Analysis of Delinquency Trends

A Deep Dive into Carvana Auto Receivables Trust (CVNA) Data

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Abstract

Executive Summary: This whitepaper presents a comprehensive analysis of the collateral characteristics and risk factors within Carvana Auto Receivables Trust (CVNA) securitizations from vintages 2021 through 2025. By leveraging loan-level data, we examine trends in Loan-to-Value (LTV) ratios, Payment-to-Income (PTI) ratios, and interest rates. Furthermore, we perform regression analyses to quantify the relationship between obligor credit scores and these risk metrics.

Key findings indicate a strong adherence to risk-based pricing, evidenced by high correlations between credit scores and interest rates. However, we observe a structural shift in collateral leverage, with recent vintages (2024-2025) exhibiting significantly higher LTV ratios for comparable credit profiles than their 2021 predecessors. Additionally, we track "risk layering" trends among prime borrowers to identify potential pockets of latent risk.

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1 Introduction

The securitization of auto loans is a critical component of the consumer credit market. This report focuses on the performance and composition of Carvana Auto Receivables Trusts (CVNA). Specifically, we analyze the evolution of underwriting standards over time and the correlation between borrower creditworthiness (FICO scores) and key loan attributes such as Loan-to-Value (LTV), Payment-to-Income (PTI), and Annual Percentage Rate (APR).

2 Data and Methodology

The analysis utilizes loan-level data stored in the `carvana_assets` database, covering multiple trust vintages from 2021 to 2025.

Data cleaning and preprocessing steps included:

- **Exclusion of Inactive Loans:** Loans with a zero reporting period balance (paid-off or charged-off) were excluded to focus on the active portfolio.
- **Metric Calculation:**
  - *Raw LTV*: Calculated as the Current Loan Balance divided by the Original Vehicle Value.
  - *PTI*: Payment-to-Income ratios were filtered to exclude invalid (zero) entries.
- **Regression Analysis:** We employed linear regression models ($y = \beta_0 + \beta_1 x + \varepsilon$) to determine the sensitivity of risk metrics (y) to the Obligor Credit Score (x).

3 Results

3.1 Portfolio Trends

We observed distinct trends in the composition of the trusts over time.

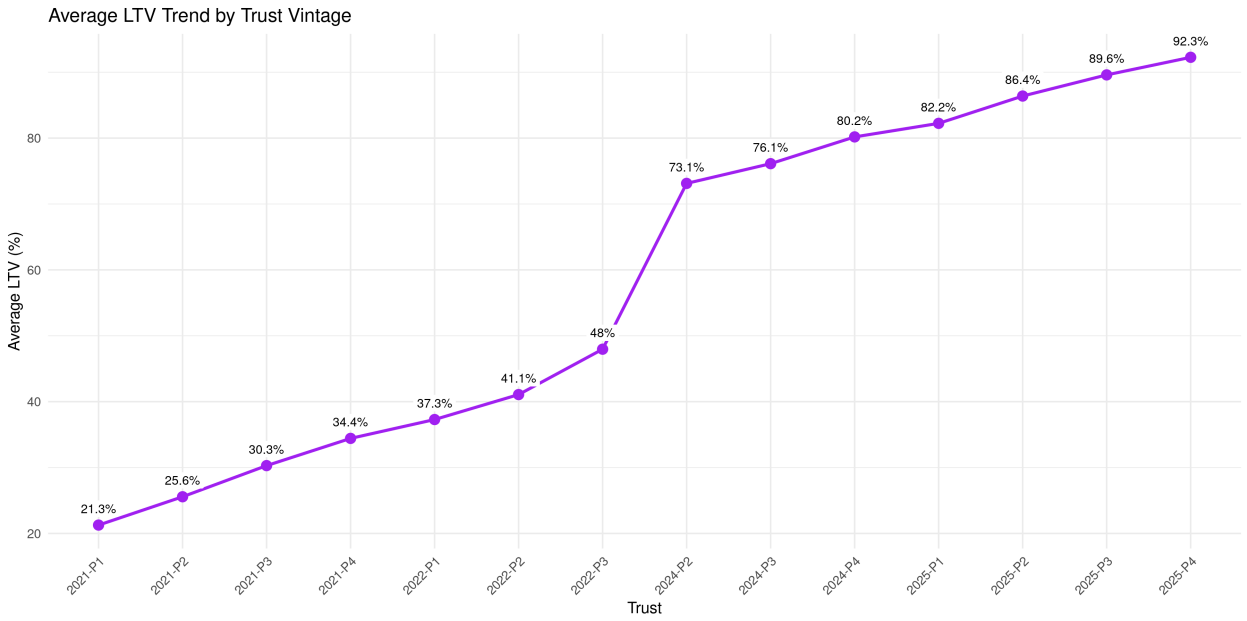

Figure 1: Average LTV Trend by Trust Vintage

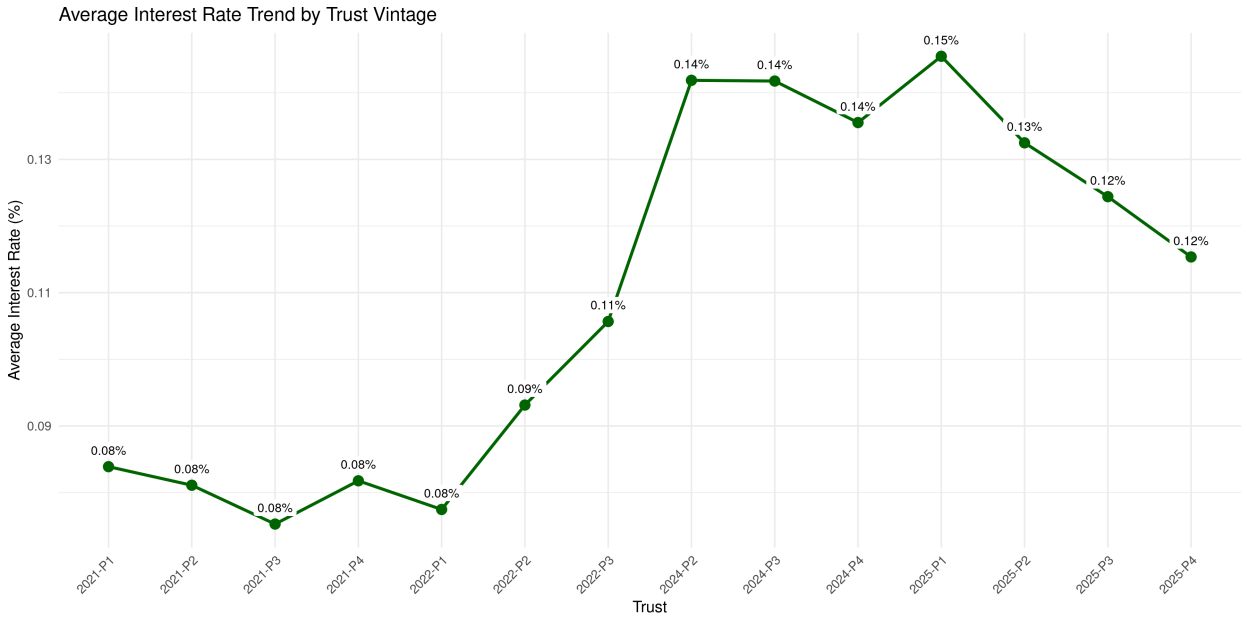

Figure 2: Average Interest Rate Trend by Trust Vintage

3.2 Regression Analysis

To assess the efficacy of underwriting, we analyzed the correlation between credit scores and loan attributes.

3.2.1 Credit Score vs. Payment-to-Income (PTI)

The correlation between credit score and PTI remains consistently weak across all vintages, typically ranging between -0.13 and -0.25. The slopes are negligible (-0.0001), indicating that a 100-point increase in FICO score results in only a 1% decrease in PTI. This suggests that high-PTI loans are distributed across the credit spectrum and are not strictly a function of credit score.

Table 1: Regression Analysis: Credit Score vs. Payment-to-Income (PTI)

Trust	Slope	Intercept	R^2	Correlation
2021-P1	-0.000102	0.1515	0.0311	-0.1764
2021-P2	-0.000128	0.1759	0.0477	-0.2184
2021-P3	-0.000113	0.1660	0.0347	-0.1864
2021-P4	-0.000114	0.1667	0.0358	-0.1893
2022-P1	-0.000106	0.1592	0.0361	-0.1899
2022-P2	-0.000113	0.1664	0.0345	-0.1859
2022-P3	-0.000083	0.1429	0.0186	-0.1365
2024-P2	-0.000104	0.1504	0.0330	-0.1818
2024-P3	-0.000111	0.1552	0.0370	-0.1924
2024-P4	-0.000097	0.1452	0.0285	-0.1687
2025-P1	-0.000124	0.1612	0.0584	-0.2417
2025-P2	-0.000128	0.1646	0.0603	-0.2456
2025-P3	-0.000128	0.1639	0.0614	-0.2477
2025-P4	-0.000121	0.1575	0.0592	-0.2432

3.2.2 Credit Score vs. Loan-to-Value (LTV)

A moderate negative correlation exists between credit scores and LTV ratios. However, the most significant finding is the shift in the **Intercept**. In 2021 vintages, the intercept was approximately 60-80. In 2024 and 2025 vintages, this intercept jumped to ranges of 110-135. This implies that for a fixed credit score, the starting LTV is significantly higher in recent vintages, suggesting a loosening of collateral requirements or an increase in vehicle valuations relative to loan amounts.

3.2.3 Credit Score vs. Interest Rate

As expected, there is a strong negative correlation (typically stronger than -0.60) between credit scores and interest rates. This confirms that risk-based pricing is a dominant factor in loan structuring. The intercepts have increased from 0.31 (31%) in 2021 to 0.40 (40%) in 2025, reflecting the broader macroeconomic environment of rising interest rates.

Table 2: Regression Analysis: Credit Score vs. Loan-to-Value (LTV)

Trust	Slope	Intercept	R^2	Correlation
2021-P1	-0.054343	59.5945	0.1734	-0.4164
2021-P2	-0.057040	65.8101	0.1771	-0.4208
2021-P3	-0.060969	73.2892	0.1780	-0.4219
2021-P4	-0.068606	82.6397	0.1936	-0.4400
2022-P1	-0.065652	83.5368	0.1733	-0.4162
2022-P2	-0.069353	89.7838	0.1471	-0.3835
2022-P3	-0.065286	93.8294	0.1079	-0.3285
2024-P2	-0.080788	129.7512	0.1001	-0.3164
2024-P3	-0.080971	132.8273	0.0947	-0.3077
2024-P4	-0.078225	135.0695	0.0818	-0.2861
2025-P1	-0.037742	108.7702	0.0214	-0.1462
2025-P2	-0.037953	113.1292	0.0238	-0.1543
2025-P3	-0.038663	116.9933	0.0258	-0.1606
2025-P4	-0.034865	117.1543	0.0217	-0.1474

3.3 Risk Layering (Danger Zones)

We monitored specific segments of "Prime" borrowers (FICO $>$ 740) who exhibit potentially risky characteristics, specifically high PTI or high Interest Rates.

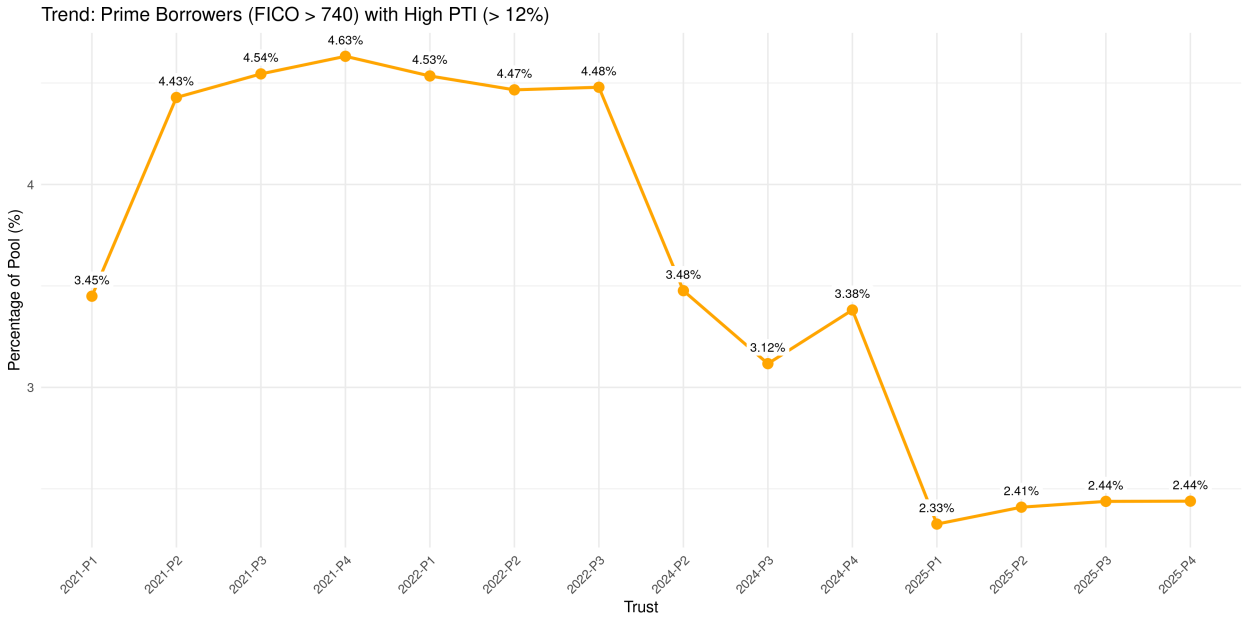

Figure 3: Trend: Prime Borrowers with High PTI ($>$ 12%)

Table 3: Regression Analysis: Credit Score vs. Interest Rate

Trust	Slope	Intercept	R^2	Correlation
2021-P1	-0.000363	0.3391	0.5387	-0.7339
2021-P2	-0.000356	0.3309	0.5527	-0.7434
2021-P3	-0.000335	0.3106	0.5189	-0.7203
2021-P4	-0.000332	0.3142	0.5420	-0.7362
2022-P1	-0.000361	0.3309	0.6073	-0.7793
2022-P2	-0.000343	0.3331	0.5324	-0.7296
2022-P3	-0.000315	0.3257	0.4801	-0.6929
2024-P2	-0.000309	0.3571	0.3302	-0.5746
2024-P3	-0.000309	0.3571	0.3346	-0.5784
2024-P4	-0.000275	0.3272	0.2480	-0.4980
2025-P1	-0.000377	0.4057	0.4800	-0.6928
2025-P2	-0.000355	0.3791	0.4090	-0.6396
2025-P3	-0.000333	0.3566	0.4114	-0.6414
2025-P4	-0.000363	0.3706	0.4640	-0.6812

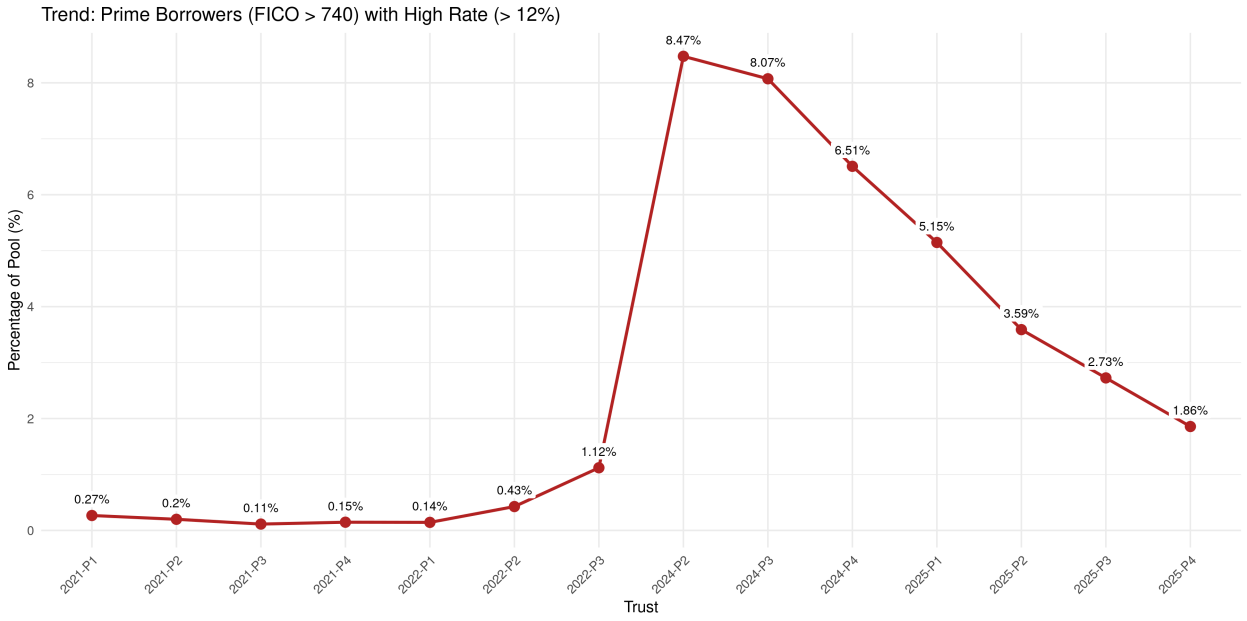

Figure 4: Trend: Prime Borrowers with High Interest Rates ($> 12\%$)

4 Conclusion

In conclusion, the analysis of Carvana ABS trusts reveals distinct shifts in underwriting characteristics from 2021 to 2025.

While risk-based pricing remains robust (evidenced by the strong Credit-Rate correlation), the structural shift in LTV intercepts indicates that recent vintages are more leveraged relative to borrower credit scores

than in the past. The weak correlation in PTI suggests that affordability metrics are less sensitive to credit scores, potentially masking risk if economic conditions deteriorate for higher-income borrowers. The "Danger Zone" analysis further highlights that even prime borrowers are increasingly taking on loans with higher relative payments and rates.