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Introducing the Cox Automotive/ Moody's Analytics Vehicle Affordability Index

Cox Automotive and Moody's Analytics have partnered to develop an affordability index for new vehicles. The Cox Automotive/Moody's Analytics Vehicle Affordability Index measures the ability of a household earning the median income to afford the purchase of an average-priced automobile. Updated monthly, using the latest data from multiple government and industry sources, this unique indicator calculates the number of weeks of median household income needed to purchase an average new vehicle.

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BY MICHAEL BRISSON AND JONATHAN SMOKE

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Jump start

As new-vehicle MSRPs continue to reach record highs, demand has increased for an average new-vehicle affordability index. Price increases in 2018 and 2019 for an average new vehicle caused many industry experts to predict a drastic movement away from new-vehicle sales and toward the used-vehicle market. The shift was not drastic, but rather a marginal movement toward used vehicles. Such a miscalculation can be partially attributed to a lack of visibility into consumers' spending power from income and interest rate changes relative to the movement of new-vehicle prices.

The Cox Automotive/Moody's Analytics Vehicle Affordability Index addresses market needs by providing an easy-to-use metric to track the affordability of new vehicles, accounting for movements in transaction prices, income and interest rates.

This paper describes the underlying data sources, methodology, and some reasoning as to why each decision was made.

Under the hood

The Cox Automotive/Moody's Analytics Vehicle Affordability Index is driven by the consumer's vehicle transaction prices, the income of the consumer, amount financed by the consumer, and the interest rate provided by the lender. Let us look at each of these inputs more closely.

First, the consumer's vehicle transaction price is determined by the new vehicle's price, how much the dealer loses in gross margin through negotiations, and price decreases from factory/dealer incentives. This information is sourced from Kelley Blue Book and Motor Intelligence and is used to derive the weighted average of actual consumer transaction prices.

The decision to use the average consumer transaction price on all vehicles sold rather than average price of cars but not trucks or SUVs was made to increase representativeness of the index. An argument can be made that affordability should consider only cars because smaller vehicles are the first place a marginal buyer will look. However, this thought is out of tune with the purchasing habits of the average American. Moreover, the average vehicle purchased today and for the foreseeable future is a light truck or specifically an SUV, and the ability of a consumer to afford this purchase is exactly what the index is intended to measure.

The second major input to the index is income of the consumer. Government sources for income are significantly lagged. In order to have current income estimates, the index utilizes the Moody's Analytics baseline economic scenario forecast for median household income. Additionally, median income is used rather than average income because average incomes are skewed as a result of income inequality in the U.S. This makes median income a better gauge of typical consumer spending power.

A harder decision comes from whether to use median family income or median household income. Median family income includes only individuals who are related through marriage or birth, and household includes everyone living in the home. Our index uses the Moody's Analytics baseline scenario forecast of household income rather than median family income. The average household owns more than one vehicle. Therefore, the typical household tends to purchase multiple vehicles. If there are nonfamily members living together, the purchase of multiple vehicles will likely increase. This goes against traditional home affordability indexes, which use the family income as a measure because it is more likely for a single-family unit to be the buyer of a home. Qualitatively speaking, if there is someone outside a family unit living in the household (owner's siblings, friends) they likely will have or want to have their own vehicle. Given this, the median income by household is more representative for the average car buyer than family income.

The third major input is the interest rate paid by the consumer. Our preferred value for this input would be the average interest rate of a 72-month, fixed-rate new-vehicle loan. However, this rate is not readily available for a longer time series. What we do have available is the interest rate for new vehicles on a 60-month loan from finance companies and credit unions and the shorter time series of the 72-month loans. Using these series, we were able to estimate the risk spread from an extra year on the books. This risk spread is added to the movements of the 60-month rate from the Federal Reserve and Moody's Analytics to inform our interest rate assumptions. These rates were checked against Cox Automotive's anonymized industry data for accuracy to further our confidence in this value.

Two final input decisions were required to round out the equation. First, what percentage of original transaction price is financed. For this, we assume a flat rate of 10% down payment. This decision was made after reviewing several years of recent vehicle sales and finance detail from Dealertrack, a Cox Automotive company that provides a credit application platform for thousands of dealers in the U.S. as well as title, econtract, and Dealer Management System services. This platform provides a very large sample of actual finance details of new-vehicle transactions. Our review of auto loans revealed that down-payment percentages are inversely correlated by loan term, with longer loans seeing much less put down at purchase and shorter terms having much higher percentages. The analysis conducted by Cox Automotive revealed that a typical down payment on a 72-month loan has averaged approximately 9% for the most recent years. As a result, the team concluded that a 10% down payment rate is a likely conservative estimate for a 72-month loan and utilizing a flat 10% down payment assumption would fairly represent the most typical new-vehicle transaction.

Second, as for term length, it was initially thought we could use the average term for new vehicles from finance companies provided by the U.S. Federal Reserve. However, the average term length in this value is biased lower by older loans on the books. A more appropriate measure would be loans that are being originated right now. Given the limited availability of this information, the next best measure is the most popular loan term length that was made available through Cox Automotive based on the Dealertrack platform.

The term analysis revealed that 72-month terms are the most popular new-vehicle loans currently. A separate analysis using Equifax data from Moody's Analytics Creditforecast.com confirmed that terms of 72 months or longer represent the majority of the most recent auto loan originations. Utilizing 72-month loans with the 10% down-payment assumption ensures that the affordability index is tracking the most typical current new-vehicle purchase.

Horsepower

With the index at our disposal (see Chart 1), some initial insights can be drawn. Surprisingly, despite all-time highs for average transaction prices, as have been reported, the index dropped for 2019. The decreased number of weeks needed to purchase a new vehicle was a significant turnaround from the growth experienced from the second half of 2018 through the first part of 2019 (see Chart 2). An important note when interpreting the charts is that affordability rises as the number of weeks needed to pay off the loan drops. That is, as the line lowers, the share of consumer's income needed for the purchase drops, making new cars more affordable.

In the second half of 2019, dealers and manufacturers increased incentives to move inventory, at the same time that wage growth continued to rise and interest rates dropped. However, without all these inputs being considered, the rise in new-vehicle prices, and at the same time continuing strength in new-vehicle sales, would seem at odds.

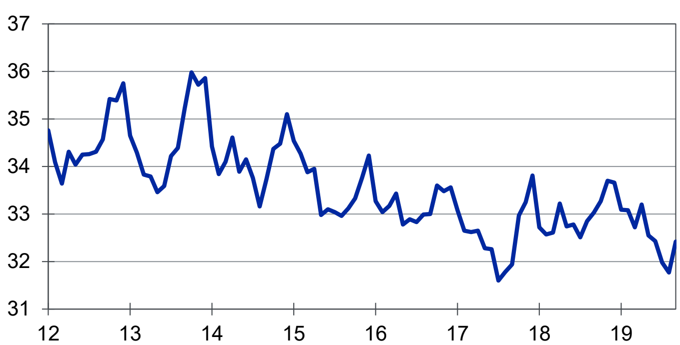
The index was able to pick up the 2018 decrease and then subsequent increase in new-vehicle affordability. It also shows that unaffordability has not risen to the levels reached at the end of 2013. Consumers were able to pay off the new vehicle 5.7% faster in 2019 compared with 2013, a time when slow wage growth kept consumers' ability to pay low. The ability to account for recent index movements in context with previous periods makes the index even more valuable.

Finish line

Using the number of weeks needed for a median income household to pay off a new vehicle gives a straightforward unit that captures affordability. The calculation eliminates the need to incorporate rules on what percentage of a buyer's income should be spent or how long the buyer's payment schedule should last. Additionally, by using the number of weeks, the

Chart 1: Vehicle Affordability Index

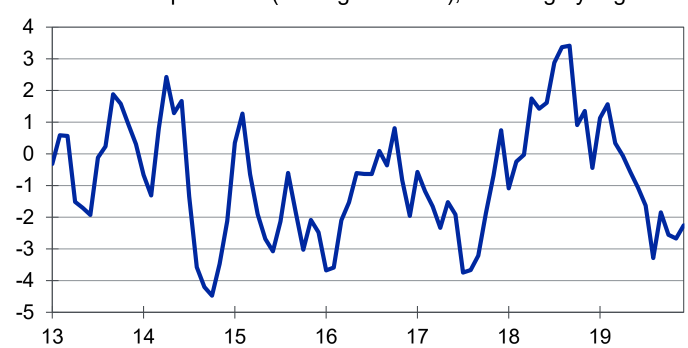
Wks needed to purchase (new light vehicle), #, NSA



Sources: Cox Automotive, Moody's Analytics

Chart 2: Fewer Weeks Needed in 2019

Wks needed to purchase (new light vehicle), % change yr ago



Sources: Cox Automotive, Moody's Analytics index does not need to be anchored to a year to be understood. Rather, the index looks across time to determine past and present trends.

The Cox Automotive/Moody's Analytics Vehicle Affordability Index provides unique insights that inform industry experts and consumers if the prices being paid for vehicles are getting out of reach or becoming more affordable. The guessing and prognosis based on disparate indicators can finally be put to rest.

About the Authors

Michael Brisson is a senior economist and associate director at Moody's Analytics. He is the lead auto economist working as a member of the Economic Research group in West Chester PA. Mike works at developing new, empirically driven auto-related products and services. Prior to leading the Moody's Analytics auto research team, Mike built loan and vintage-level CECL, CCAR, and stress-testing models of consumer loan performance as a member of the Business Analytics group at Moody's Analytics. Additionally, Mike has spent time developing econometric models used by U.S. states and local governments for tax/revenue projections. Mike holds a PhD in applied economics from Northeastern University.

Jonathan Smoke is chief economist for Cox Automotive. Smoke leads Cox Automotive's economic industry insights team, which tracks new- and used-vehicle sales, supply, prices, retail and fleet demand, consumer credit and auto financing, and dealer sentiment to understand the key trends impacting both the wholesale and retail markets for vehicles informed by the proprietary data from all of the company's businesses and platforms including Manheim, Autotrader, Kelley Blue Book, and Dealertrack. For more than 24 years, Smoke has focused on translating data and trends into relevant, actionable insights for the industries that represent the biggest purchases that consumers make in their lifetimes: real estate and automotive.

Prior to joining Cox Automotive, Smoke served as Realtor.com's chief economist. Before that, he was the chief economist for Hanley Wood, a media and market intelligence company, and also served in a variety of roles at Beazer Homes, including senior vice president of strategy and innovation.

Smoke is an executive member of the board for the Atlanta Economics Club and is a member of the Conference of Business Economists, Harvard Industrial Economists and the National Association of Business Economists. He has spoken at major industry conferences such as the NADA and NIADA conventions, Automotive News World Congress, and Used Car Week. His views on the economy and the auto industry are featured regularly in industry and national news outlets such as Automotive News, Auto Remarketing, The Wall Street Journal, USA Today, Bloomberg, and CNBC. Follow him on Twitter @SmokeonCars to keep up with the latest industry insights.

Smoke holds a bachelor's degree in economics and religious studies from Rhodes College and a master's degree in business from The University of Texas at Austin.

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Moody's Analytics added the economic forecasting firm Economy.com to its portfolio in 2005. This unit is based in West Chester PA, a suburb of Philadelphia, with offices in London, Prague and Sydney. More information is available at www.economy.com.

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