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Stress-Testing Auto Loans: Is the Fed Doing It Right?

Abstract

During the Great Recession, the auto finance industry has performed admirably. Although it is true that the default rate on auto loans, traditionally in the 0.5% to 1% range when the economy is performing according to its potential, rose to around 1.3% during 2008 and 2009, this was mostly offset by an overall drop in net dollar loss rates. The fundamental explanation for this trend can be found in the evolution of the Manheim used vehicle index, the gold standard for the recycled auto industry. Although the index did fall by 14.3% between May 2007 and November 2008, this was followed by a record rally: Prices recovered their lost ground entirely by the summer of 2009 and then soared an additional 11.4% by May 2011. Prices remain well above the levels seen in 2007 though some heat has escaped from the market.
Stress-Testing Auto Loans: Is the Fed Doing It Right?

BY JUAN CARLOS CALCAGNO, TONY HUGHES, AND STEPHEN KERNYTSKY

During the Great Recession, the auto finance industry has performed admirably. Although it is true that the default rate on auto loans, traditionally in the 0.5% to 1% range when the economy is performing according to its potential, rose to around 1.3% during 2008 and 2009, this was mostly offset by an overall drop in net dollar loss rates. The fundamental explanation for this trend can be found in the evolution of the Manheim used vehicle index, the gold standard for the recycled auto industry. Although the index did fall by 14.3% between May 2007 and November 2008, this was followed by a record rally: Prices recovered their lost ground entirely by the summer of 2009 and then soared an additional 11.4% by May 2011. Prices remain well above the levels seen in 2007 though some heat has escaped from the market.

In part, the solid performance of the auto sector was due to policies instituted by the federal government. Most notably, the cash for clunkers program, part of the Obama administration’s stimulus package, was instrumental in kick-starting the surge in vehicle prices. The program, which ran during the summer of 2009, incentivized people to trade in older vehicles for newer, or new, ones. The clunkers were then removed from the marketplace and scrapped. This reduction in supply at the low end of the used vehicle market rippled through the rest of the industry, pushing up the prices of all used cars. Though the program was primarily sold to the public as a boost to the new car market and on environmental grounds, it could be argued that the biggest beneficiary was actually the auto finance industry generally.

In a renewed stress event such as those described in the Federal Reserve’s Supervisory Stress Scenarios (SSS) for the Comprehensive Capital Analysis and Review (CCAR) and related bank stress tests, could such a program be counted on to recur? One would think that the auto market is an obvious channel through which legislators could implement a fast-acting, far-reaching economic stimulus. Nearly everyone in the economy drives—a reduction in the cost of car maintenance, purchase or financing thus means more disposable income for people who would actually spend it. Further, auto manufacturing, financing and retail are big employers—stimulus that as-sists the auto industry would thus retain or create more jobs than many other programs of a similar cost to taxpayers. Though we may not see an exact replica of cash for clunkers in the next Great Recession, some sort of auto-related stimulus package is closer to a certainty, especially given the perceived success of the program instituted in 2009.

Other auto industry dynamics suggest that losses should typically be low during the latter part of deep downturns. Early in three of the past four recessions, stretching back to the 1980s, new vehicle sales have declined sharply, as is evident in Chart 1. In the early-1980s recession, sales dropped from 12 million per month to 8.5 million, in the 1990s recession from 13 million to 11 million, and in the Great Recession from...
14.5 million to a paltry 8.5 million. The one exception to this rule was the 2001 recession that saw new car sales barely affected by the downturn at all. In some respects, the 2001 recession was the most dangerous for auto lenders. Given that a decline in new vehicle sales has the effect of reducing supply into the used vehicle market with a two-to-three year lag, we should expect to see used vehicle prices, absent any government policy changes, lag new vehicle sales by a similar period of time. Interestingly, the lag actually seems to be a little bit shorter than this. The lag was around one year in 2008-2009, brought forward by cash for clunkers, and about 18 months in the recovery from the 1990s recession. The early-1980s recession, by way of contrast, saw no clear lag, though this recession was unusual in that it was stagflationary and largely driven by oil prices, a key input to the cost of driving. The slow recovery from the 2001 recession, meanwhile, saw used vehicle prices decline by around 15% during 2003-2004, largely because the supply of used vehicles remained very robust.

In conducting the stress test, the Fed remains silent on what it is assuming will happen to the auto market during the hypothetical scenarios it uses to assess bank losses. From the perspective of an “expected loss” framework calculated as

\[ PD_t \times LGD_t \times EAD_t \]

the discussion in this section implies that while PD increased during the Great Recession, LGD fell because of strong used car prices that triggered higher recovery rates. The overall effect on net losses is unclear because of these contradictory cyclical forces, so the timing of turning points in both PD and LGD becomes critical for the assessment of likely credit losses under stress. Although auto losses were high in 2008 and early 2009 because the default rate was elevated during a period of depressed recoveries, they were then historically low in late 2009, 2010 and 2011. In many ways, the severely adverse scenario mimics the Great Recession so, presumably, we can assume that auto dynamics follow a similar path to that which just unfolded. However, as we will show in the next section, the vehicles-specific macroeconomic series often run counter to the prevailing business cycle, and this can have unintended consequences on models built to forecast expected losses and economic capital under alternative macroeconomic scenarios.

**CCAR/DFAST models for vehicles**

As a part of the SSS, the Fed released scenarios for 14 variables in the U.S. economy “that capture economic activity, asset prices, and interest rates in the U.S. economy and financial markets.” The economic variables include real and nominal GDP growth, real and nominal disposable income growth, the unemployment rate, and inflation. Interest rate variables include three-month and 10-year Treasury yields, BBB corporate rates, and the mortgage rate. Asset prices include the Dow Jones Stock Market Index, the CoreLogic House Price Index, and a commercial real estate price index. The VIX is used to capture volatility. There are no economic series directly linked to vehicle prices or auto market activity.

That the Fed chooses not to include auto sales and auto prices in the SSS is telling. Based on the vague description of the methodology used to model auto losses, it seems as if house prices and unemployment are the main drivers used to model PD while no mention is made of which variables are used to capture EAD or LGD dynamics:

“The PD model for auto loans estimates the probability that a loan transitions from either a current or delinquent status to default status, given the characteristics of the loan and borrower as well as macroeconomic variables such as house prices and the unemployment rate (which, in some cases, are interacted with loan and borrower characteristics to allow for greater sensitivity to stressful conditions in high-risk segments). Default on auto loans is defined based on either the payment status (120 days past due), actions of the borrower (bankruptcy), or the lender (repossession). Because the relationship between the PD and its determinants can vary with the initial status of the account, separate transition models are estimated for accounts that are current and delinquent accounts. The historical data used to estimate this model are loan-level, credit bureau data.”

“The LGD for auto loans is estimated given the characteristics of the loan as well as macroeconomic variables. The historical data used to estimate this model are pooled, segment-level data provided by the BHCs on the FR Y-14Q. The EAD for auto loans is based on the typical pattern of amortization of loans that ultimately defaulted in historical credit bureau data. The estimated EAD model captures the average amortization by loan age for current and delinquent loans over nine quarters.”

One wonders how the Fed would view a mortgage PD or LGD model that did not include house prices as a driver. The reality is that used vehicle prices are a key determinant not only of recoveries but also of default probability. Therefore, a fundamental question from the perspective of stress testing auto portfolios is whether it is possible to proxy used vehicle price dynamics with house prices and unemployment.

The interesting feature about the vehicle market is that used cars are an imperfect substitute for new ones. As income falls on the outset of recession, overall demand for cars declines, but this triggers both an income and a substitution effect in the overall market for personal transportation devices. Some people who would normally be expected to purchase new vehicles would forgo or postpone their purchase while others would decide to trade in their cars for newer, albeit used, autos. A postponement of the transaction would have the effect of reducing demand for new cars, which is clearly seen in the data, but it would also reduce the supply of vehicles entering the used vehicle market. The second dynamic would increase both the demand and supply of used vehicles. Those who might previously have been customers in the cheap used vehicle market have fewer options. Taking the bus is not a valid choice for the vast majority of American consumers.

Among the variables included in the FRB’s SSS, none appears to match any of the dynamics we have identified in the new and
used vehicles markets. Below, we map the CoreLogic house price index against the Manheim Used Vehicle Value Index. Overall, Chart 2 suggests a fairly strong negative correlation between house and used car prices. If one restricts attention to the period between 2004 and early 2009, one could claim a positive correlation between the two sets of drivers though this would be a very distorted and myopic way to view the data. House prices were enjoying a record boom from 2004 to 2006 while used car prices merely edged higher. The key point here is that there is no way that house prices can pick up the substitution and supply side effects that overwhelmingly drive the behavior of used auto markets. It has a theoretical chance of picking up the (also important) income effect though it does not seem to do a very good job with this, at least over the past dozen years or so.

More formally, we examine the statistical correlations of the CoreLogic house price index used in the Fed’s stress scenario against the Manheim used vehicle index and the CPI for used trucks and vehicles. We consider both the levels as well as the year-to-year growth rates. For each transformation, we also consider both a one-year lag and one-year lead. In all of the cases, we find either a strong negative correlation or a near zero correlation in one direction or the other. Table 1 below shows the results for correlations estimated using quarterly data from 1953Q1 to 2012Q4 for the CPI (1982-84=100, SA) and from 1995Q1 to 2012Q4 for the Manheim index (Index Jan 1995=100, SA).

Next, we turn our attention to the other driver used explicitly by the Fed—the unemployment rate (see Chart 3). Here the correlation is a little bit stronger—and appropriately signed—with turning points roughly coinciding in early 2003, late 2006 and mid-2009. A clear turning point in the vehicle price series, in early 2011, is not matched by a similar turn in the unemployment rate. We view unemployment as a strong demand side indicator for the used vehicle market that is clearly able to pick up the underlying income effect driving prices. Note that, as mentioned previously, the biggest price fall—from 2001-2004—occurred as the jobless rate rose from 4% to 6% whereas the rise from 4.5% to 10% caused only a small car price correction. Though the direction of car price changes is reasonably well-captured, the relative magnitude of the effects is completely upside down. In stress testing, it is clearly important that models capture both the timing of turning points and exactly how badly recessions will affect each sector. The last column of Table 1 above shows the statistical correlations that support these statements.

The conclusions of this section are simple: recessions like those observed since the 1980s will trigger bank losses on auto portfolios expected to be lower than those for other retail assets. This is mainly due to observed dynamics in the market for used vehicles. Stress-testing models based on HPI and

### Table 1: Correlation Coefficient Between Vehicles Series, CoreLogic HPI and Unemployment Rate

<table>
<thead>
<tr>
<th>Variable</th>
<th>Transformation</th>
<th>Lag/Lead</th>
<th>Correlation With HPI</th>
<th>Correlation With Unemployment</th>
</tr>
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<tbody>
<tr>
<td><strong>Manheim</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Level</td>
<td>Lag 4 qtrs</td>
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<td>0.527</td>
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<td></td>
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</tr>
<tr>
<td></td>
<td>Lead 4 qtrs</td>
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<td>0.317</td>
</tr>
<tr>
<td>Yr-to-yr %</td>
<td>Lag 4 qtrs</td>
<td></td>
<td>-0.185</td>
<td>0.158</td>
</tr>
<tr>
<td></td>
<td>Simultaneous</td>
<td></td>
<td>0.024</td>
<td>-0.149</td>
</tr>
<tr>
<td></td>
<td>Lead 4 qtrs</td>
<td></td>
<td>-0.086</td>
<td>-0.471</td>
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<tr>
<td><strong>CPI – Used Vehicles</strong></td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Level</td>
<td>Lag 4 qtrs</td>
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<td>-0.553</td>
<td>0.295</td>
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<tr>
<td></td>
<td>Simultaneous</td>
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<td>-0.535</td>
<td>0.236</td>
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<td></td>
<td>Lead 4 qtrs</td>
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<td>0.182</td>
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<tr>
<td>Yr-to-yr %</td>
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<td>0.202</td>
</tr>
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<td>-0.138</td>
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<tr>
<td></td>
<td>Lead 4 qtrs</td>
<td></td>
<td>-0.312</td>
<td>0.022</td>
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</table>
unemployment rate shocks only will tend to overestimate banks’ net losses on vehicles’ portfolios. Although this can be seen as a conservative approach for regulatory purposes, it could trigger massive unintended consequences for banks that are highly specialized or overweight in their exposure to auto finance. The first aim of CCAR stress testing should be accuracy with conservatism being a distant second order concern. The Fed, of course, could easily provide auto industry series as part of the SSS and thus prescribe the dynamics auto lenders must assume in developing stressed loss projections.

Building a meaningful stress scenario for the auto finance industry

An interesting question therefore emerges: Exactly what would be a worst-case scenario for the auto industry? And the corollary is whether such a scenario is even plausible. If a deep, long recession occurs in which, somehow, new vehicle sales remain elevated in the early part of the event, we would have a situation where total auto loans outstanding would be bloated at a time of high unemployment and strong supply into the used vehicles market. Such a confluence of events would lead to a strong surge in net credit losses for auto finance companies. Given that new sales fell so far in the early days of the Great Recession suggests that this scenario holds little credence.

Alternatively, we can consider a situation in which a speculative bubble forms in the market for vehicles. Let us say, for a moment, that new vehicle sales rise to 25 million per month in a reasonably strong economy. Such a figure would be about 50% above the level of auto sales seen during the boom year of 2006. Crippled by overleveraged auto purchases, consumers pull back their spending in a vain attempt to rebalance their household finances, triggering a recession. As defaults rise, a couple of years after the peak new sales period, a flood of used vehicles enter the market, causing used vehicle prices to crater. Losses then rise sharply as repossessed vehicles sell for a pittance in the wholesale used vehicle market.

Is a bubble even possible in the market for cars? For it to be so, speculators would need to perceive the potential for quick profits from having a few Toyota Camrys or Chevy Tahoes parked in the driveway to be sold after used vehicle prices spike. There are examples of people buying late model sports cars and then selling them for a profit in the used vehicle market, though such examples rely more on serendipity than strategy. The simple fact is that owning a depreciating, mass-produced asset with high carrying cost is not an obvious candidate for speculative plays. Auto finance, despite the size of the sector, is not structurally significant. It is virtually impossible to imagine an auto demand-caused recession happening anywhere.

If the Fed wants the stress test to be maximally stressful for auto portfolios specifically, a repeat of the 2001-2004 dynamics would yield the most satisfying outcome from an analytical perspective. The narrative needed to develop a scenario involving 2001-2004 price dynamics with 2007-2011 employment dynamics might turn out to be rather a surreal concoction, however.

Conclusion

We have demonstrated that many of the key dynamic features of the auto finance industry run counter to the prevailing business cycle. We concede that auto loan losses will typically be high at the onset of recession but that, over the course of the entire event, losses are likely to be mild due mainly to supply side and substitution effects in the market for used cars. Further, we have shown that the CCAR auto modeling methodology pays too little heed to these countercyclical dynamics, using house prices and unemployment to distort the relatively weak income effect that follows an economic downturn. Although artificially higher net losses can be seen as a conservative approach for regulatory purposes, it could lead to a capital misallocation as banks realize they will incur above par capital charges for holding auto loans.

One easy solution for the Fed would involve publishing auto market variables as part of the SSS. We suggest that new vehicle sales and the Manheim price index be included in the next version of the CCAR process. Our view, though, is that even this would not fix the problem since scenarios that whack the used vehicle market as hard as the broader economy do not mesh with the behavior of the sector over the past quarter century.
About the Authors

Juan Carlos Calcagno

Juan Carlos Calcagno is Director of Consumer Credit Analytics at Moody's Analytics. Dr. Calcagno is an expert applied econometrician involved in developing and updating econometric models to forecast credit risk under different economic scenarios. Before joining Moody's Analytics, Juan Carlos evaluated public policy at Mathematica Policy Research. He holds a PhD in economics and education from Columbia University and a BS in economics from the National University of Cordoba in Argentina.

Tony Hughes

Tony Hughes is Senior Director of Consumer Credit Analytics at Moody's Analytics. His main responsibility involves managing the company’s credit analysis consulting projects for global lending institutions. An expert applied econometrician, Dr. Hughes also oversees the development of Moody’s CreditCycle and manages the data and forecasting products CreditForecast.com and CreditForecast.co.uk. His varied research interests have lately focused on problems associated with loss forecasting and stress testing credit portfolios.

Now based in the U.S., Dr. Hughes previously headed the Moody's Analytics Sydney office, where he was editor of the Asia/Pacific edition of the Dismal Scientist web site and was the company’s lead economist in the region. He retains a keen interest in emerging markets and in Asia/Pacific economies.

A former academic, Dr. Hughes held positions at the University of Adelaide, the University of New South Wales, and Vanderbilt University and has published a number of articles in leading statistics and economics journals. He received his PhD in econometrics from Monash University in Melbourne, Australia.

Stephen Kernytsky

Stephen Kernytsky is an associate economist with Moody's Analytics. He is a member of the Credit Analytics group, where he works on the CreditForecast database and other consumer credit projects. He received his bachelor’s degree in economics and mathematics from La Salle University.

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ASIA/PACIFIC
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Email: help@economy.com
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