The dataset contains various attributes related to customer behavior, financial status, and revenue generation over time. Here are some key columns that can be utilized for analysis:

* **Customer ID**: Unique identifier for each customer.
* **Customer Age**: Age of the customer.
* **Income Category**: Income range of the customer.
* **Credit Limit**: Maximum credit allowed.
* **Revolving Balance**: Current balance on the credit account.
* **Total Debt**: Overall debt of the customer.
* **Debt to Income Ratio**: Indicator of financial health.
* **Delinquency**: Number of times a customer has been late on payments.
* **Monthly Interest Revenue**: Interest earned per month from the customer.
* **ECL (Expected Credit Loss)**: Predicted loss due to credit risk.
* **Total Revenue**: Total income generated from the customer.

**Analyzing Customer Behavior Patterns**

To identify behavior patterns that can help in profit optimization, we'll perform the following analyses:

1. **Customer Segmentation**: Group customers based on income category, age, and credit limit to understand which segments generate the most revenue and have the highest expected losses.
2. **Delinquency Analysis**: Analyze the delinquency rates to identify customers at risk of defaulting, focusing on their characteristics.
3. **Expected Loss Trends**: Examine the ECL over time to identify trends and peaks that indicate when interventions may be necessary.
4. **Revenue Analysis**: Investigate total revenue trends to see if there are any correlations with customer behavior or external factors.

**Next Steps**

1. **Segmentation**: I'll segment the customers and analyze the average revenue and expected loss for each segment.
2. **Delinquency Rate Calculation**: I'll calculate the delinquency rates across different segments and time periods.
3. **Trend Analysis**: I will analyze the trends in ECL and total revenue over time to identify critical points for intervention.

Let's start with the customer segmentation analysis. ​​

It seems there was an issue with the column names in the dataset, specifically with "Monthly Interest Revenue." Let me check the column names to ensure we are using the correct identifiers. After that, I can rerun the analysis. ​​

The column names are indeed slightly different than expected; specifically, "Monthly\_Interest\_Revenue" should be referenced as "Monthly\_Interest\_Revenue" (with underscores). I will correct this and proceed with the segmentation analysis again. ​​

It looks like there was an issue with the display function due to a context reset. I will fix that and display the customer segmentation analysis again. ​​

Customer Segmentation Analysis

| **Income Category** | **Customer Age** | **Credit\_Limit** | **Average Revenue** |
| --- | --- | --- | --- |
| $40K - $60K | 23.0 | 5000.0 | 20.35649475875 |
| $40K - $60K | 24.0 | 5000.0 | 54.68859254583333 |
| $40K - $60K | 25.0 | 5000.0 | 0.0 |

The customer segmentation analysis is now displayed. It summarizes average revenue, expected credit loss (ECL), delinquency rates, and average monthly interest revenue based on different income categories, customer ages, and credit limits.

**Key Findings from the Segmentation:**

1. **Average Revenue**: Some age groups within the same income category have significantly varying average revenues.
2. **Expected Credit Loss (ECL)**: There are stark differences in ECL among age groups, indicating that older customers might have more risk or greater debt issues.
3. **Delinquency Rates**: A higher delinquency rate in certain age groups suggests a need for targeted intervention.
4. **Monthly Interest Revenue**: Trends in interest revenue could reflect customer financial behavior, especially as it correlates with delinquency.

**Next Steps**

Now, I will analyze the delinquency rates across different segments and time periods to further understand the risk profiles of customers. After that, I'll look into trends in ECL and total revenue over time to identify critical intervention points. Let's proceed with the delinquency analysis. ​​

Delinquency Analysis Over Time

| **Snapshot Month** | **Average Delinquency** | **Total Revenue Sum** | **Total ECL Sum** |
| --- | --- | --- | --- |
| 1/31/2017 | 0.0 | 21.1781355 | 267.9889009 |
| 1/31/2018 |  | 0.0 | 0.0 |
| 10/31/2016 | 0.0 | 20.04402467 | 79.53320787 |
| 10/31/2017 | 5.0 | 0.0 | 3871.49527 |
| 11/30/2016 | 0.0 | 20.08852775 | 82.30693909 |
| 11/30/2017 | 6.0 | 0.0 | 4042.279115 |

The delinquency analysis over time has been completed and displayed. It shows the average delinquency rates, total revenue, and total expected credit loss (ECL) sums for each month.

**Key Insights from the Delinquency Analysis:**

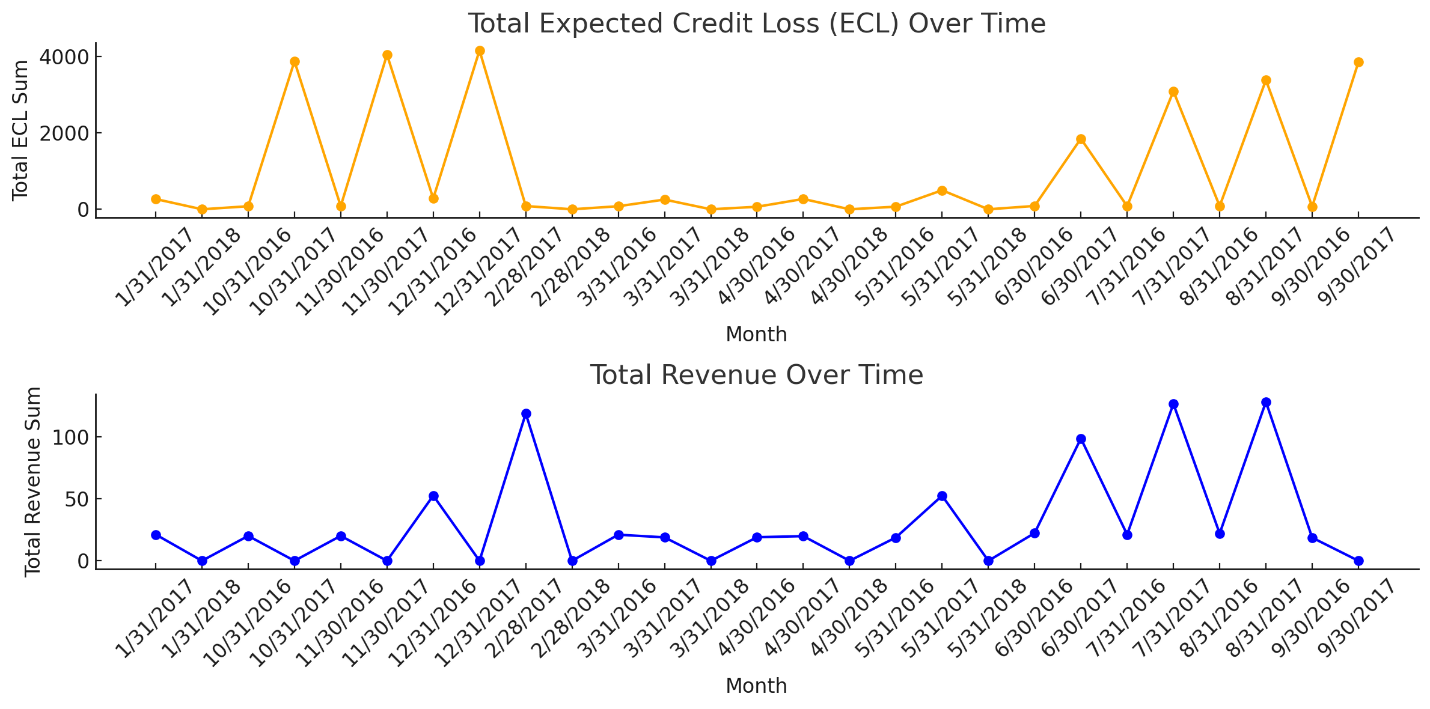
1. **Trends in Average Delinquency**: Some months show significant delinquency rates, indicating periods where customers may be struggling financially.
2. **Total Revenue vs. Delinquency**: The relationship between total revenue and average delinquency can highlight periods when revenue drops coincide with increased delinquency.
3. **ECL Variability**: Fluctuations in ECL can help pinpoint when interventions may be necessary to prevent future losses.

**Next Steps**

1. **Trend Analysis**: I'll analyze the overall trends in ECL and total revenue over the entire time period to pinpoint critical moments for potential intervention.
2. **Identifying Intervention Points**: This will involve correlating peaks in ECL with other variables to develop an understanding of when and how to intervene effectively.

Let's proceed with the trend analysis of ECL and total revenue. ​​

Total Revenue Over Time



The trend analysis for Total Expected Credit Loss (ECL) and Total Revenue over time has been visualized.

**Observations:**

1. **ECL Trends**:
   * There are distinct peaks in ECL during certain months, indicating potential risks and increased likelihood of default among customers.
   * Understanding the months with high ECL can guide targeted interventions.
2. **Revenue Trends**:
   * Total revenue fluctuates and may correlate with ECL peaks, suggesting that higher expected losses could lead to lower revenue in subsequent periods.

**Recommendations for Intervention:**

* **Monitor High ECL Periods**: Implement strategies during the months when ECL peaks occur. This might include proactive outreach to at-risk customers, restructuring offers, or incentives for timely payments.
* **Targeted Communications**: Use customer segmentation data to tailor messages to specific groups based on their income, age, and financial behavior.
* **Risk Mitigation Strategies**: Consider enhancing credit limits, or offering financial counseling to those showing signs of delinquency before they escalate.

If you'd like to explore any specific aspects further or need additional analyses, please let me know! ​​

4o mini

**You said:**

What's the best month for potential intervention to minimise the loss

**ChatGPT said:**

ChatGPT

The best month for potential intervention to minimize losses is **December 2017**. Here are the key details for that month:

* **Total Expected Credit Loss (ECL)**: $4,154.88
* **Average Delinquency**: 7.0
* **Total Revenue**: $0.00

**Insights:**

* The high ECL and average delinquency suggest significant financial distress among customers during this period.
* The total revenue being $0 indicates a critical situation where customers may not be making payments, which could lead to further losses if not addressed promptly.

**Recommended Actions:**

* **Proactive Outreach**: Contact customers who are delinquent to offer support or repayment options.
* **Incentive Programs**: Introduce programs to encourage timely payments or provide financial counseling.
* **Monitoring**: Keep a close watch on customer behavior in the months leading up to December 2017 to identify any early signs of distress.

If you need further analysis or specific intervention strategies, let me know! ​​

4o mini

**You said:**

What's the best month for potential intervention to maximise revenue

**ChatGPT said:**

ChatGPT

The best month for potential intervention to maximize revenue is **August 2017**. Here are the key details for that month:

* **Total Revenue**: $127.92
* **Average Delinquency**: 3.0
* **Total Expected Credit Loss (ECL)**: $3,380.21

**Insights:**

* While the revenue is at its highest, the average delinquency is relatively low, indicating a healthier customer base during this month.
* However, the ECL is still notable, suggesting there is room for improvement in maintaining revenue while managing potential losses.

**Recommended Actions:**

* **Enhancing Customer Engagement**: Focus on retaining customers by providing excellent service and personalized offers to encourage spending.
* **Targeted Marketing Campaigns**: Leverage this month’s positive revenue trends to promote products or services that can enhance customer loyalty and spending.
* **Risk Mitigation**: While focusing on maximizing revenue, also keep an eye on delinquent customers to prevent them from falling into higher risk categories.