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Economics 446: Monetary Policy

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Forecasting Lab

I. Executive Summary

Data from outstanding consumer credit, S&P 500 index, and vehicle sales suggest that the economy will continue to grow into mid-2014, with particularly clear growth in consumer credit. While the results from S&P 500 and vehicle forecasting are less clear, they still suggest future economic growth. Together, these models suggest that the Federal Reserve could begin tapering its asset purchases early in 2014.

II. Introduction and Data Description

Mixed economic data has recently stayed the Federal Reserve's hand in implementing its tapering program, as they wait for more solid economic data. What remains unclear, however, is when those data will come. This report will forecast consumer credit, S&P 500 prices, and vehicle sales into mid-2014 to gain a better sense of when to begin tapering based on historical data from the 1940s up to October 1, 2013. The below table gives those projections.

	Consumer Credit Outstanding	S&P 500 Index	Vehicle Sales
January 2014	3121.381	1456.909	1174.92
February 2014	3131.236	1460.08	1299.656
March 2014	3141.098	1463.258	1542.708
April 2014	3150.967	1466.441	1453.238
May 2014	3160.844	1469.63	1560.924
June 2014	3170.729	1472.825	1543.678

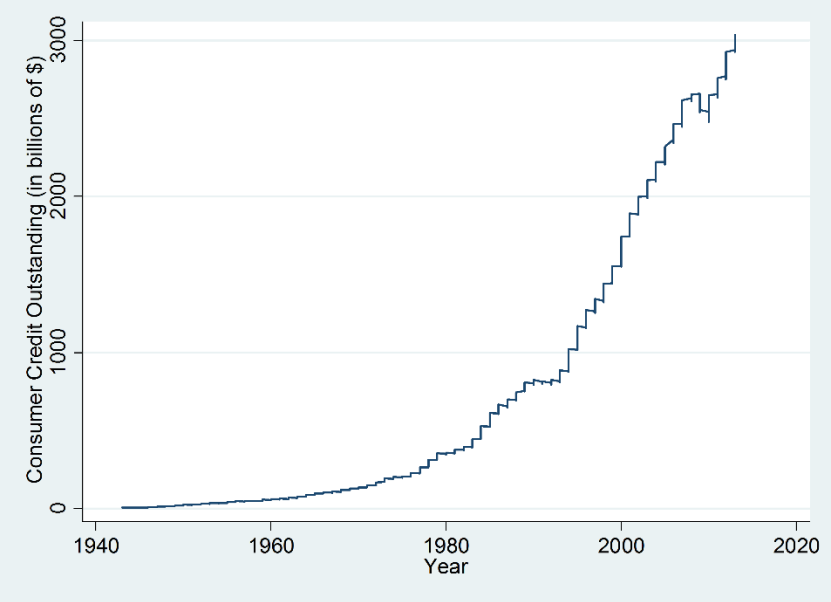
Table I: Market Indicator Forecasts

These indicators were selected because of their impact on the economy. Consumer Credit Outstanding signifies the loans that consumers are taking, which turn into consumption, stimulating aggregate demand. The S&P 500 is an index of 500 stocks with large market capitalizations, whose growth signifies an increase in the wealth effect, leading consumers to believe they have more wealth, which will lead them to spend more. It will also incentivize them to invest. Together, these factors will increase aggregate demand. Vehicle sales are a component of consumption, and such large purchases are also a sign that consumers are more confident in the economy and willing to spend.

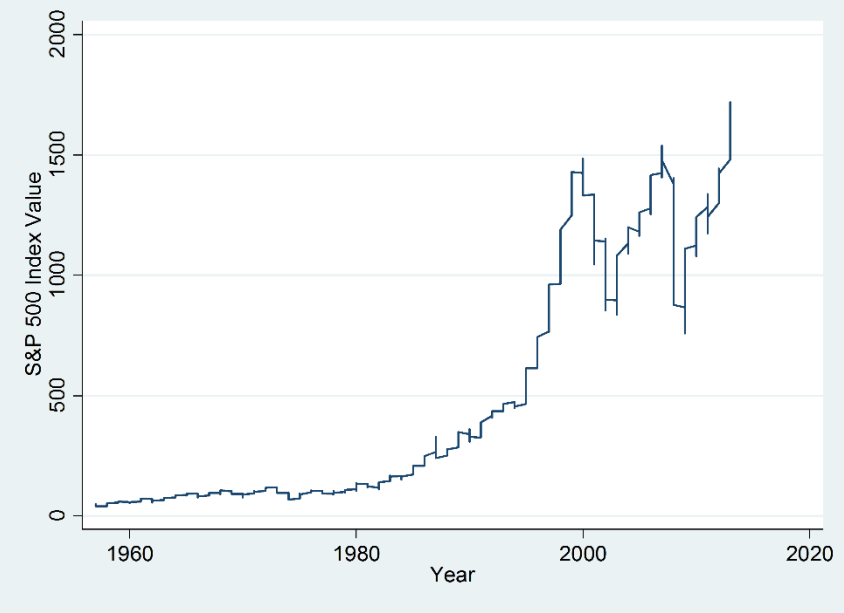
These data come from FRED, are reported monthly, and their descriptive statistics and trends are below:

Name	Observations	Start Date	End Date	Min	Max
Consumer Credit Outstanding (in billions of $)	849	Jan. 1, 1943	Oct. 1, 2013	5.203	3033.452
S&P 500 Index	682	Jan. 1, 1957	Oct. 1, 2013	40.33	1720.03
Vehicle Sales (in thousands of units)	454	Jan. 1, 1976	Oct. 1, 2013	670.4	1845.7

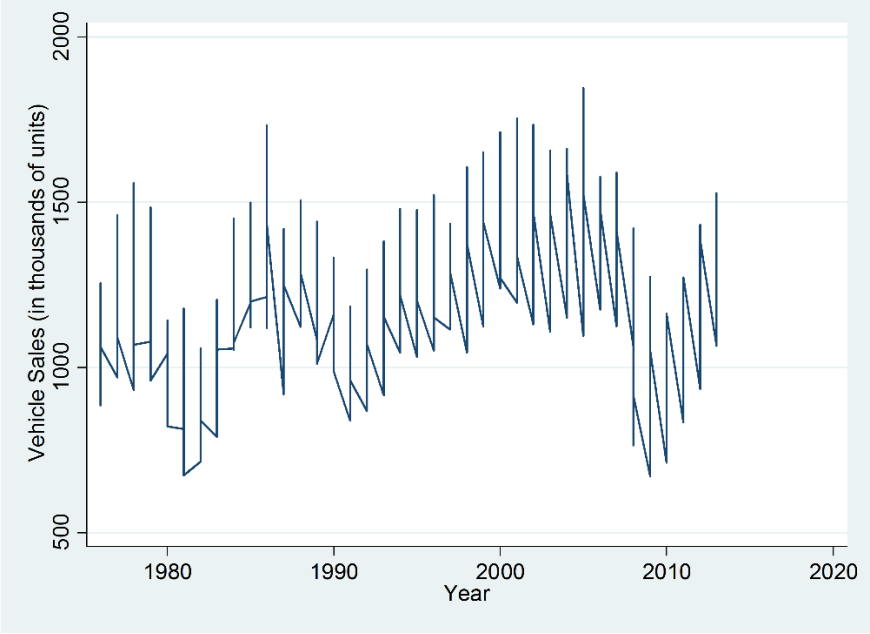
Table II: Descriptive Statistics



Graph I: Consumer Credit Trend



Graph II: S&P 500 Trend



Graph III: Vehicle Sales Trend

III. Analysis

All three of these graphs show trends that can be analyzed through technical analysis to determine future values. The next section discusses the forecasts in detail.

Consumer credit is perhaps the easiest to forecast, and, as shown in Table II, has the most data available. Two particular variables stand out in its graph: a time trend, and exponential growth. To capture these, I used time and time^2 as variables. What is also notable is a drop-off in credit in the late 2000s, which then sped upward. To capture this, I used a dummy variable for the time before and after this shift, as well as an interaction term to capture the change in slope. Together, these variables yielded a model with an adjusted R^2 of .995, stating that the model explains 99.5% of the variation in consumer credit. Given the improving economic situation overall, I trust these numbers, though they may be slightly lower because of fiscal uncertainty. The historical data do not take into account credit levels in light of the government shutdown or

near-default, which are likely to reduce credit levels as consumers become cut down on spending in light of risk.

Asset prices are harder to forecast, but once again, time and time^2 prove useful explanatory variables. Graph II also displays a more cyclical trend beginning in the mid-1990s. To capture this, I once again used a dummy variable. Unlike consumer credit, I did not include an interaction term because the post-1990s slope was non-linear. Together, this resulted in a model with an adjusted R^2 of .933, stating that the model represents 93.3% of the variation in the S&P index. Despite the high adjusted R^2, I do not trust these numbers, as a separate regression of the S&P index on the previous month's index gave an adjusted R^2 of .997, suggesting that asset prices follow a random walk model, wherein the current value is a function of the last period's value and an error term, making forecasting impossible. That the S&P has already broken 1800 casts serious doubt on the projections in Table I.

Vehicle sales are even harder to forecast, and have the least amount of data available (see Table II), but some trends are still visible. Vehicle sales have a slight upward time trend, as well as clear seasonality, so time and variables for each month (excluding December, to avoid multicollinearity) were added to the model. Additionally, there appear to be four different "segments" of the trend, which end with significant troughs: 1976 to the early 1980s, the early 1980s to the early 1990s, the early 1990s to the financial crisis of 2008, and 2008 to today. Including three dummy variables for those four times (excluding the second segment), as well as interaction terms for all four sections yield jointly statistically significant results for the dummy variables and interaction terms, as well as an adjusted R^2 of .5801, stating that the model explains 58.01% of the variation in vehicle sales. I moderately trust this model, but there are

some possible omitted variables: consumer confidence, a metric for fiscal risk, and data on replacement cycles for cars, which could explain more of the variation on vehicle sales.

IV. Conclusion

These data have interesting implications for monetary policy, as they suggest a slowly resurging economy. Credit will continue to rise, while vehicle sales continue to remain seasonal with a slight upward trend. The S&P index are more likely to follow a random walk, but they are currently at historic highs. Growth in outstanding credit will stimulate consumption, aiding aggregate demand, and hopefully reducing unemployment as the economic multiplier continues to work. This increased consumption will also hopefully increase inflation rates, which are still below the Fed's goal of 2%. It is also possible, however, that the effects of quantitative easing have not reached the inflation channel yet. Given these data, however, it seems reasonable that the Fed will begin tapering its asset purchase program in the first quarter of 2014.