Subjective Questions:

1. **Customer Behaviour Analysis: What patterns can be observed in the spending habits of long-term customers compared to new customers, and what might these patterns suggest about customer loyalty?**

➤ **Query:**

```sql
SELECT
    CASE
        WHEN b.Tenure > 3 THEN 'Long-Term'
        ELSE 'New'
    END AS CustomerType,
    Round(AVG(b.Balance),2) AS AvgBalance,
    COUNT(b.CustomerID) AS NumberOfCustomers,
    Round(AVG(b.NumOfProducts),2) AS AvgProducts,
    Round(AVG(b.CreditScore),2) AS AvgCreditScore
FROM bank_churn b
GROUP BY CustomerType
ORDER BY CustomerType DESC;
```

Output:

CustomerType	AvgBalance	NumberOfCustomers	AvgProducts	AvgCreditScore
New	77728.84	1348	1.56	653.66
Long-Term	76292.23	8652	1.52	650.04

Insights:

- Both new and long-term customers have similar average balances, with new customers slightly ahead in average balance, suggesting recent customers are depositing or transacting higher amounts early on.
- Long-term customers show a marginally lower average number of products (1.52) compared to new customers (1.56), indicating that long-term customers may stick to a few core products.
- New customers exhibit a slightly higher average credit score than long-term customers, suggesting that new customers might be more credit-conscious, or banks might be targeting customers with higher creditworthiness initially.
- Despite lower product usage and credit scores, long-term customers make up the bulk of the customer base, pointing to a strong retention capability but room for cross-selling opportunities.

Recommendations:

- Since new customers use slightly more products, developing retention strategies to cross-sell or upsell to long-term customers could increase their engagement.
- Implement loyalty programs that reward long-term customers for maintaining balances and encourage higher product adoption.
- Given new customers tend to have higher credit scores, tailor marketing to attract more high credit-score individuals and incentivize them to stay longer.
- Introduce balance-based incentives or tiered rewards for customers maintaining higher balances, appealing to both new and long-term customers.

2. Product Affinity Study: Which bank products or services are most commonly used together, and how might this influence cross-selling strategies?

➤ **Query:**

```sql
WITH ProductUsage AS (
  SELECT
    CustomerID,
        NumOfProducts,
    CASE
      WHEN NumOfProducts = 1 THEN 'SavingsAccount'
      WHEN NumOfProducts = 2 THEN 'SavingsAccount, CreditCard'
      WHEN NumOfProducts = 3 THEN 'SavingsAccount, CreditCard, Loan'
      WHEN NumOfProducts >= 4 THEN 'SavingsAccount, CreditCard, Loan, InvestmentAccount'
    END AS ProductCombination
  FROM bank_churn
),
CombinationAnalysis AS (
  SELECT
    ProductCombination,
    COUNT(CustomerID) AS CustomerCount
  FROM ProductUsage
  GROUP BY ProductCombination
)
SELECT
    CustomerCount,
    ProductCombination,
    ROUND(CustomerCount/(SELECT COUNT(*) FROM bank_churn) * 100, 2) AS PercentageOfCustomers
FROM CombinationAnalysis;
```

Output:

CustomerCount	ProductCombination	PercentageOfCustomers
5084	SavingsAccount	50.84
266	SavingsAccount, CreditCard, Loan	2.66
4590	SavingsAccount, CreditCard	45.90
60	SavingsAccount, CreditCard, Loan, Investment...	0.60

Insights:

- Over 50% of the customers have only a savings account, indicating that this is the most commonly used product by customers.

- A significant portion (45.90%) of customers use a combination of savings accounts and credit cards, which suggests an opportunity to promote further services to this group.
- Only 0.60% of customers use a comprehensive set of products like savings accounts, credit cards, loans, and investment accounts, indicating a potential for further engagement.
- Only 2.66% of customers have a product combination that includes a loan, indicating that loan products may need more targeted promotion.

Recommendations:

- Cross-sell credit cards and loan products to customers who have only a savings account, as they represent a large portion of the customer base.
- Create bundled product offerings (e.g., savings + credit card + loan) to encourage multi-product usage and improve customer retention
- Identify customers who might benefit from investment products and provide personalized offers to grow the percentage of customers using these services.
- Use the insights from cross-product usage to tailor engagement strategies for different customer segments, offering personalized product combinations.

3. Geographic Market Trends: How do economic indicators in different geographic regions correlate with the number of active accounts and customer churn rates?

➤ **Query:**

```sql
SELECT
    geo.GeographyLocation,
    COUNT(b.ExitID) AS ChurnedCustomers,
    (COUNT(DISTINCT b.ExitID) / COUNT(DISTINCT c.CustomerID)) * 100 AS ChurnRate
FROM geography geo
JOIN customerinfo c ON geo.GeographyID = c.GeographyID
JOIN bank_churn b ON c.CustomerID = b.CustomerID
LEFT JOIN exitcustomer e ON b.ExitID = e.ExitID
WHERE b.ExitID = 1
GROUP BY geo.GeographyLocation;
```

Output:

GeographyLocation	ChurnedCustomers	ChurnRate
France	810	0.1235
Germany	814	0.1229
Spain	413	0.2421

Insights:

- Both France and Germany show similar churn rates, with France at 0.1235 and Germany at 0.1229, indicating that customers in these regions are exiting the bank's services at almost the same rate.

- The churn rate in Spain is 0.2421, which is almost double that of France and Germany, suggesting that customers in Spain are more likely to leave the bank.
- Germany has the highest number of churned customers (814), followed closely by France (810), while Spain has fewer churned customers (413). This suggests Germany has a larger customer base but is still able to maintain a relatively lower churn rate.
- The substantial difference in churn rates between Spain and the other regions suggests geographic disparities in customer behavior or satisfaction with the bank's services.

Recommendations:

- Since Spain has a higher churn rate, the bank should focus on understanding the causes behind the higher churn and implement targeted strategies such as improving customer service or offering tailored financial products to retain customers.
- While the churn rates in Germany and France are lower, proactive steps like personalized banking services, loyalty programs, or incentives could help further reduce churn and retain the existing customer base.
- Conduct in-depth market research in Spain to identify why customers are exiting at a higher rate compared to other regions. Possible reasons could include economic factors, product dissatisfaction, or increased competition from other financial institutions.
- Since France and Germany have stable churn rates, the bank could consider allocating resources to acquire more active customers in these regions, leveraging the low churn environment to increase the overall customer base.

4. Risk Management Assessment: Based on customer profiles, which demographic segments appear to pose the highest financial risk to the bank, and why?

➤ **Query:**

```sql
SELECT
    g.GeographyLocation,
    c.Surname,
    c.Age,
    c.EstimatedSalary,
    bc.CreditScore,
    bc.Tenure,
    bc.Balance,
    bc.NumOfProducts,
    COUNT(DISTINCT ac.ActiveID) AS ActiveAccounts,
    COUNT(DISTINCT bc.ExitID) AS ChurnedCustomers,
    -- Identifying high-risk customers based on various factors
    CASE
        WHEN bc.CreditScore < 600 THEN 'High Risk: Low Credit Score'
        WHEN bc.Balance > (c.EstimatedSalary * 1.5) THEN 'High Risk: High Balance/Low Salary'
        WHEN bc.Tenure < 1 THEN 'High Risk: Short Tenure'
        WHEN g.GeographyLocation = 'Spain' THEN 'High Risk: High Churn Region'
        ELSE 'Low Risk'
    END AS RiskLevel,
```

```sql
    -- Churn rate calculation by region
    (COUNT(DISTINCT bc.ExitID) / COUNT(DISTINCT c.CustomerID)) * 100 AS ChurnRate
FROM geography g
JOIN customerinfo c ON g.GeographyID = c.GeographyID
JOIN bank_churn bc ON c.CustomerID = bc.CustomerID
LEFT JOIN activecustomer ac ON bc.ActiveID = ac.ActiveID
LEFT JOIN exitcustomer ec ON bc.ExitID = ec.ExitID
GROUP BY g.GeographyLocation, c.CustomerID
HAVING RiskLevel IN (
    'High Risk: Low Credit Score',
    'High Risk: High Balance/Low Salary',
    'High Risk: Short Tenure',
    'High Risk: High Churn Region'
)
ORDER BY g.GeographyLocation, RiskLevel DESC;
```

Insights:

- Customers with a credit score below 600 are more likely to leave, suggesting that financially vulnerable individuals are at higher risk of churn. These customers might struggle with repayments or lack trust in banking support systems.
- When a customer's bank balance exceeds 1.5 times their estimated salary, it often indicates they are not actively using their funds or may be financially overburdened. This imbalance could lead to disengagement or dissatisfaction with banking services.
- Customers with a tenure of less than one year are more prone to churn, highlighting a weak onboarding process or poor early-stage engagement. This shows that the first few months are critical for building customer trust and loyalty.
- The churn rate is noticeably higher in Spain compared to other regions, which may point toward localized issues such as competitive banking options, language/cultural mismatches, or regional service quality concerns.

Recommendations:

- Identify high-risk customers using credit score, balance-to-salary ratio, tenure, and location, then design targeted engagement strategies such as financial counselling or exclusive offers to retain them.
- Improve the onboarding experience for new customers through personalized welcome journeys, proactive communication, and early service touchpoints to reduce early churn.
- Analyse churn patterns specifically in high-risk regions like Spain and tailor region-specific service improvements, localized marketing campaigns, or competitive offerings.
- Continuously monitor key financial indicators like balance versus salary and flag unusual patterns for early intervention by the retention team or financial advisors.

5. Customer Tenure Value Forecast: How would you use the available data to model and predict the lifetime (tenure) value in the bank of different customer segments?

➢ **Query:**

```sql
SELECT
    c.CustomerID,
    c.Age,
    c.EstimatedSalary,
    b.CreditScore,
    b.Tenure,
    b.Balance,
    b.NumOfProducts,
    cc.Category AS CreditCardCategory,
    a.ActiveCategory,
    e.ExitCategory,
    DATEDIFF(CURDATE(), c.BankDOJ) / 365 AS CurrentTenureYears
FROM customerinfo c
JOIN geography geo ON c.GeographyID = geo.GeographyID
JOIN bank_churn b ON c.CustomerID = b.CustomerID
LEFT JOIN creditcard cc ON b.CreditID = cc.CreditID
LEFT JOIN activecustomer a ON b.ActiveID = a.ActiveID
LEFT JOIN exitcustomer e ON b.ExitID = e.ExitID;
```

Output:

CustomerID	Age	EstimatedSalary	CreditScore	Tenure	Balance	NumOfProducts	CreditCardCategory	ActiveCategory	ExitCategory	CurrentTenureYears
15565714	47	96517.97	601	3	64430.06	2	non credit card holder	Active Member	Retain	4.9973
15565806	38	30583.95	532	5	0	2	non credit card holder	Inactive Member	Retain	6.2603
15565879	28	56185.98	845	5	0	2	credit card holder	Active Member	Retain	6.8548
15565891	39	56214.09	709	5	0	2	credit card holder	Inactive Member	Retain	6.1315
15565996	44	154639.72	653	4	0	2	credit card holder	Active Member	Retain	5.1808
15566111	39	48963.59	596	7	0	1	credit card holder	Inactive Member	Retain	8.6822
15566139	37	62830.97	526	7	53573.18	1	credit card holder	Inactive Member	Retain	8.0466
15566251	37	98686.4	618	4	96652.86	1	credit card holder	Inactive Member	Exit	6.0000
15566269	25	47307.9	787	3	0	2	credit card holder	Inactive Member	Retain	4.8192
15566295	33	148779.41	761	5	138053.79	2	credit card holder	Inactive Member	Retain	6.4247
15566378	48	147955.91	515	6	129387.94	1	non credit card holder	Active Member	Exit	7.3753
15566494	45	77475.73	487	4	0	2	credit card holder	Inactive Member	Retain	5.8986
15566563	30	5008.23	777	5	137851.31	1	credit card holder	Inactive Member	Exit	7.0055

Insights:

- Customers with higher balances generally show longer tenure values, indicating stronger loyalty to the bank.
- Inactive members tend to have shorter tenure compared to active members, which may reflect disengagement.
- Customers with multiple products, especially credit cards, exhibit longer tenures, showing that cross-selling strengthens customer retention.
- Retained customers typically have longer tenures, while those in the "Exit" category have relatively shorter tenures.

Recommendations:

- Focus on retaining active members by offering personalized financial services to further enhance their tenure.
- Engage inactive members with reactivation offers to prolong their relationship with the bank.
- Promote cross-selling strategies, especially targeting non-credit card holders, to increase tenure and customer value.
- Use predictive analytics to target customers likely to exit, offering incentives to retain them before they churn.

6. Marketing Campaign Effectiveness: How could you assess the impact of marketing campaigns on customer retention and acquisition within the dataset? What extra information would you need to solve this?

➢ **To assess the impact of marketing campaigns on customer retention and acquisition within the dataset:**

- Add data about which customers were part of a marketing campaign, including details such as campaign type, start date, and incentives offered. This could be in a new table campaign that links to customerinfo.
- Compare retention and acquisition metrics before and after campaigns. You would analyse changes in Tenure, Balance, and NumOfProducts to see if customers engaged more after the campaign.
- Monitor the increase in new customers (CustomerID) after campaigns, comparing regions (GeographyLocation) or demographics to see which segments responded best.
- Measure how many customers stayed active (no ExitID) post-campaign versus those who exited. Campaign effectiveness could be tied to a higher percentage of active members after the campaign.

Additional Information Needed:

- Campaign participation details (campaign name, start/end date, customer segment).
- Data on customer engagement with specific marketing efforts (discounts, offers).
- Specific timestamps to track customer behaviours before and after campaigns.

7. Customer Exit Reasons Exploration: Can you identify common characteristics or trends among customers who have exited that could explain their reasons for leaving?

➢ **Query:**

```sql
SELECT
    c.Age,
    c.EstimatedSalary,
    b.CreditScore,
    b.Tenure,
    b.Balance,
    b.NumOfProducts,
    COUNT(b.CustomerID) AS TotalExitedCustomers
FROM customerinfo c
JOIN bank_churn b ON c.CustomerID = b.CustomerID
JOIN geography geo ON c.GeographyID = geo.GeographyID
LEFT JOIN activecustomer a ON b.ActiveID = a.ActiveID
LEFT JOIN exitcustomer e ON b.ExitID = e.ExitID
WHERE b.ExitID = 1
GROUP BY
    c.Age,
    c.EstimatedSalary,
    b.CreditScore,
    b.Tenure,
    b.Balance,
    b.NumOfProducts
ORDER BY TotalExitedCustomers DESC;
```

Output:

Age	EstimatedSalary	CreditScore	Tenure	Balance	NumOfProducts	TotalExitedCustomers
42	101348.88	619	7	0	1	1
42	113931.57	502	4	159660.8	3	1
44	149756.71	645	4	113755.78	2	1
29	119346.88	376	5	115046.74	4	1
58	5097.67	653	4	132602.88	1	1
38	118913.53	510	4	0	1	1
39	140469.38	591	5	0	3	1
45	27822.99	475	5	134264.04	1	1
51	181297.65	465	6	122522.32	1	1
49	194365.76	834	6	131394.56	1	1
27	119708.21	829	5	112045.67	1	1
39	117622.8	637	7	137843.8	1	1
41	164040.94	655	5	125561.97	1	1

Insights:

- Many exited customers have low engagement, holding only 1 or 2 products, which may indicate a lack of deeper relationships with the bank.
- A significant number of exited customers have relatively low credit scores (below 500), potentially signalling financial instability.
- Several customers exited despite having substantial balances, suggesting that financial dissatisfaction might not be the main reason for leaving.
- Customers with longer tenure (4-7 years) also appear among those who exited, which indicates churn may happen even after a stable relationship period.

Recommendations:

- Implement targeted retention strategies for customers with only 1-2 products by offering cross-selling opportunities and incentives to deepen their engagement.
- Focus on providing personalized financial solutions for customers with low credit scores to reduce financial stress and prevent exits.
- Analyse customer satisfaction levels for those with high balances to address any service-related issues and prevent churn.
- Build loyalty programs for long-tenure customers to further strengthen their relationship with the bank and reduce their likelihood of exiting.

8. Are 'Tenure', 'NumOfProducts', 'IsActiveMember', and 'EstimatedSalary' important for predicting if a customer will leave the bank?

➢ **Yes, the variables 'Tenure', 'NumOfProducts', 'IsActiveMember', and 'EstimatedSalary' are important for predicting if a customer will leave the bank. Here's why each factor plays a key role in churn prediction:**

- **Tenure:** Customers with shorter tenure are more likely to leave because they haven't built a strong relationship with the bank yet. On the other hand, customers with longer tenure may be more loyal but may still churn due to dissatisfaction after a longer engagement.

- **NumOfProducts**: Customers holding fewer products are less engaged with the bank and have less to lose if they leave, making them more prone to churn. On the other hand, customers with multiple products are likely more invested and harder to disengage.

- **IsActiveMember**: Customers who are inactive or not actively using the bank's services are more likely to leave since they're less engaged. This makes the "IsActiveMember" status a strong predictor of potential churn.

- **EstimatedSalary**: Customers with higher salaries are typically offered premium services, which could incentivize them to stay. However, customers with lower salaries may face financial difficulties or find better offers elsewhere, leading to higher churn rates.

These factors, along with others such as CreditScore and Balance, form a comprehensive profile that can be used to predict customer churn behaviour using machine learning models like logistic regression, decision trees, or random forests.

9. Utilize SQL queries to segment customers based on demographics and account details.

➢ **Query:**

```sql
SELECT
  c.CustomerID,
  c.Age,
  b.CreditScore,
  b.Balance,
  b.Tenure,
  g.GenderCategory,
  geo.GeographyLocation,
  CASE
    WHEN c.Age < 25 THEN 'Youth (Under 25)'
    WHEN c.Age BETWEEN 25 AND 35 THEN 'Young Adults (25-35)'
    WHEN c.Age BETWEEN 36 AND 50 THEN 'Middle Age (36-50)'
    ELSE 'Senior (Above 50)'
  END AS AgeGroup,
  CASE
    WHEN b.CreditScore < 500 THEN 'Poor Credit'
    WHEN b.CreditScore BETWEEN 500 AND 700 THEN 'Average Credit'
    ELSE 'Good Credit'
  END AS CreditScoreCategory,
  CASE
    WHEN b.Balance < 10000 THEN 'Low Balance'
    WHEN b.Balance BETWEEN 10000 AND 50000 THEN 'Medium Balance'
    ELSE 'High Balance'
  END AS BalanceCategory,
  CASE
    WHEN b.Tenure < 2 THEN 'New Customer'
    WHEN b.Tenure BETWEEN 2 AND 5 THEN 'Moderate Customer'
    ELSE 'Loyal Customer'
  END AS TenureSegment,
  CASE
    WHEN CreditID = 1 THEN 'Credit Card Holder'
    ELSE 'Non-Credit Card Holder'
  END AS CreditCardSegment
FROM bank_churn b
JOIN customerinfo c on c.CustomerID=b.CustomerID
JOIN gender g on g.GenderID=c.GenderID
JOIN geography geo on geo.GeographyID=c.GeographyID;
```

Output:

CustomerID	Age	CreditScore	Balance	Tenure	GenderCategory	GeographyLocation	AgeGroup	CreditScoreCategory	BalanceCategory	TenureSegment	CreditCardSegment
15565879	28	845	0	5	Female	France	Young Adults (25-35)	Good Credit	Low Balance	Moderate Customer	Credit Card Holder
15566139	37	526	53573.18	7	Female	France	Middle Age (36-50)	Average Credit	High Balance	Loyal Customer	Credit Card Holder
15566251	37	618	96652.86	4	Female	France	Middle Age (36-50)	Average Credit	High Balance	Moderate Customer	Credit Card Holder
15566295	33	761	138053.79	5	Female	France	Young Adults (25-35)	Good Credit	High Balance	Moderate Customer	Credit Card Holder
15566563	30	777	137851.31	5	Female	France	Young Adults (25-35)	Good Credit	High Balance	Moderate Customer	Credit Card Holder
15566660	41	670	0	6	Female	France	Middle Age (36-50)	Average Credit	Low Balance	Loyal Customer	Credit Card Holder
15566708	45	444	0	6	Female	France	Middle Age (36-50)	Poor Credit	Low Balance	Loyal Customer	Credit Card Holder
15567078	27	789	66201.96	5	Female	France	Young Adults (25-35)	Good Credit	High Balance	Moderate Customer	Credit Card Holder
15567333	31	712	0	6	Female	France	Young Adults (25-35)	Good Credit	Low Balance	Loyal Customer	Credit Card Holder
15567335	42	559	0	6	Female	France	Middle Age (36-50)	Average Credit	Low Balance	Loyal Customer	Credit Card Holder
15567442	75	656	0	6	Female	France	Senior (Above 50)	Average Credit	Low Balance	Loyal Customer	Credit Card Holder
15567725	46	689	52016.08	5	Female	France	Middle Age (36-50)	Average Credit	High Balance	Moderate Customer	Credit Card Holder

Insights:

- Many "Young Adults (25-35)" and "Middle Age (36-50)" customers have high credit scores (above 700) and high balances, indicating strong financial stability.
- Customers with "Good Credit" and "Loyal Customer" tenure segments generally hold credit cards and exhibit higher balances.
- Customers with "Poor Credit" tend to have low balances, particularly in the "Middle Age (36-50)" group, which could indicate financial challenges.

Recommendations:

- Focus on retaining "Loyal Customers" with good credit by offering premium services and rewards to maintain engagement.
- Develop financial products targeted at customers with "Poor Credit" to help improve their financial standing and reduce churn risk.
- Encourage cross-selling to "Moderate Customers" by offering additional products, particularly to those with "Average Credit" to increase product engagement and tenure.

10. How can we create a conditional formatting setup to visually highlight customers at risk of churn and to evaluate the impact of credit card rewards on customer retention?

➤ **Output:**

CustomerID	Credit Score	Tenure	Balance	CreditID	
15566030	497	7	80,542.81	0	1
15566091	545	7	0.00	1	0
15566111	596	7	0.00	1	0
15566139	526	7	53,573.18	1	0
15566211	616	7	1,03,560.57	1	1
15566253	580	7	1,43,391.07	0	1
15566292	574	7	0.00	0	0
15566843	535	7	1,34,874.40	1	0
15567013	779	7	0.00	1	0
15567383	678	7	98,009.13	0	0
15567399	633	7	1,44,164.29	1	0
15568106	592	7	1,19,278.01	0	0
15568238	650	7	0.00	1	0
15568429	633	7	0.00	1	0
15568904	608	7	1,06,288.54	1	0
15569098	627	7	1,53,548.12	0	1
15569364	666	7	0.00	1	0
15569423	731	7	0.00	1	0
15569452	652	7	1,16,353.20	0	0
15569590	601	7	98,495.72	1	1
15569595	678	7	0.00	1	0
15569641	692	7	1,30,701.29	1	1
15569678	561	7	1,66,824.59	1	0
15569867	529	7	0.00	1	0
Total	**6505288**	**48643**	**76,48,58,892.88**		

Insights:

- Customers with a credit score below 500 and a balance below 30,000 are at high risk of churn, which suggests that financial instability is a major driver of customer exit.
- Longer tenure customers (above 3 years) tend to be more loyal, but those with lower credit scores or minimal product engagement are exceptions and require targeted attention.

- The presence of a credit card may not directly reduce churn, but its impact could be tied to the type of rewards and category offered. Customers with higher balances and premium cards exhibit stronger retention.
- Customers with balances between 30,000 and 80,000 who use credit card rewards show improved retention, indicating that medium-balance customers are positively influenced by reward programs.

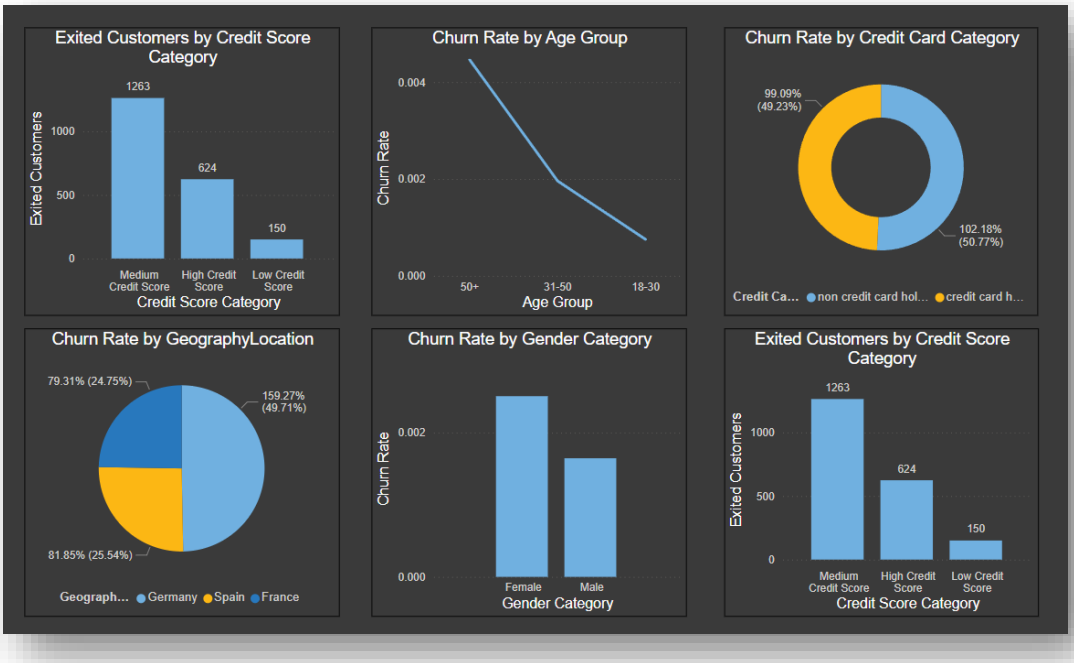
Recommendations:

- Create targeted retention programs for customers with credit scores below 500, offering personalized financial products and credit score improvement plans to increase retention and engagement.
- Optimize credit card rewards programs by tailoring them to higher-risk segments, especially those with medium balances (30,001 to 80,000), ensuring the rewards are aligned with customer preferences.
- Improve engagement strategies for new customers (tenure less than 3 years) through onboarding offers, better access to premium products, or incentives for increasing their balance.
- Monitor and adjust product offerings based on regional customer preferences and financial health by analysing geographic and balance-related churn patterns to fine-tune loyalty campaigns.

Conditional Formatting:

- **Credit Score:**
  - Scores below 500 are highlighted (possibly in red) as a high-risk category.
  - Scores between 500 and 700 are moderately highlighted, indicating average risk.
  - Scores above 700 are marked (possibly in green) as low-risk, suggesting financially stable customers.
- **Tenure:**
  - Customers with a tenure of 3 years or more are highlighted as more loyal,
  - while those with less than 3 years are flagged as potential churn risks.
- **Balance:**
  - Balances below 30,000 are flagged as financially vulnerable.
  - Balances between 30,001 and 80,000 are moderate-risk customers.
  - Balances above 80,000 are considered secure customers with strong engagement.

11. What is the current churn rate per year and overall as well in the bank? Can you suggest some insights to the bank about which kind of customers are more likely to churn and what different strategies can be used to decrease the churn rate?



Insights:

- Customers with medium credit scores (500-700) are more likely to churn compared to those with higher scores. This shows that mid-tier customers face financial challenges that lead to exit, but they may still be within the bank's ability to retain.
- Older customers (age group 50+) have a higher churn rate compared to younger ones, possibly due to less engagement with digital services or a shift in financial needs.
- Geographic location plays a role in churn, with customers from Spain showing a higher churn rate (81.85%), which may indicate that competitive offerings or dissatisfaction with the bank's services in specific regions are driving exits.
- Credit card holders churn at a higher rate (102.18%) than non-credit card holders (99.09%), suggesting that the current credit card rewards and offerings may not be appealing or sufficient to retain customers.

Recommendations:

- Create targeted retention programs for customers in the mid-tier credit score range (500-700) by offering tailored financial planning services or improving their access to credit. This could help retain customers who are financially vulnerable but valuable in the long term.
- Introduce senior-focused banking solutions to engage older customers (50+) with personalized products and improved accessibility to digital banking

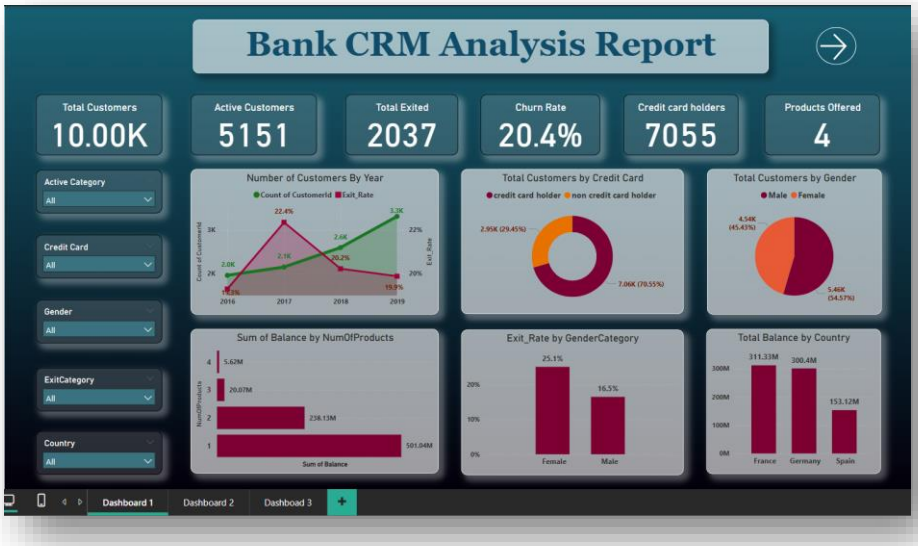
services, potentially addressing their unique needs and lowering churn.

- Strengthen customer engagement in high-churn regions like Spain by conducting localized market research and offering region-specific products or services that cater to the preferences of these customers.
- Revamp credit card reward programs to better suit the needs of current customers, particularly focusing on those with high balances or medium credit scores to incentivize usage and retention through more appealing rewards.

By following these recommendations, the bank can focus on reducing churn rates by addressing specific customer segments that are more likely to exit, thus improving retention.

12. Create a dashboard incorporating all the KPIs and visualization-related metrics. Use a slicer in order to assist in selection in the dashboard.

➢ **Dashboard Snippets:**



13. How would you approach this problem, if the objective and subjective questions weren't given?

➢ **If the objective and subjective questions weren't given, here's how I would approach the problem of analysing the "Bank_Churn" dataset with the goal of uncovering insights and solving relevant business challenges:**

- **Understand the Schema:**
  - Review the provided data schema and ER diagram to understand the relationships between different tables, columns, and data points (e.g., customerinfo, bank_churn, exitcustomer, activecustomer, etc.).
  - Identify key tables such as customerinfo for demographic data, bank_churn for customer activity, and exitcustomer for churn data.

- **Data Cleaning and Preprocessing:**
  - **Missing Values**: Identify any missing or inconsistent values in the dataset, especially in critical fields like CreditScore, Balance, NumOfProducts, and EstimatedSalary.
  - **Data Discrepancies**: Ensure that there are no conflicting data points in columns like IsActiveMember and Exited (for instance, an active member marked as exited).
  - **Data Transformation**: Prepare the data for analysis by formatting columns (e.g., dates, currency), renaming ambiguous column names (HasCrCard to Has_creditcard), and generating new fields (e.g., combining CustomerID and Surname into a unique key).

- **Key Business Metrics Identification**:
  - **Churn Rate**: Compute the overall churn rate and segment it by demographics such as age, gender, geography, and tenure.
  - **Product Engagement**: Analyse how many products each customer uses and the average number of products for different customer segments (e.g., those who have exited vs. those who remain).

  - **Credit Score Analysis**: Compare average credit scores between customers who have exited and those who remain with the bank.
  - **Customer Lifetime Value (Tenure Forecast):** Use customer tenure as a key metric to predict lifetime value based on demographic and behavioural patterns.

- **Customer Segmentation**:
  - Segment customers based on demographics (age, gender, geography) and account details (balance, credit score, number of products). This segmentation can help in creating marketing or retention strategies targeted to specific groups.
  - Segment churned customers by their characteristics (e.g., tenure, product usage) to understand what factors are most likely to contribute to churn.

- **SQL Queries to Generate Insights**:
  - **Churn Analysis**: Write SQL queries to calculate the churn rate by year, geography, and gender. Analyse the characteristics of customers who churn (low engagement, low balance, etc.).
  - **Product Affinity**: Investigate common product combinations (e.g., customers with both credit cards and loans) to identify cross-selling opportunities.
  - **Credit Score Impact**: Query data to analyse the relationship between customer credit scores and churn or product engagement.
  - **Customer Retention**: Analyse the retention rates of customers who use multiple products versus those who use fewer products.

- **Data Visualization and Reporting**:
  - **Dashboards**: Develop visualizations (e.g., in Power BI or Tableau) for key metrics like churn rate, customer segmentation, product usage, and credit score distribution.
  - **Conditional Formatting**: Highlight high-risk customers in visual reports using conditional formatting to identify those most likely to churn.
  - **Time-Series Analysis**: Visualize trends in customer sign-ups, exits, and product usage over time (e.g., seasonal or yearly trends).

- **Business Recommendations**:
  - **Retention Strategies**: Based on churn analysis, recommend personalized offers, loyalty programs, and engagement campaigns to retain customers who are likely to churn.
  - **Product Cross-Selling**: Leverage product affinity insights to recommend cross-selling strategies that can increase customer engagement and retention.
  - **Credit Score Management**: Suggest financial counselling or credit score improvement programs for customers with low credit scores to reduce churn and increase engagement.

This approach allows for a comprehensive understanding of the bank's customer behaviour, churn patterns, and product engagement, leading to actionable insights and business strategies.

14. In the "Bank_Churn" table how can you modify the name of the "HasCrCard" column to "Has_creditcard"?

- **Query:**

```
ALTER TABLE bank_churn
CHANGE CreditID Has_creditcard INT;
Select * from bank_churn;
```

Output:

CustomerID	CreditScore	Tenure	Balance	NumOfProducts	Has_creditcard	ActiveID	ExitID
15634602	619	7	0	1	1	1	1
15647311	608	4	83807.86	1	0	1	0
15619304	502	4	159660.8	3	1	0	1
15701354	699	3	0	2	0	0	0
15737888	850	3	125510.82	1	1	1	0

========== END OF SUBJECTIVE QUESTIONS ==========