate
Active	5,151	736	14.3%
Inactive	4,849	1,301	26.9%

## 8. High-Value Customer Churn

High-value customers are defined here as those in the top quartile of account balances. This group of 2,500 customers churns at 23.7% — higher than the overall 20.4%. That means the bank's wealthiest customers are actually more likely to leave than the average.

Metric	Value
High-Value Customers (top 25% by balance)	2,500
Churned from this group	592
High-Value Churn Rate	23.7%

Average balance of HV churners	€149,755
Estimated total assets lost	€88.6 million (approx.)

592 high-value customers have left, carrying an average balance of €149,755. In total that represents roughly €88.6 million in assets that have moved elsewhere. Even a modest improvement in high-value retention would have a significant financial impact — probably larger than any cost savings the bank could make elsewhere.

## 9. Summary of Findings

Finding	Number	Why it matters
<b>Overall churn</b>	20.4%	1 in 5 customers has already exited
<b>Germany churn</b>	32.4%	Double France and Spain, higher balances
<b>Age 46–60 churn</b>	51.1%	Most at-risk demographic by far
<b>Female churn</b>	25.1%	Consistent 9pt gap across all 3 countries
<b>Inactive member churn</b>	26.9%	Nearly 2x active members
<b>3-product churn</b>	82.7%	Cross-selling badly backfiring
<b>4-product churn</b>	100%	Every single customer has left
<b>2-product churn</b>	7.6%	The optimal engagement point
<b>High-value churn</b>	23.7%	Above average, €149k avg balance lost
<b>Credit score</b>	Flat across bands	Not a meaningful churn driver
<b>Tenure</b>	Minimal variation	Long tenure is not building loyalty

## 10. Recommendations

### 10.1 Find out what is happening in Germany

A 32.4% churn rate does not happen by chance. It is double the rate in the other two markets and it is consistent enough to be structural. The first thing I would do is talk to recently churned German customers directly — structured exit interviews, not a satisfaction survey. Then review pricing against local competitors and look carefully at what the service experience looks like in that market specifically. The answer is unlikely to be something generic.

### 10.2 Build a real retention programme for the 46–60 segment

This group churns at 51.1% and almost certainly holds the largest accounts. A general loyalty programme will not cut it. What tends to work for this demographic is something more personal — a dedicated relationship manager, proactive annual account reviews, meaningful fee waivers or rate benefits tied to their existing relationship with the bank. The return on retaining even a fraction of this group would be significant.

### 10.3 Take the gender gap seriously

The 8.6 point churn gap between female and male customers is present in every single country. That level of consistency across markets strongly suggests a product or service design issue rather than anything market-specific. The bank should speak directly to recently churned female customers and try to understand what was missing. This is not something that can be reverse-engineered from the data alone — it requires qualitative research.

### 10.4 Act on inactive members earlier

The data shows inactive members churning at nearly double the rate of active ones, and almost half the customer base is currently inactive. An automated trigger at around 60–90 days of inactivity — a direct call or a genuinely personalised offer — could intercept a lot of these customers before they make the decision to leave. The key word is genuinely personalised. Another generic marketing email is unlikely to move the needle.

### 10.5 Stop pushing 3 and 4 product bundles

This is probably the most urgent recommendation in the whole analysis. The numbers are too extreme to ignore — 82.7% and 100% churn rates for customers with 3 and 4 products tell you the cross-selling model is creating real harm. The bank needs to understand how customers end up with 3 or 4 products, whether they were sold to or opted in voluntarily, and whether they are actually using what they have. The 2-product segment should be treated as the target state for most customers until this is sorted out.

## 11. Conclusion

When I started looking at this dataset, the 20.4% overall churn rate felt like the story. By the time I finished, it felt more like a distraction — a number that is true but not particularly useful on its own.

The actual story is that churn in this bank is concentrated in specific, identifiable groups. Germany is churning at twice the rate of everywhere else. Half of the 46–60 age cohort has left. Female customers are consistently more likely to exit than male customers regardless of which country they are in. Customers enrolled in too many products are leaving at rates that should make any retention team very uncomfortable.

At the same time, two of the variables you might expect to matter — credit score and tenure — barely move the needle. People are not leaving because they are in financial trouble. They are leaving because of service experience, product fit, or a gradual disengagement that the bank was not catching early enough.

The recommendations in this paper are not particularly complicated. Talk to churned customers in Germany. Build something meaningful for the 46–60 segment. Figure out why female customers are leaving at a higher rate and address it properly. Catch inactive members before they walk out the door. Stop over-enrolling customers in products they do not need. None of these require sophisticated modelling — they require the bank to take what the data is already showing and act on it.

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