SaaS Churn Risk Analysis - Power BI Project

Done by **Sam Buwalda** in 2025 as part of his portfolio project, showcasing skill proficiency in **SQL** and **Power BI**.

In this project, I will answer five business questions regarding a SaaS customer churn dataset, from Kaggle. The dataset includes 7000+ rows and 19 different customer features. First, I'll visualize the churn rate of all the customer features in the dataset. This will give us a good overview of the biggest main drivers of churn. Next, we will look at a selection of features for each question based on what is being asked. All of the questions are fictional and created by me to simulate real-world business scenarios.

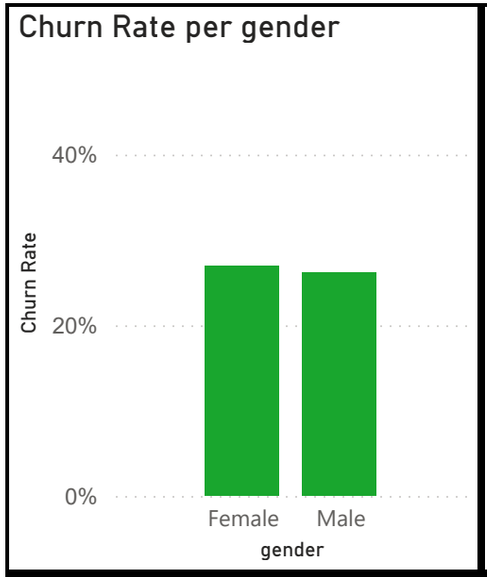
We will divide all of the customer features into five domains, each with its own distinct color. You will see these colors when looking at the bar charts. Below I will list the domains present in this Power BI report:

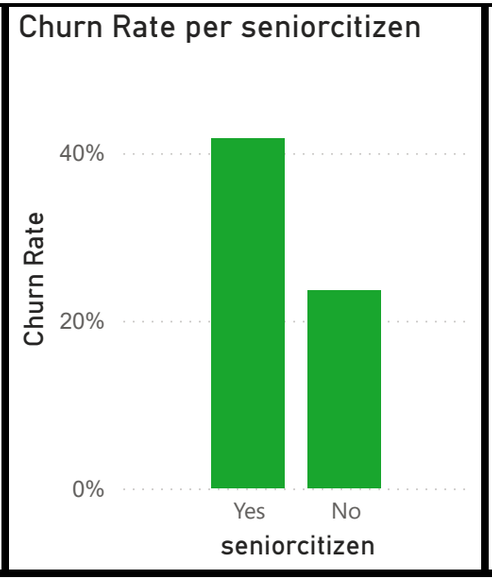
- **Green**: Demographic & Household
- **Red**: Contract & Structure (determining the relationship with the provider)
- **Purple**: Internet & Core Product (choices regarding core infrastructure and primary services)
- **Blue**: Extra Services / Add-ons (optional or supplementary services)
- **Yellow**: Financial (monthly charges and total charges)

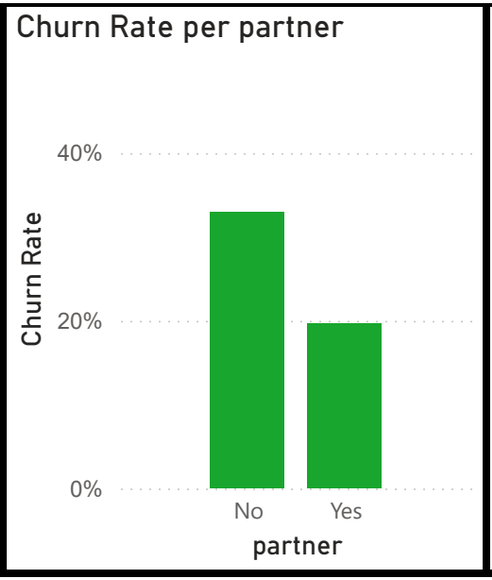
Q1: Which customer features show the strongest association with churn overall?

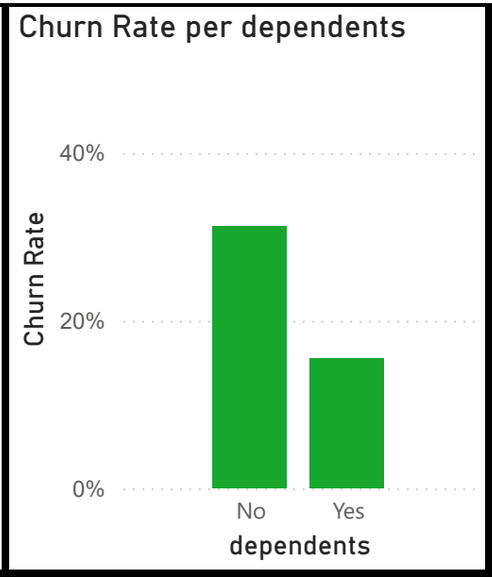
- **Goal:** Identify, at a global level, which individual features have the largest differences in churn rates between their categories. This provides a complete “top drivers” view without separating features into predefined groups such as product, support, or behavioral.
- **Segmentation frame:** All customer features in the dataset, except for `customerid`.
- **Approach:** Calculate the churn rate per category for each customer feature. Create diagrams showcasing the churn rate per category for each customer feature. Select all the customer features showing a churn rate of 40+%. Rank the selected list of customer features in a descending way, starting with the highest churn rate on top. Form an holistic risk profile based on the customer features showing a churn rate of 40+%.
- **Reflection:** This method provides a ranked list of customer features with the highest churn rate, making it easy to prioritize further investigation or targeted interventions. However, results remain correlational and should be interpreted with caution.
- **Decision impact:** Gives stakeholders a shortlist of the customer features that have the most impact on the total churn rate, enabling more targeted / focused retention strategies across all domains.

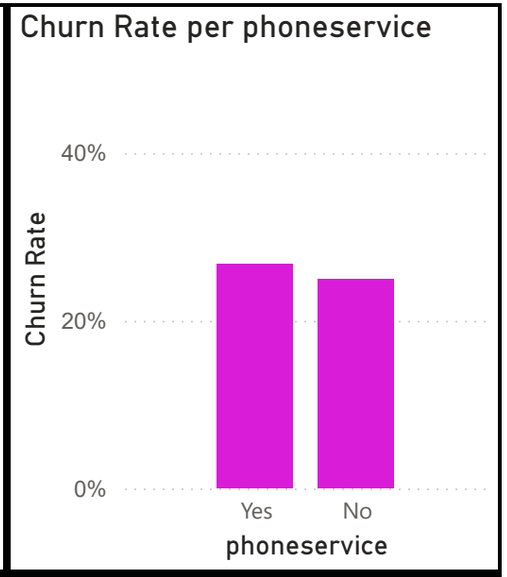
Q1 (Global): Visualization Charts

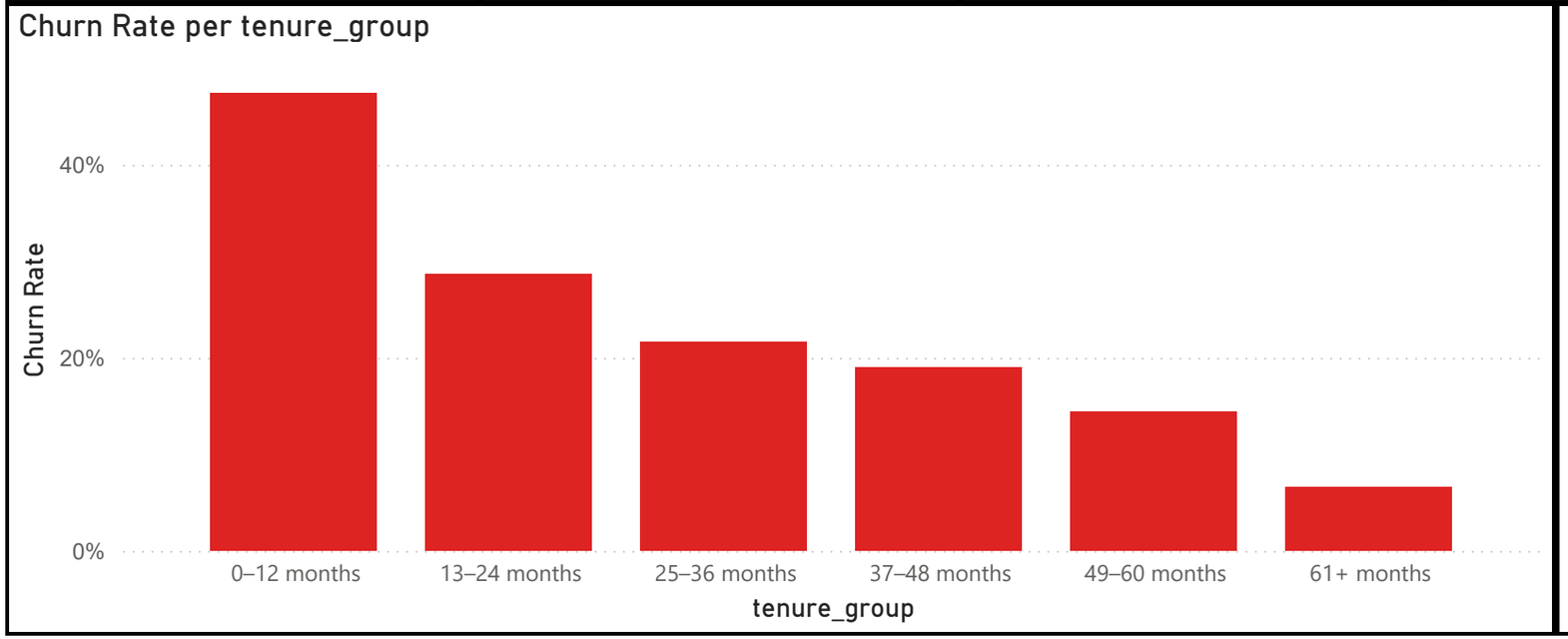


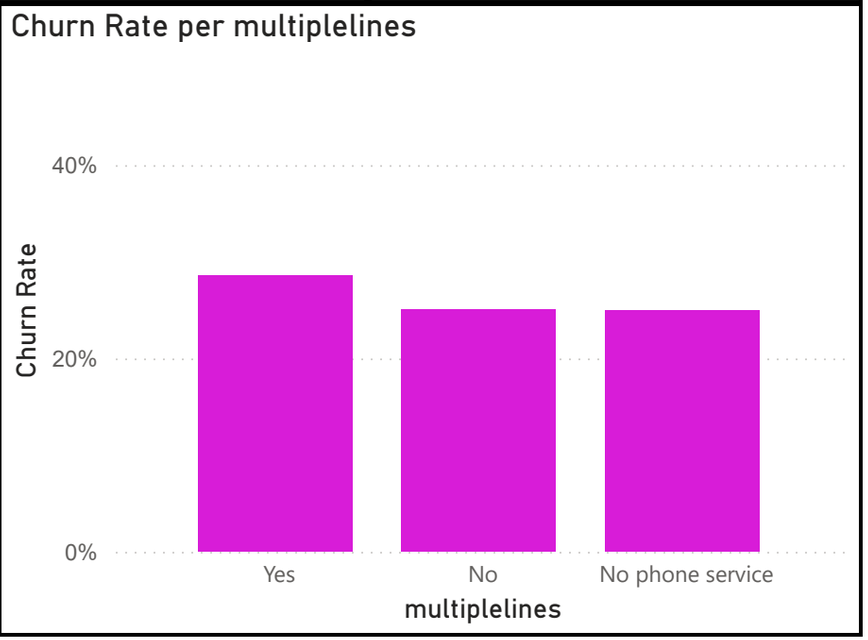












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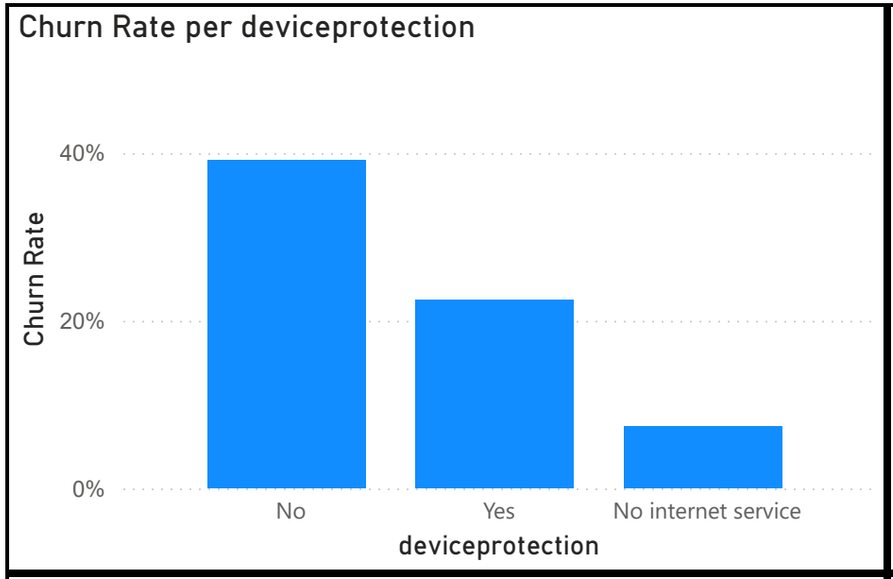

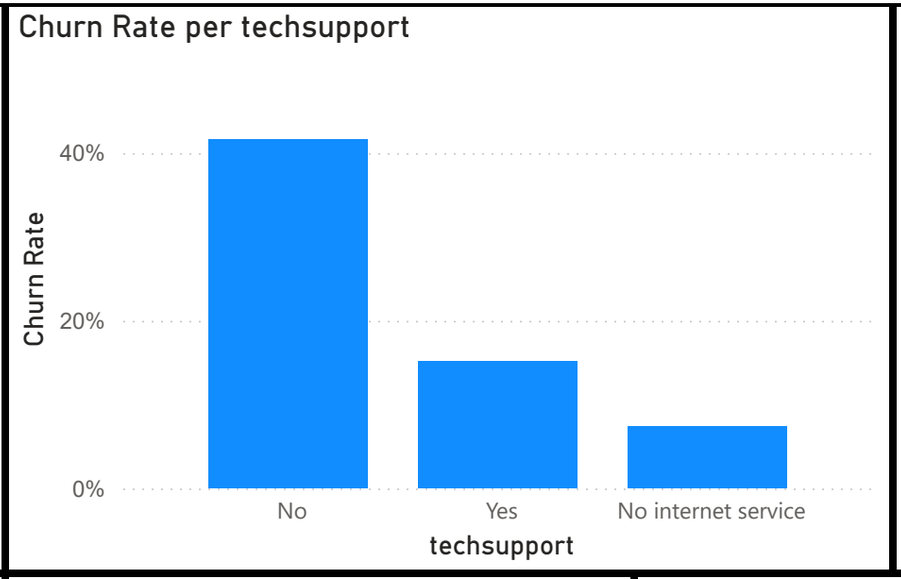

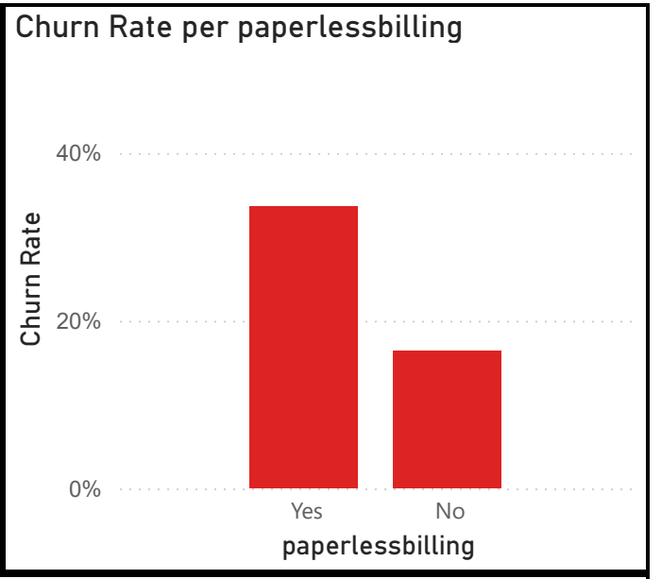

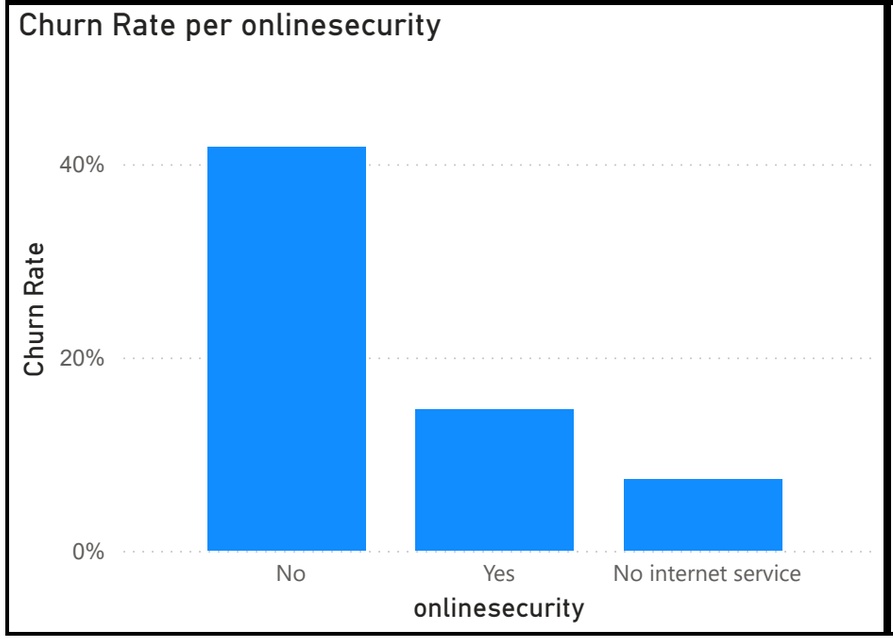

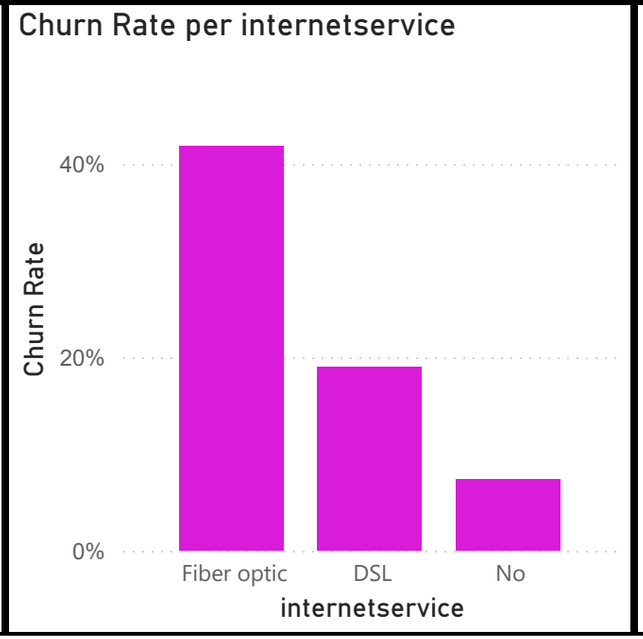

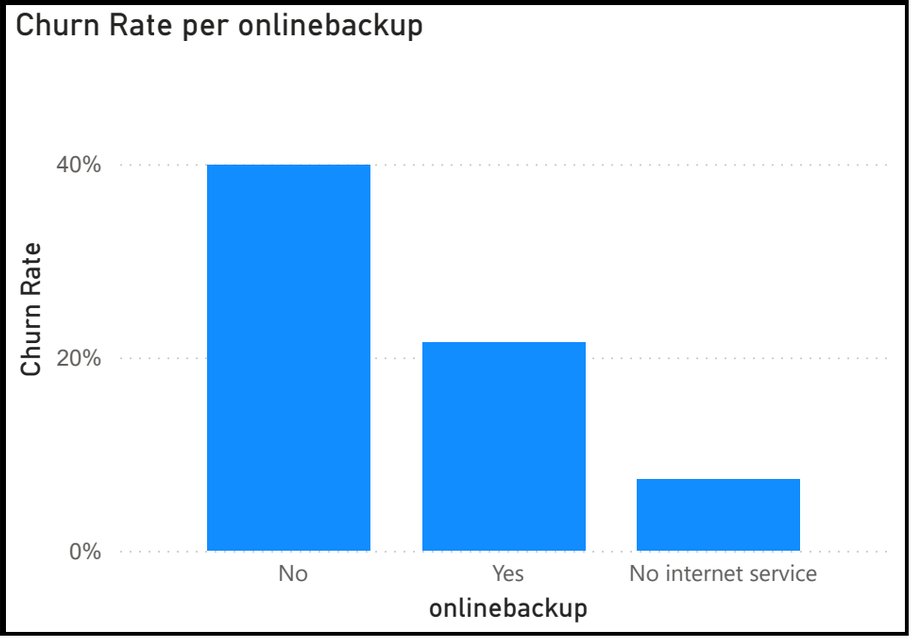

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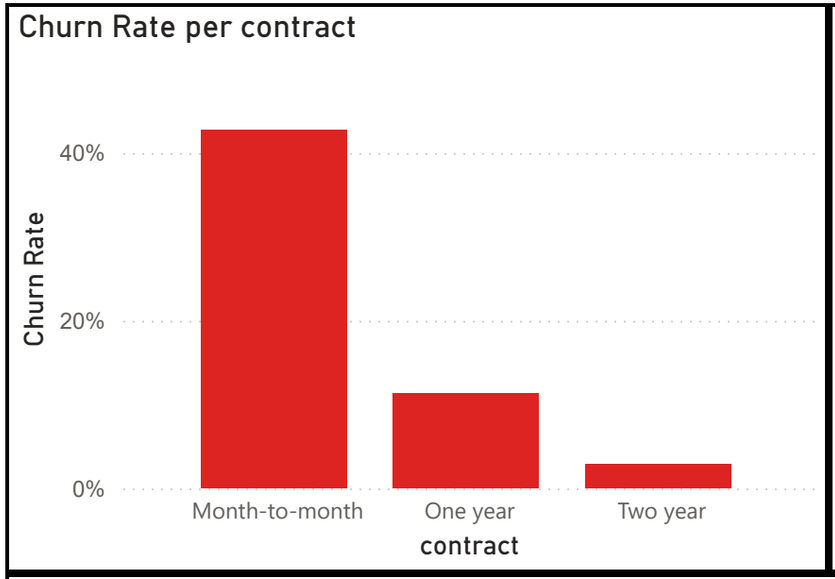

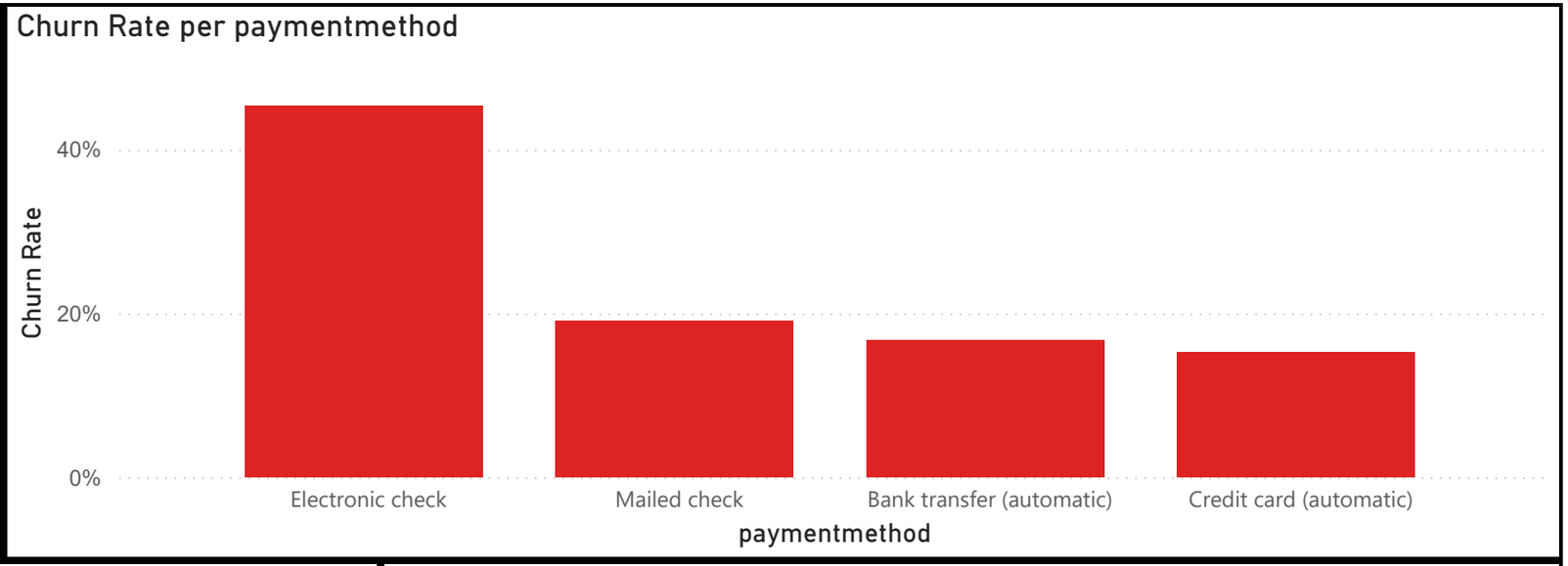

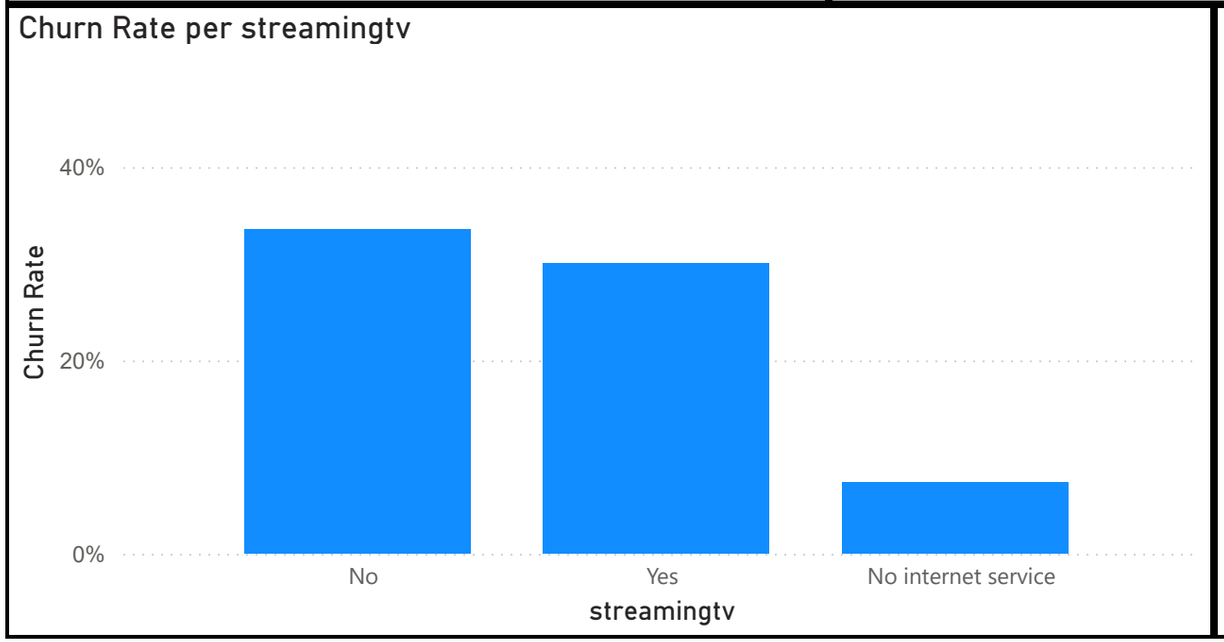

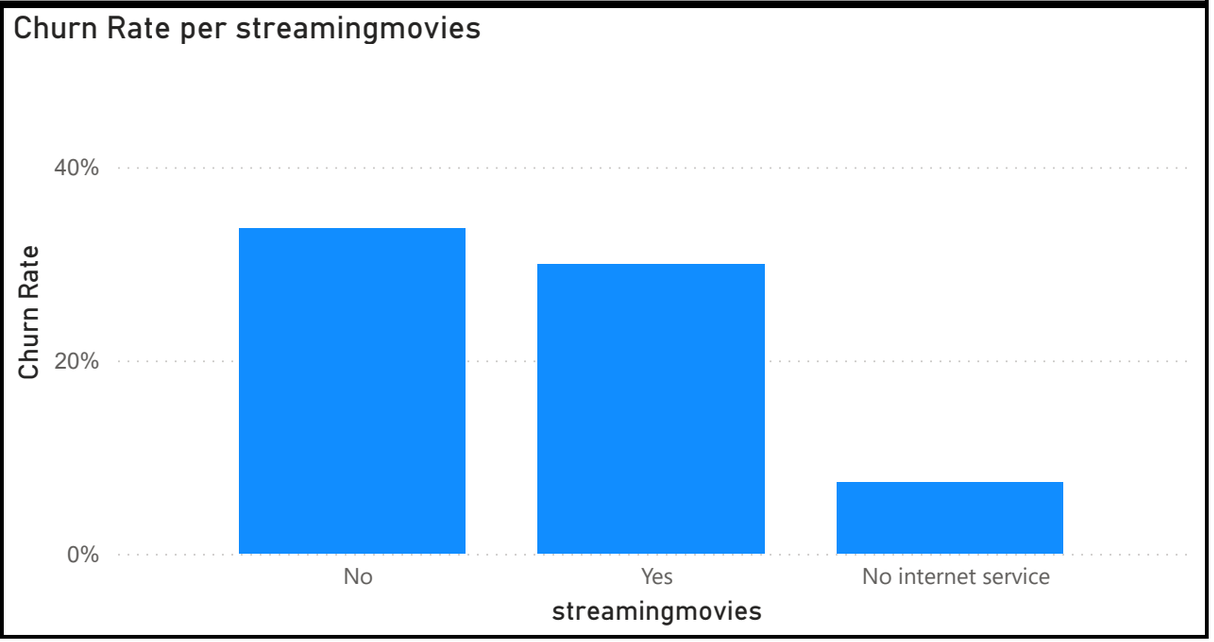

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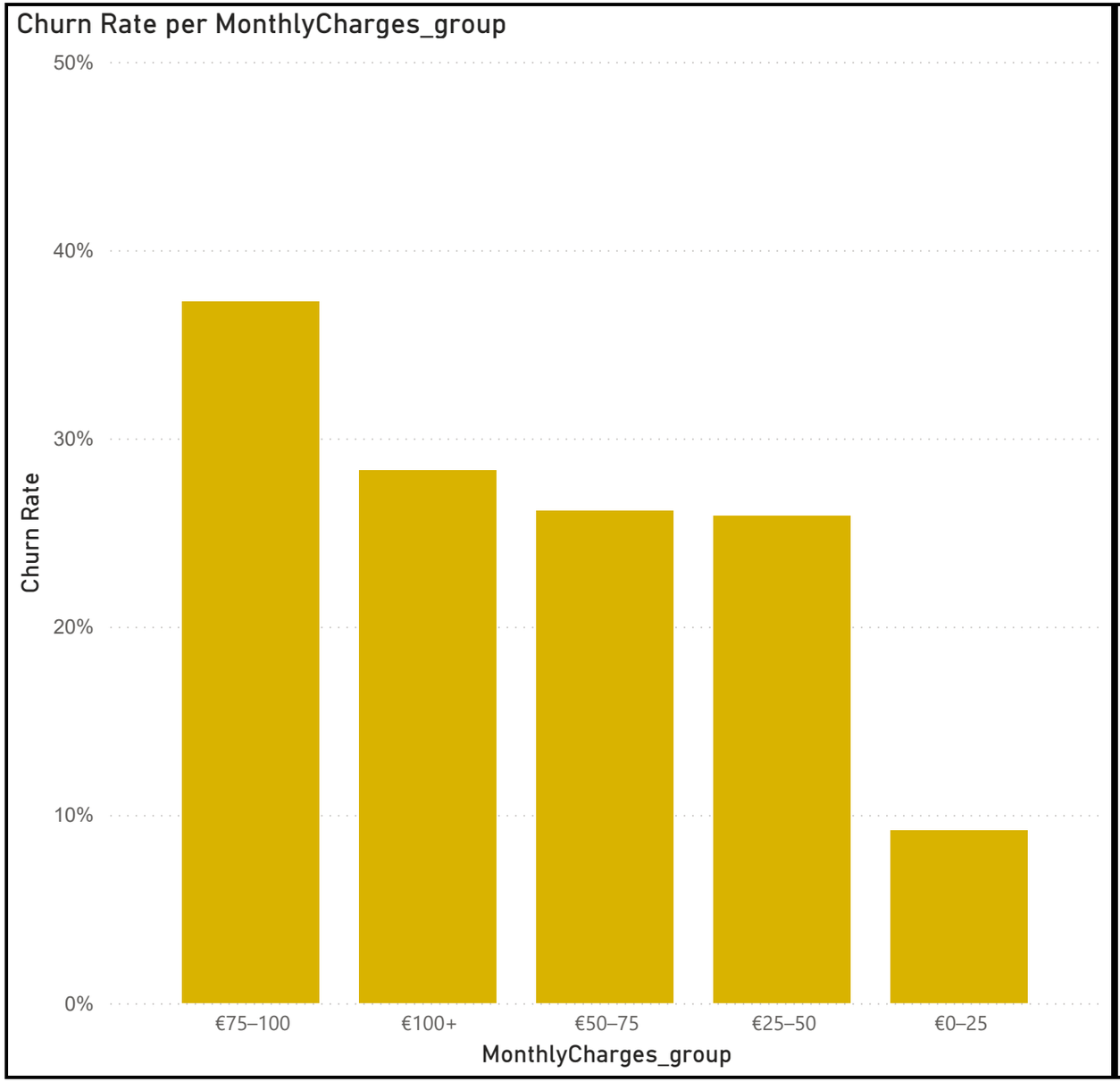
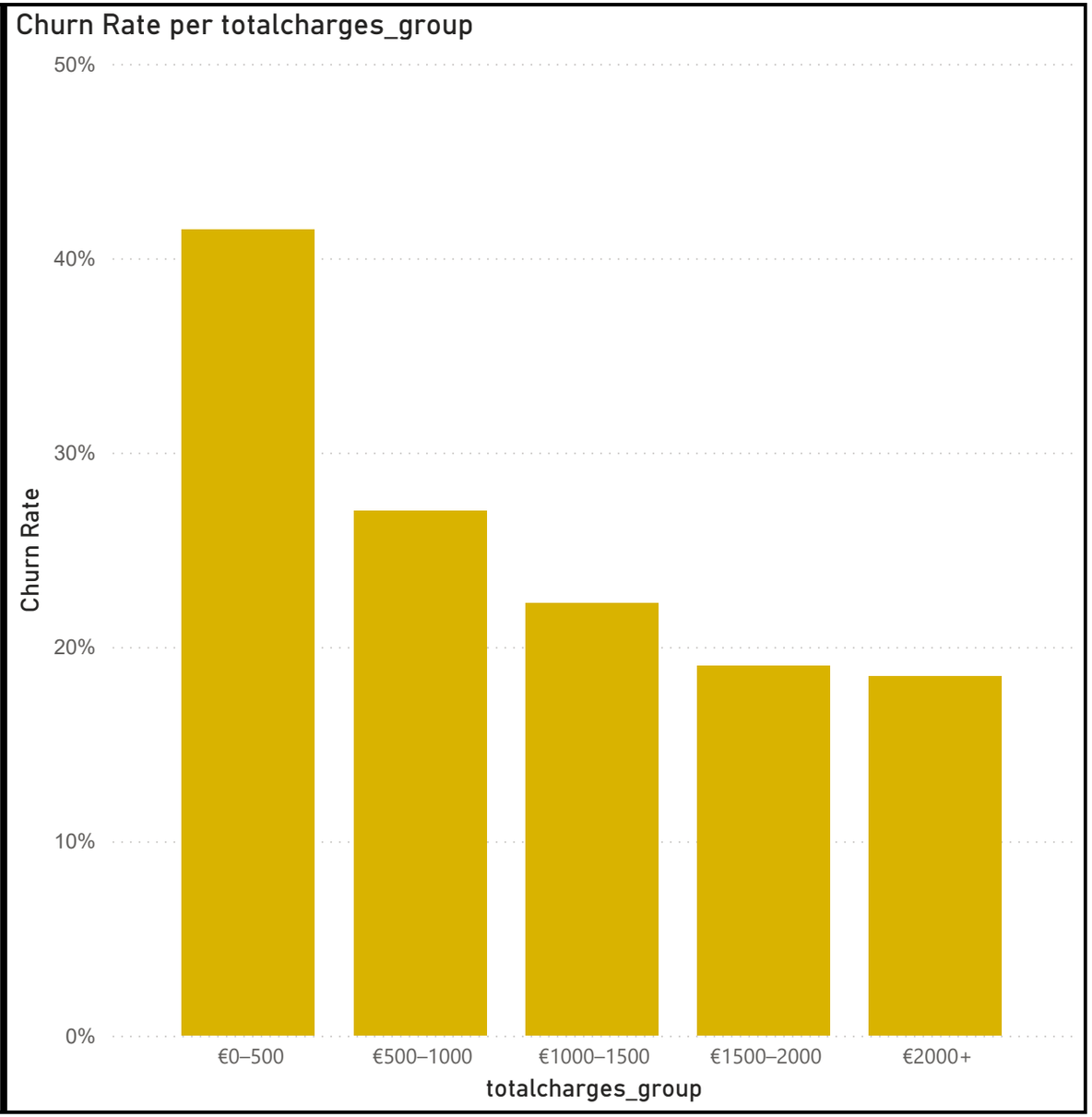




Q1 (Global): Results and Insights

Risk profile features ranked (40+% churn rate):

- Tenure 0-12 months (47,44% churn rate)
- Electronic check (45,29% churn rate)
- Month to month contract (42,71% churn rate)
- Fiber optic internet service (41,89% churn rate)
- No online security (41,77% churn rate)
- Senior citizen (41,68% churn rate)
- No techsupport (41,64% churn rate)
- Total charges €0-€500 (41,45% churn rate)

Insight:
The analysis shows a ranked list of customer features with churn rates above 40%. On the right, we see the churn rate of the combined risk profile made from those features.

The results show that new customers (0–12 months of tenure) with month-to-month contracts are most likely to cancel. This makes sense, since many of them are still trying out the service to see if it meets their needs. Making a strong first impression with these customers should be the main priority.

Another important finding is that customers who pay by electronic check have the second-highest churn rate. Because they make a manual payment every month, they are more aware of the cost and more likely to ask themselves if the service is worth it. If the answer is no, they cancel. Customers on automatic payments think about this less often.

A possible action is to move more customers to automatic payment methods, which would reduce the monthly “reminder” effect and lower cancellations.

77,48%
Q1 Risk Profile Churn Rate (containing all features with 40+% churn rate)

Risk profile amount: 111

26,54%
Total Churn Rate

Total amount: 7043

Q2: Among the customer features that are stable, which customer features are associated with the highest churn?

- **Goal:** Identify which stable customer features, defined by demographic or structural features that rarely change within a quarter, are most at risk of cancellation. This allows churn prevention efforts to focus on segments that are both high-risk and stable enough to target consistently.

- **Segmentation frame:** We will include customer features that meet two conditions:
  - **Demographic** or **structural** with high switching cost → hard or unlikely to change once set.
  - Unlikely to change **within a quarter** → stable enough to be meaningful for retention actions.

- **Selected customer features:**
  - gender (demographic)
  - seniorcitizen (demographic)
  - partner (household setup)
  - dependents (household setup)
  - tenure_group (monotonic increase = predictable and stable enough because bins span 12 months each)
  - contract (rarely changed before renewal)
  - paymentmethod (structural choice, high friction to change)
  - internetservice (infrastructure setup, rarely switched mid-contract)

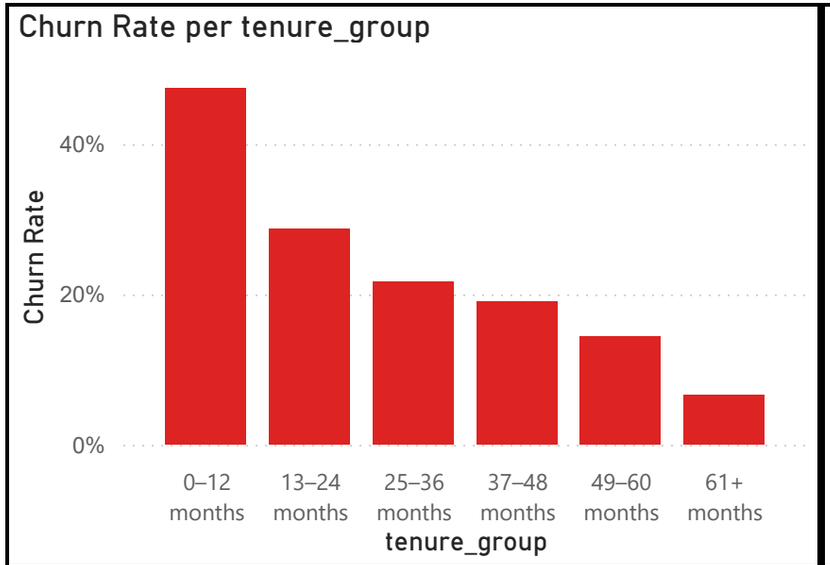
- **Approach:** For each of these variables, I calculate the churn rate per category. Then make a list of the variables that are highest associated with churn. And make a risk profile including all the features that are associated with a churn rate of 30+%.

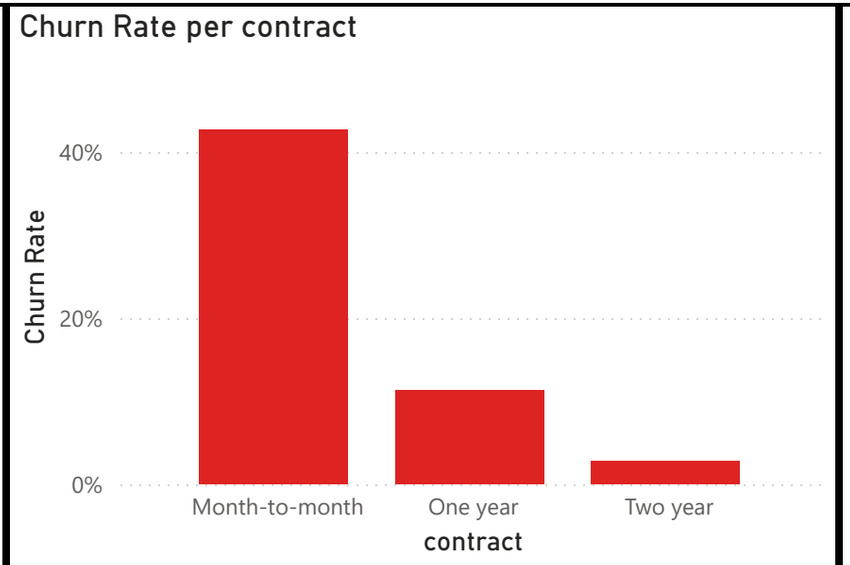
- **Reflection:** By restricting the analysis to stable customer features, we avoid segments defined by fluid preferences (e.g. paperless billing, add-on services) that can change quickly and weaken the reliability of segmentation. A disadvantage is that these remain correlations without a causal basis.

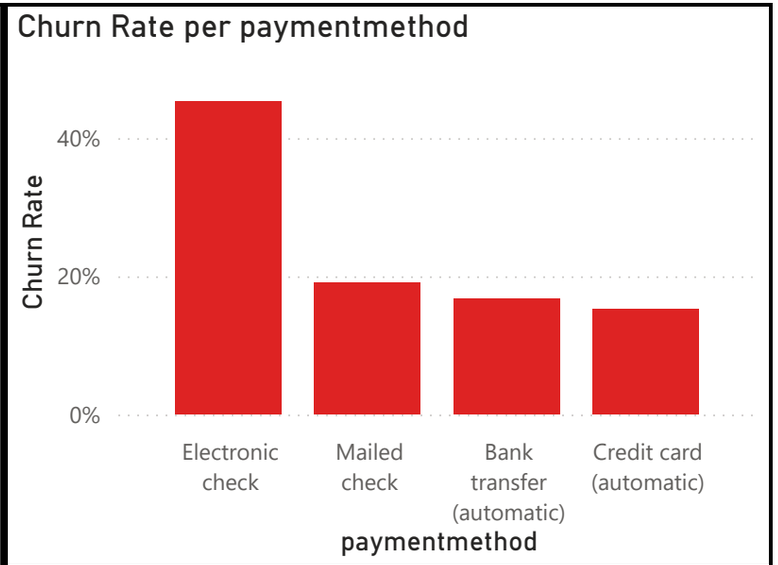
- **Decision impact:** Highlights long-term at-risk customer groups where intervention strategies (onboarding, retention campaigns, tailored offers) can be stably applied.

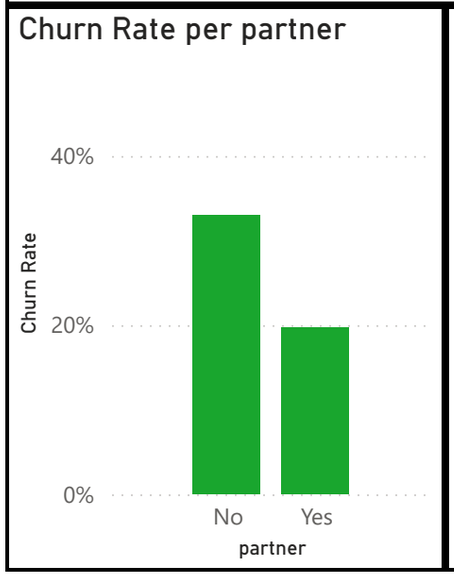
Q2 (Stable): Visualization Charts

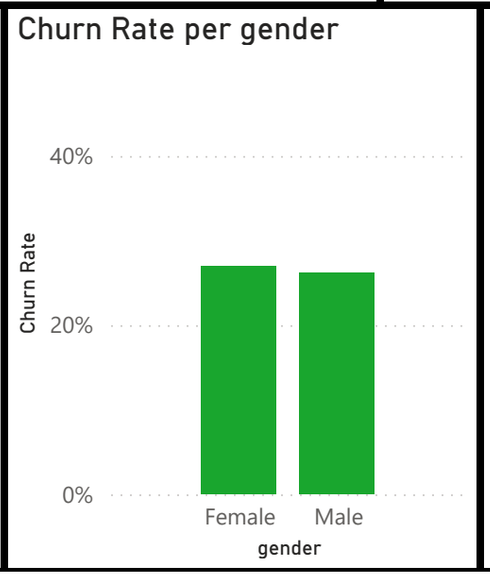
Visualizing churn rate per stable customer features using bar charts.

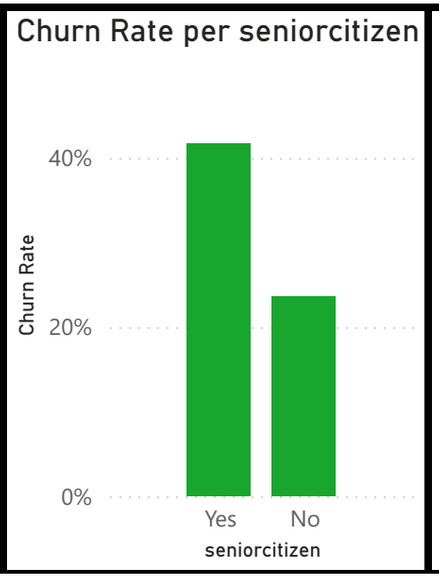


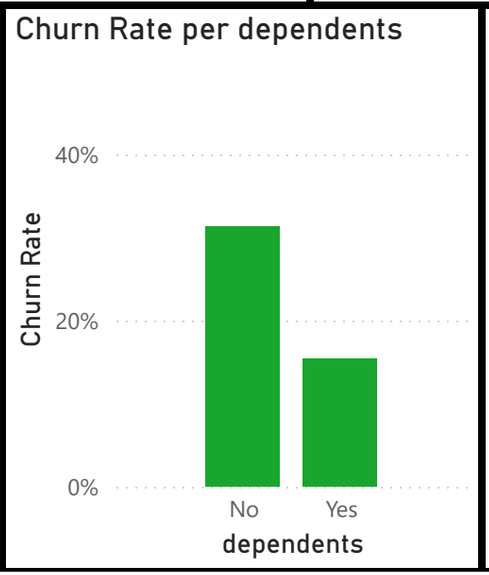


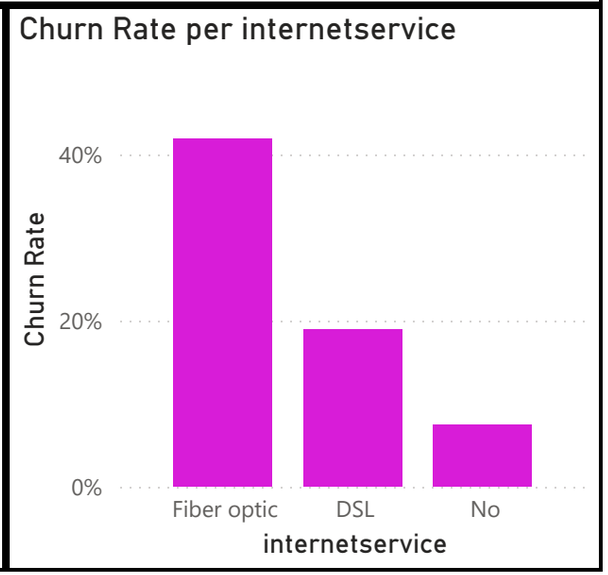












Q2 (Stable): Results and Insights

Risk profile features ranked (30+% churn rate):

- Tenure 0-12 Months (47,44% churn rate)
- Electronic check (45,29% churn rate)
- Month-to-month contract (42,71% churn rate)
- Fiber optic internet service (41,89% churn rate)
- Senior citizen (41,68% churn rate)
- No partner (32,96% churn rate)
- Independent (31,28% churn rate)

Insight:
These results focus on stable customer features that rarely change, such as demographics, household setup, internet service, and contract type. Because these features don’t shift often, they are reliable indicators for long-term churn risk.

Similar to Question 1, the data shows that new customers with month-to-month contracts should be the top priority for retention efforts. Customers paying by electronic check (manual monthly payment) also stand out again as a high-risk group.

Looking at demographics and household features, senior citizens have the highest churn rate of all (40%+), well above average. This makes older customers an important group to pay special attention to.

74,38%

Q2 Risk profile Churn Rate (containing all features with 30+% churn rate in this domain)

Risk profile amount: 121

26,54%

Total Churn Rate

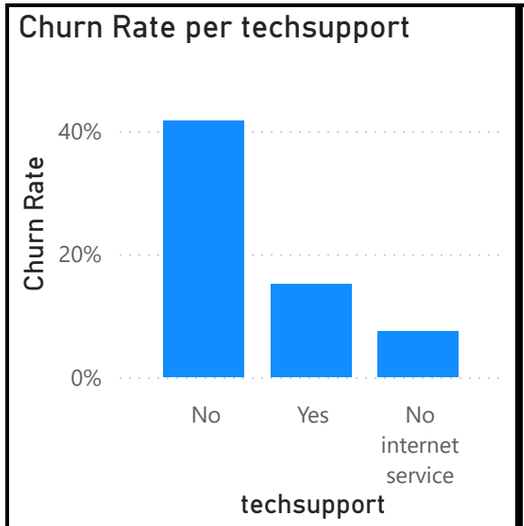
Total amount: 7043

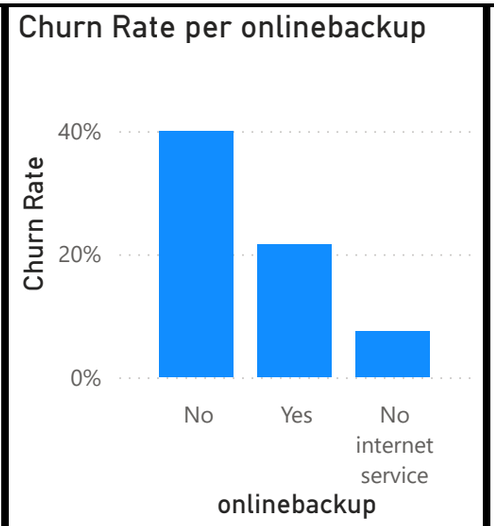
Q3: Which product features or forms of customer support are associated with a higher risk of cancellation?

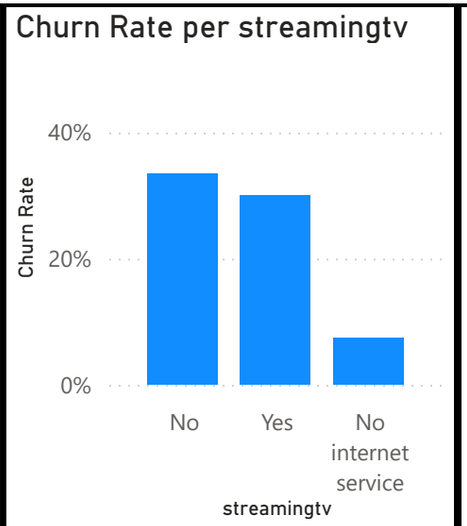
- **Goal:** Gain insight into which services and forms of customer support occur more frequently among customers who cancel. This allows companies to make targeted improvements to their service offering or support structure.
- **Segmentation frame:** We analyze churn rates based on *product and support features*. These are binary or categorical features that indicate whether a customer uses a particular service or form of support.
- **Selected customer features:**
  - TechSupport
  - OnlineSecurity
  - OnlineBackup
  - DeviceProtection
  - StreamingTV
  - StreamingMovies
  - PhoneService
  - MultipleLines
  - InternetService
  - PaperlessBilling
- **Approach:** For each of these variables, I calculate the churn rate per category. Then make a list of the variables that are highest associated with churn. And make a risk profile including all the features that are associated with a churn rate of 30+%.
- **Reflection:** This analysis helps less with understanding *who* cancels (as in Question 1) and more with *why* customers might leave. Important: this remains correlational. We cannot determine whether the use (or absence) of a service is actually the cause of churn.
- **Decision impact:** If certain support options or services are found to be strongly linked to churn, companies can take action. For example, by improving onboarding, making certain services mandatory, or resolving technical issues.

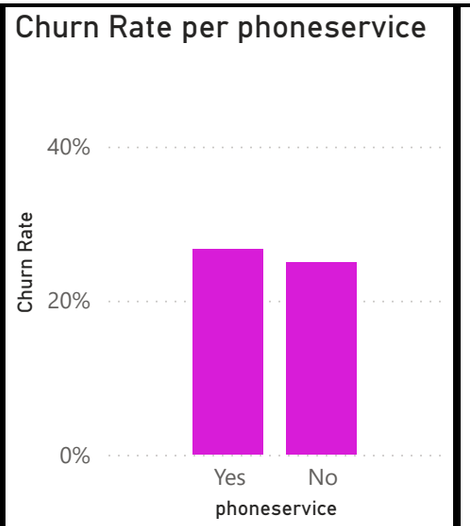
Q3 (Product & Support): Visualization Charts

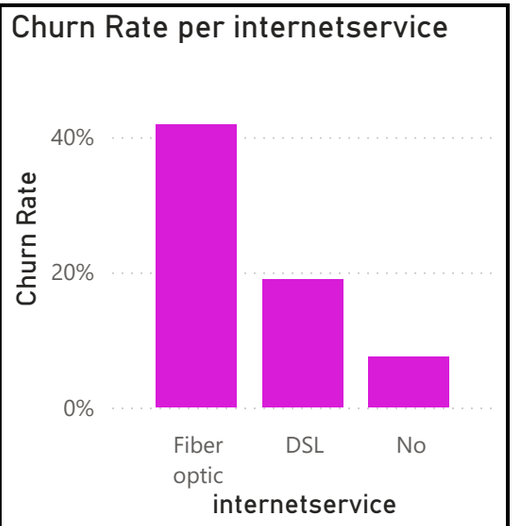
Visualizing churn rate per product and support feature using bar charts.

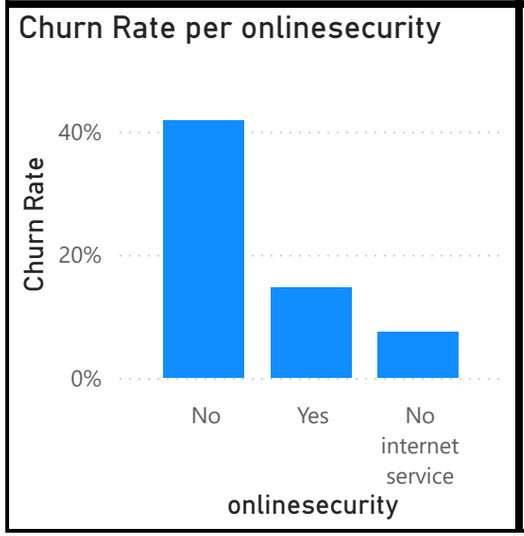


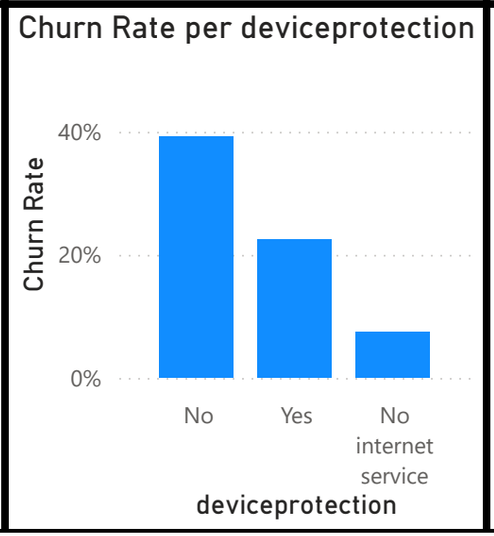


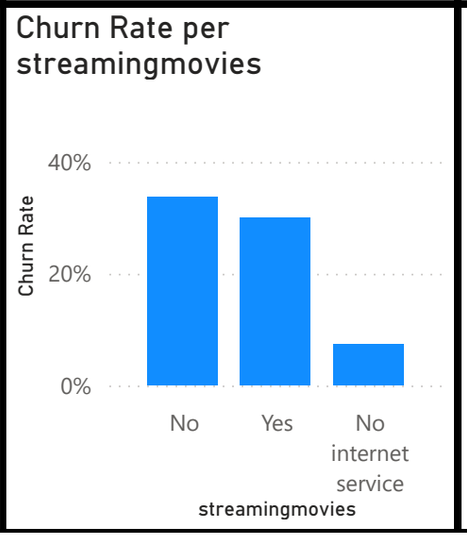


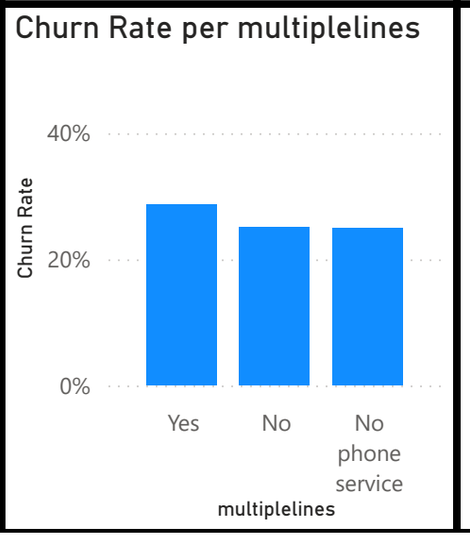


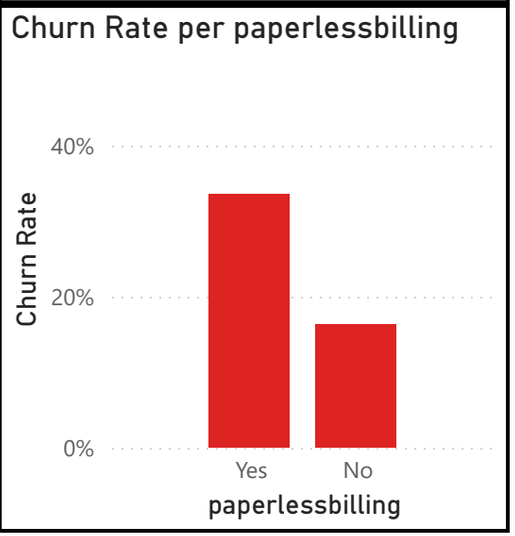












Q3 (Product & Support): Results and Insights

Risk profile features ranked (30+% churn rate):

- Fiber optic internet service (41,89% churn rate)
- No online security (41,77% churn rate)
- No tech support (41,64% churn rate)
- No online back-up (39,93% churn rate)
- No device protection (39,13% churn rate)
- No streaming movies (33,68% churn rate)
- Paperless billing (33,57% churn rate)
- No streaming TV (33,52% churn rate)

Insight:
The most striking result here is that customers with no extra services or add-ons are more likely to cancel than those who do have them. This suggests that churn is not mainly about being unhappy with add-on products or support.

Instead, it points to commitment and trust. Customers with only one service feel it's easy to cancel. But those who use multiple services are more tied in — cancelling would mean moving everything to another provider, which takes more effort.

Takeaway: The more services customers use, the more committed and loyal they become. Encouraging them to adopt additional services can reduce churn.

62,21%

Q3 Risk profile Churn Rate (containing all features with 30+% churn rate in this domain)

Risk profile amount: 307

26,54%

Total Churn Rate

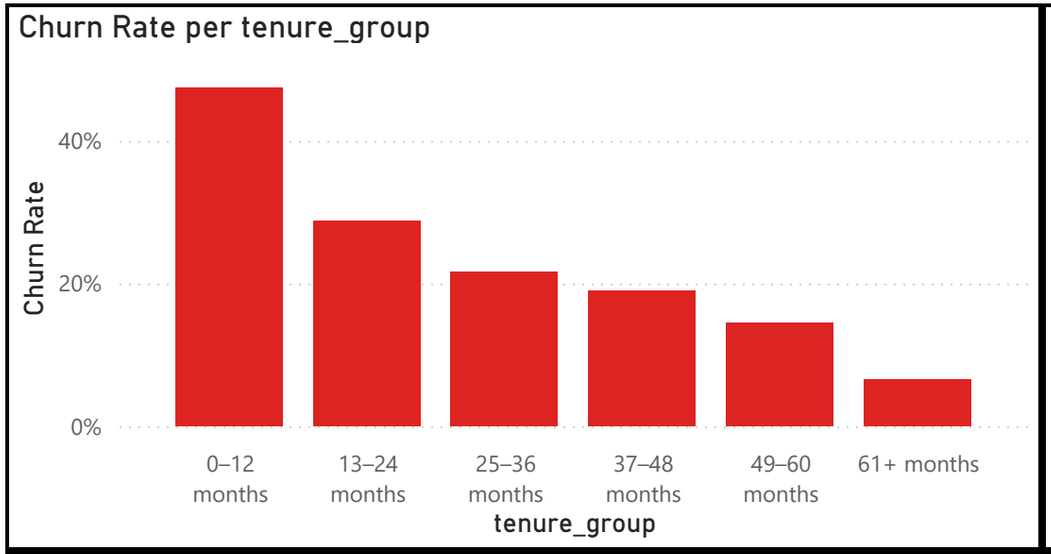
Total amount: 7043

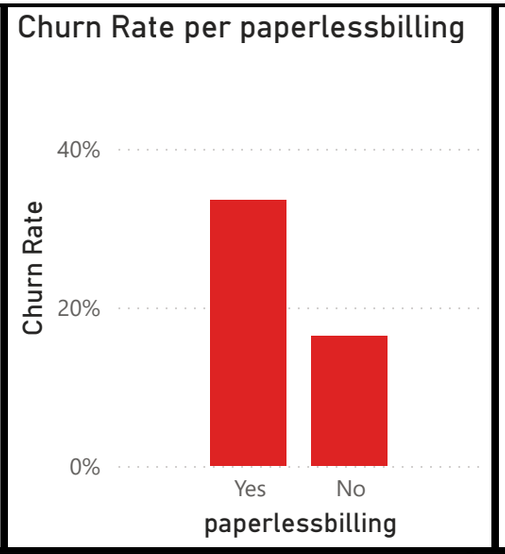
Q4: Are there behavior patterns that predict churn before customers leave?

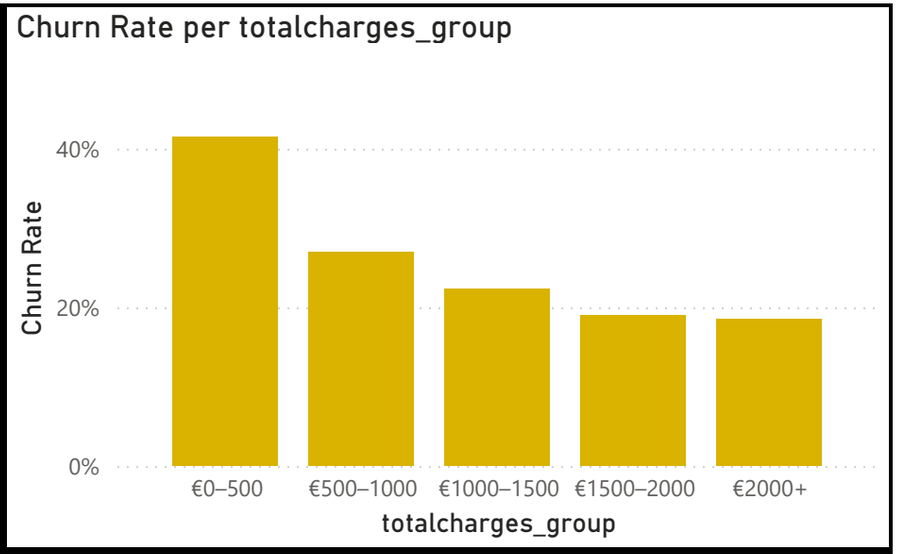
- **Goal:** Early detection of churn risk by using indirect behavioral indicators.
- **Context:** The dataset contains only static customer features. Still, some of these can plausibly say something about behavior, engagement, or friction. We use these customer features as *behavioral proxies*.
- **Selected behavioral proxies:**
  - tenure – Proxy for loyalty or onboarding problems
  - contract – Level of commitment (short vs. long)
  - paperlessbilling – Digital preference, convenience
  - paymentmethod – Friction or degree of automation
  - monthlycharges – Perceived value vs. cost
  - totalcharges – Lifetime value and intensity of use
- **Approach:** First, we categorize the numerical proxies (such as tenure and charges) into logical behavior groups through binning. We then calculate the churn rate per category for each of the variables. Then I make a list of the variables that are highest associated with churn. And make a risk profile including all the features that are associated with a churn rate of 30+%.
- **Reflection:** This approach makes it possible to analyze behavior *indirectly*. While less accurate than real behavioral logs, it still provides valuable signals for early risk detection. All insights remain correlational and should be interpreted with caution.
- **Decision impact:** The results help in building churn profiles that can be directly applied in onboarding, retention campaigns, or proactive service. This allows teams to intervene earlier with customers who have a risk profile, before dissatisfaction leads to cancellation.

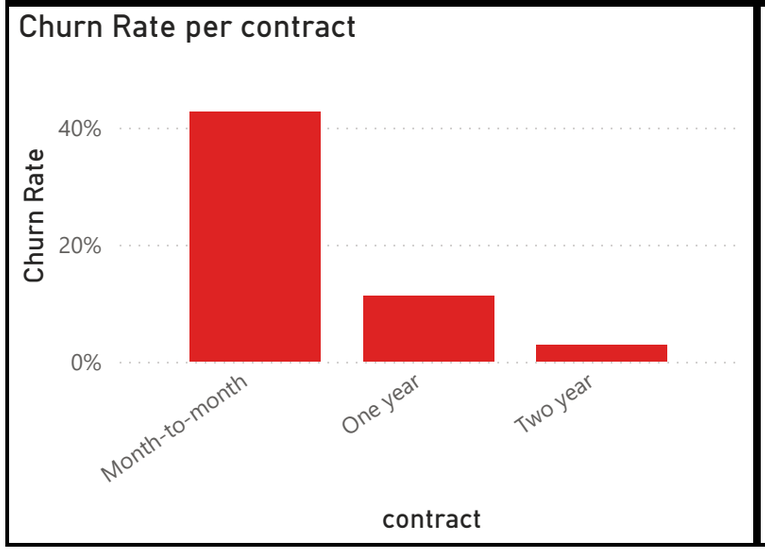
Q4 (Behavior): Visualization Charts

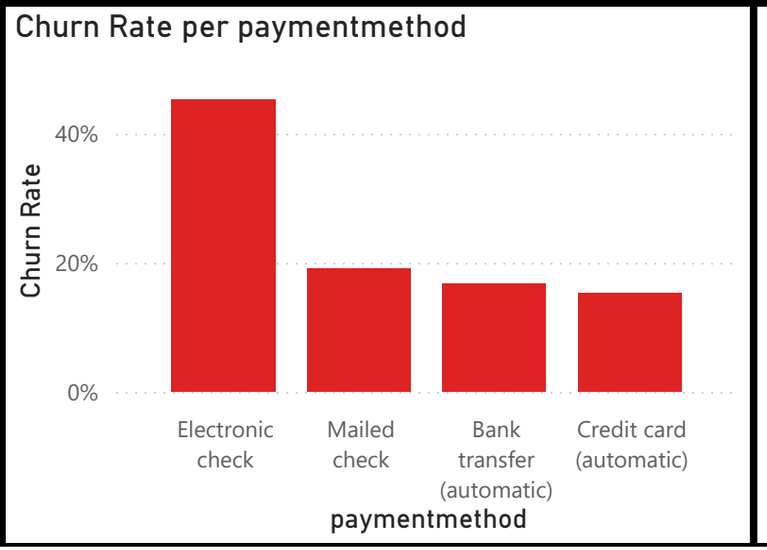
Visualizing churn rate per behavioral proxy using bar charts.

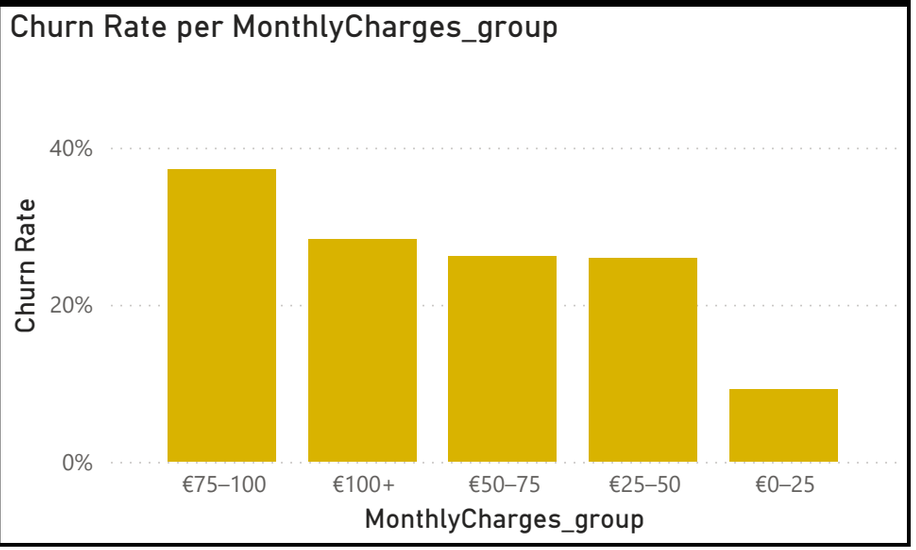












Q4 (Behavior): Results and Insights

Risk profile features ranked (30+% churn rate):
- 0-12 months tenure (47,44% churn rate)
- Electronic check (45,29% churn rate)
- Month-to-month contract (42,71% churn rate)
- €0-€500 total charges (41,45% churn rate)
- €75-€100 monthly charges (37,25% churn rate)
- Paperless billing (33,57% churn rate)

Insight:
All features are included in this risk profile. Compared to the profiles from segments and product & support, this one shows the highest churn rate. When compared to the overall churn rate, it confirms a strong link between churn and certain customer behaviors.

The categories most associated with churn reflect:
- Low commitment (0–12 months tenure, €0–500 total charges, month-to-month contract)
- High spending (€75–€100 monthly charges)
- Digital preferences (electronic check, paperless billing)

Actions to consider:
- Focus on building trust with new customers to increase commitment.
- Promote affordable customer packages, especially for new subscribers.

79,13%
Q4 Risk profile Churn Rate (containing all features with 30+% churn rate in this domain)

Risk profile amount: 264

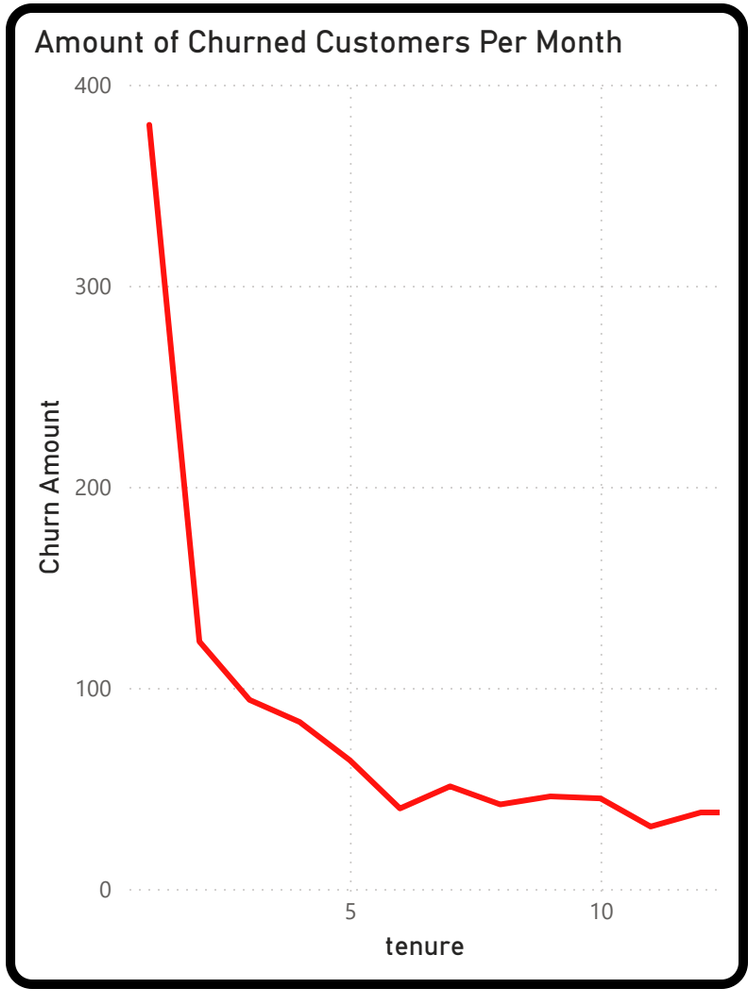
26,54%
Total Churn Rate

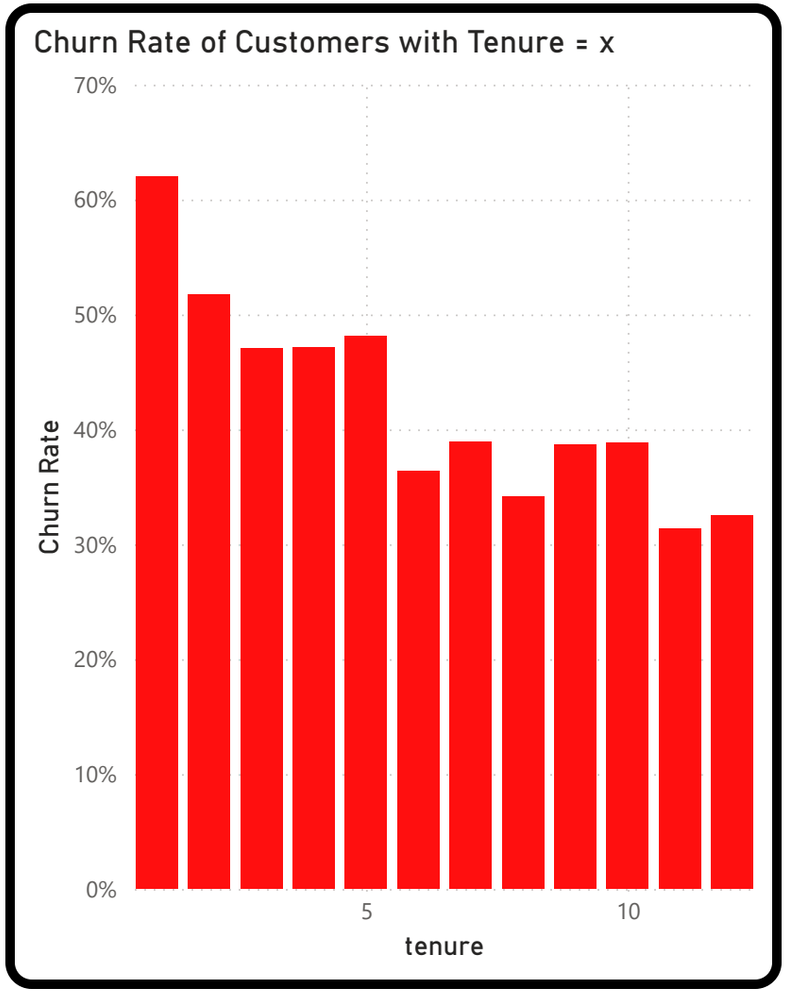
Total amount: 7043

Q5: How many customers cancel within the first months, and how does this evolve during the first year?

- **Goal:** Measure how many customers terminate their contract in the early stage of their subscription, and extend this to a full month-by-month trend for the first 12 months. This reveals when in the customer lifecycle the most cancellations occur.
- **Segmentation frame:** Only the first 12 months after a customer signs up are considered.
- **Selected customer features:**
  - tenure (in months)
  - churn (Yes/No flag)
- **Approach:** Count the number of churn events per month for months 1–12 of tenure. Present the results in a line chart to highlight cancellation peaks and trends.
- **Reflection:** This analysis does not explain *why* customers cancel, but it pinpoints *when* churn is most likely to occur.
- **Decision impact:** Provides clear insight into the timing of churn. If cancellations cluster in the first months, targeted interventions (improved onboarding, early support, welcome campaigns) can be prioritized to reduce early-stage churn.

Q5 (Monthly Churn): Results and Insights





Insights and Recommendations

On the left we see a line chart showcasing the trend of how many customers cancel their subscription each month, until the 12th month.

As expected, most customers cancel at the start of their subscription, with the first month showing the highest churn. This highlights the importance of making a strong first impression. Key actions include:

- Meeting customer expectations
- Reducing early disappointments with the service
- Providing fast, helpful support
- Ensuring a smooth onboarding process
- Building trust from day one

After around the sixth month, churn levels off and becomes more stable.