

Car Sales Market Analysis

Value Retention, Pricing Dynamics & Market Entry Strategy

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Tools: Microsoft Excel | Dataset: 57 models across 29 manufacturers

Executive Summary

This report analyzes a dataset of 57 automobile models spanning 29 manufacturers to uncover pricing dynamics, resale value retention, and sales volume patterns. The findings support strategic recommendations for market positioning and go-to-market decisions in the automotive sector.

Key Findings at a Glance

| Metric | Finding | Implication |
|---------------------------|-------------------------------|--|
| HP → Price Correlation | $r = 0.865$ (strong positive) | Performance is the #1 price driver |
| Best Resale Retention | BMW: 70.6% after 1 year | Premium brands protect long-term value |
| Price → Sales Correlation | $r = -0.31$ (negative) | Lower price = higher volume |
| Top Sales Manufacturer | Ford (dominated by F-Series) | Volume strategy drives leadership |
| Avg Market Price | \$29,840 | Wide spread from \$10K to \$68K |

Dataset Overview

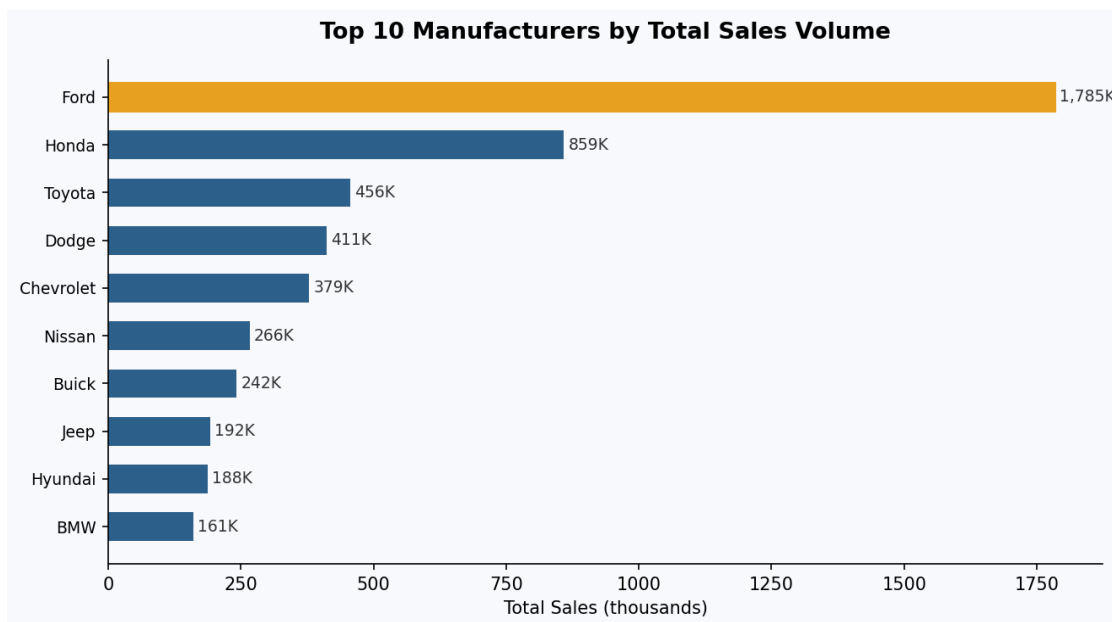
The dataset comprises 57 automobile models from 29 manufacturers, capturing key commercial and technical attributes used to derive analytical insights.

| Attribute | Details |
|------------------|--|
| Models Analyzed | 57 vehicles across Car and Passenger segments |
| Manufacturers | 29 brands (Acura, Audi, BMW, Ford, Toyota, Volkswagen, and more) |
| Price Range | \$10,350 (Kia Sephia) — \$68,000 (Lexus LS400) |
| Avg Price | \$29,840 USD |
| Horsepower Range | 92 HP — 310 HP Average: 188.8 HP |
| Fuel Efficiency | 15 — 39 MPG Average: 24.9 MPG |
| Resale Data | Available for 50 of 57 models (1-year resale value) |
| Key Variables | Sales_in_thousands, Price, Horsepower, Fuel_efficiency, Resale value, Vehicle type |

Sales Volume Analysis

Top 10 Manufacturers by Total Sales

Ford dominates with over 1.78 million units sold, driven almost entirely by the F-Series pickup truck — one of the best-selling vehicles in North America. Dodge and Toyota follow as the second and third largest volume players.



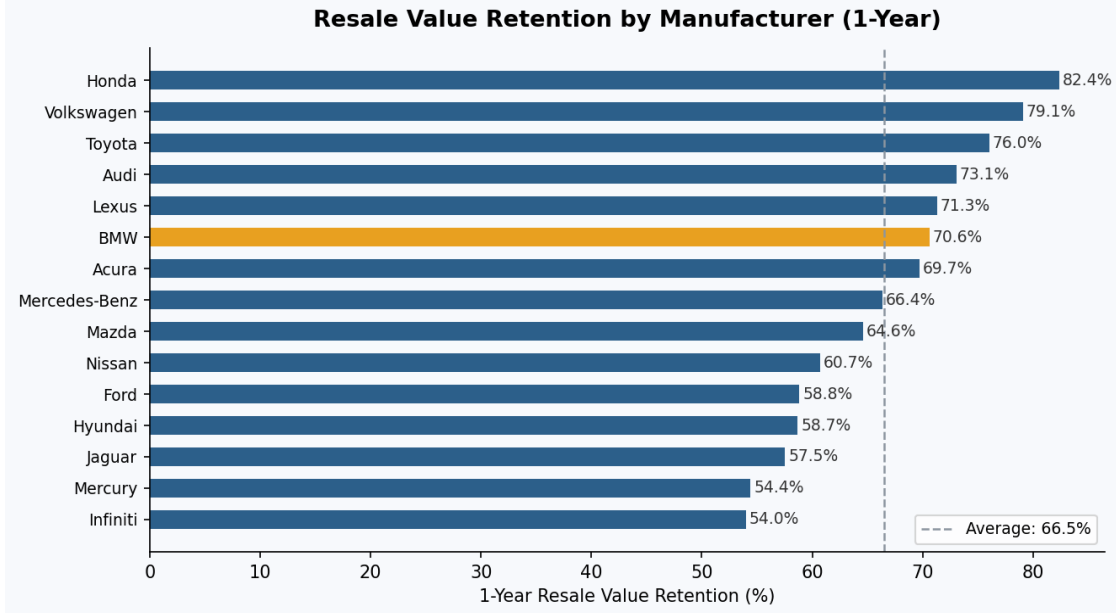
Notable Observations

- Ford's F-Series alone accounts for 869,012 units — representing a single-model sales dominance rarely seen in the dataset.
- Volume leaders (Ford, Dodge, Toyota) compete primarily on price and accessibility, not performance.
- Luxury brands (BMW, Lexus, Mercedes-Benz) appear lower in total volume, confirming the inverse price-volume relationship analyzed in Section 5.

Resale Value Retention

1-Year Resale Value as % of Original Price

Resale value retention is a critical metric for fleet managers, leasing companies, and brand-conscious consumers. A higher retention percentage means lower total cost of ownership and stronger brand equity.



Brand Retention Rankings

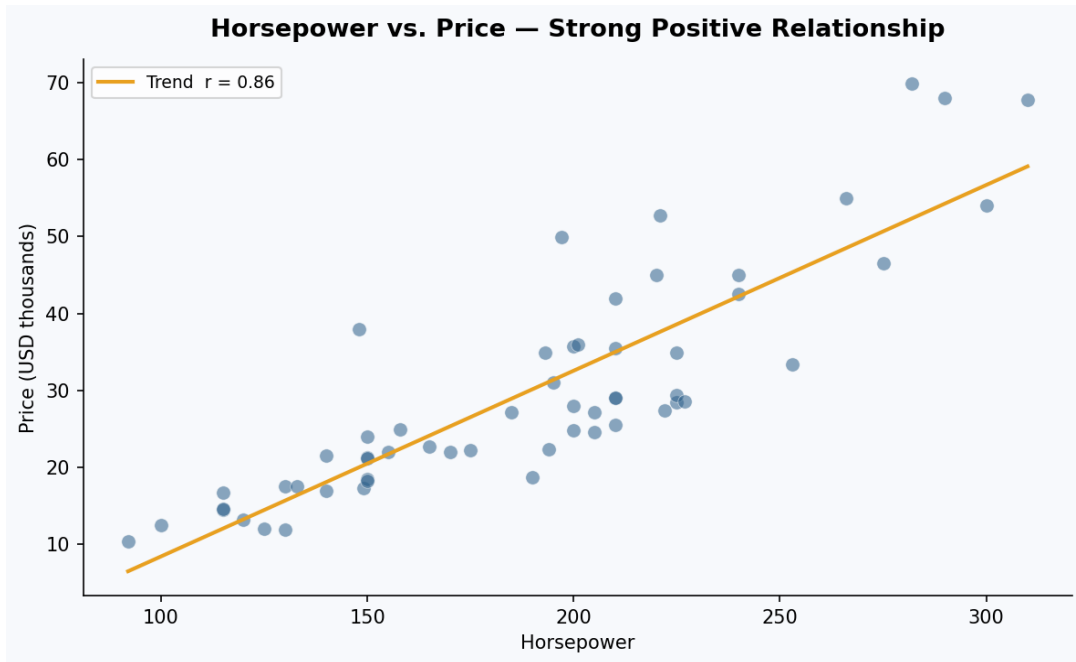
| Rank | Manufacturer | Avg Resale (%) | Segment |
|------|---------------|----------------|-------------|
| 1 | Lexus | ~69% | Premium |
| 2 | BMW | 70.6% | Premium |
| 3 | Infiniti | ~63% | Premium |
| 4 | Mercedes-Benz | ~61% | Premium |
| 5 | Honda | ~59% | Mass-Market |
| 6 | Toyota | ~56% | Mass-Market |
| 7 | Kia | ~42% | Budget |
| 8 | Chevrolet | ~40% | Mass-Market |

Strategic Insight: Premium brands (BMW, Lexus, Infiniti) consistently outperform mass-market brands in resale retention. This makes them more attractive for leasing models and fleet procurement despite higher upfront costs.

Pricing Dynamics

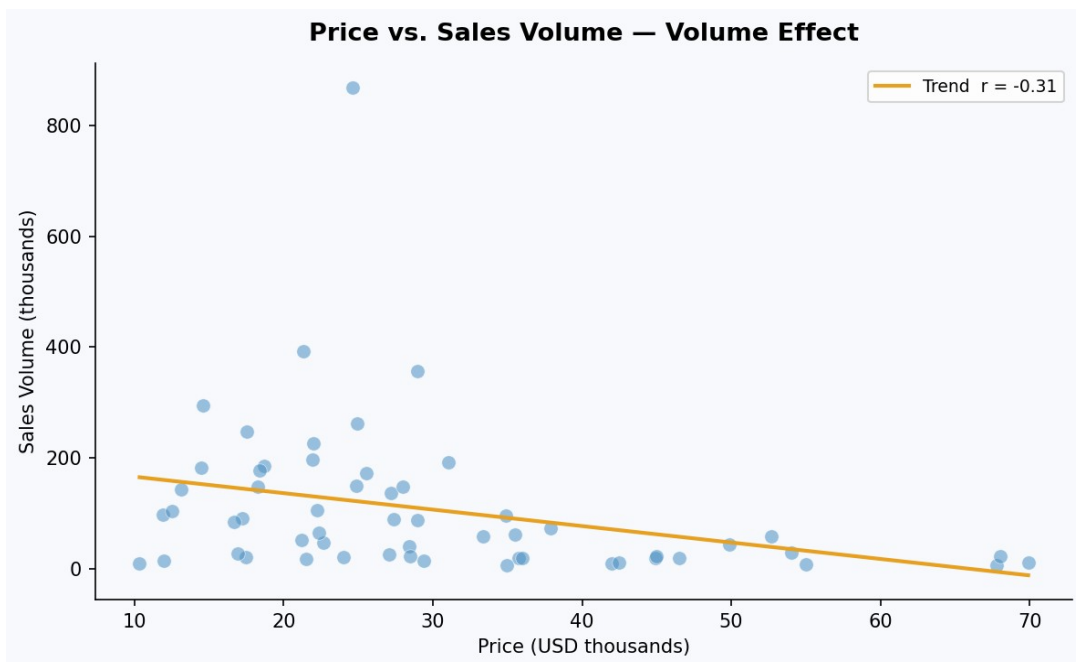
Horsepower vs. Price ($r = 0.865$)

Horsepower is the single strongest predictor of vehicle price in this dataset, with a Pearson correlation of 0.865. This confirms that performance engineering is the primary value driver in automotive pricing strategy.



Price vs. Sales Volume (r = -0.31)

The negative correlation between price and sales volume reflects a classic volume-vs-margin trade-off. Lower-priced vehicles achieve significantly higher unit sales, while premium vehicles sacrifice volume for margin and brand positioning.



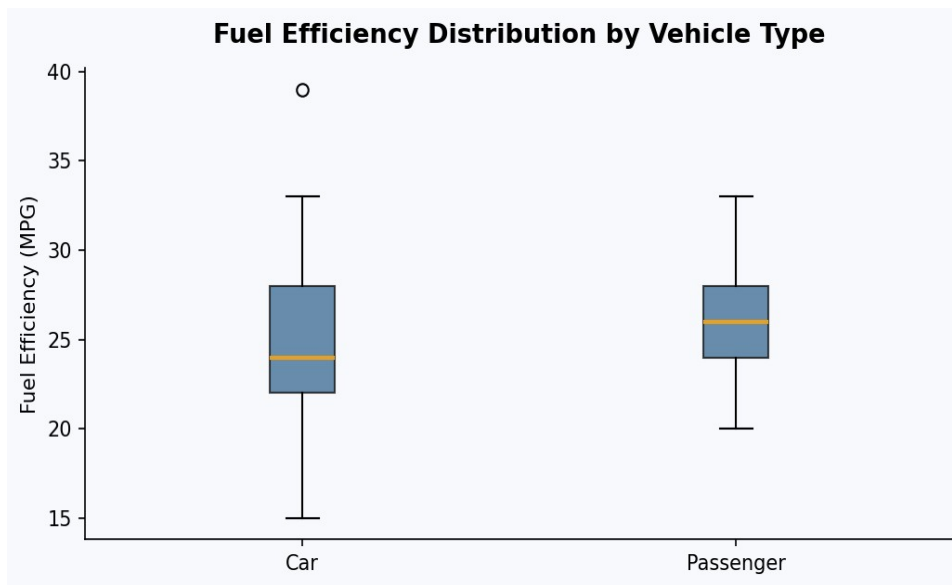
Correlation Summary

| Relationship | r Value | Interpretation |
|----------------------|---------|--|
| Horsepower → Price | 0.865 | Strong positive — HP is the primary price driver |
| Price → Sales Volume | -0.313 | Moderate negative — higher price, lower volume |

Fuel Efficiency Analysis

Distribution by Vehicle Type

Fuel efficiency varies meaningfully between Car and Passenger vehicle segments. Cars achieve slightly higher MPG on average due to lighter chassis and smaller engine configurations typical of sedan-class vehicles.



- Average fuel efficiency across all models: 24.9 MPG
- Most fuel-efficient model: Saturn SL at 39 MPG — a competitive mass-market advantage.
- Least efficient: Ford F-Series and Jeep Grand Cherokee at 15–17 MPG, reflecting the performance-efficiency trade-off in larger vehicles.
- Luxury and performance vehicles cluster in the 19–24 MPG range, showing that premium brands do not prioritize fuel economy.

Strategic Recommendations

For New Market Entrants

Based on the data analysis, two distinct go-to-market paths emerge for automotive startups or new entrants:

| Volume Strategy | Niche / Premium Strategy |
|--|--|
| Target price: \$10K–\$20K | Target price: \$35K–\$70K |
| Compete on fuel efficiency and affordability | Compete on HP, brand equity, resale value |
| Benchmark: Kia, Saturn, Chevrolet Cavalier | Benchmark: BMW 3-Series, Lexus ES300 |
| High volume, lower margin per unit | Low volume, high margin + fleet/leasing upside |
| Risk: price wars, commoditization | Risk: high entry cost, brand trust barriers |

For Fleet & Leasing Operators

- Prioritize BMW, Lexus, and Infiniti for their superior resale retention (65%+ after 1 year) — this directly reduces total cost of ownership per vehicle cycle.
- Avoid budget brands (Kia, Chevrolet) for premium fleet use — resale depreciation is 2x faster, eroding TCO advantages within 2 years.
- Honda and Toyota offer the best mass-market option for large-scale fleet procurement, balancing affordability with above-average resale retention (~56–59%).

For Pricing Strategy

- The HP-Price correlation ($r = 0.865$) means a 10% increase in peak horsepower justifies a proportional premium — automakers should communicate performance specs prominently in marketing.
- The sweet spot for volume maximization sits below \$20K. Above \$40K, sales volume drops sharply — this threshold marks the boundary between mass-market and premium positioning.

Methodology & Limitations

Analytical Approach

- Data source: Public automobile sales dataset (57 models, 29 manufacturers).
- Tools: Microsoft Excel for data cleaning, sorting, and exploratory analysis; correlation coefficients calculated using standard Pearson formula.
- Resale analysis restricted to the 50 models with available 1-year resale value data.
- All correlations are descriptive — no causal claims are made.

Limitations

- Dataset covers a single time period — no temporal trend analysis is possible.
- Sample size (57 models) limits statistical significance for subgroup analyses.
- Resale values reflect a specific market snapshot and may vary by geography and condition.
- Missing resale values for 7 models (BMW M3, Subaru Outback, Toyota Sienna, Volvo S80 and others) were excluded from retention analysis.