

Economics Group

Special Commentary

John E. Silvia, Chief Economist

john.silvia@wellsfargo.com • (704) 410-3275

Michael A. Brown, Economist

michael.a.brown@wellsfargo.com • (704) 410-3278

Erik Nelson, Economic Analyst

erik.f.nelson@wellsfargo.com • (704) 410-3267

Fed Rate Hike: What Does it Mean for Consumer Spending?

In part one of our series on the drivers of consumer spending, we explored the impact of various income measures on real consumer spending. In part two, we turn to the role of consumer credit and interest rates on real spending activity to provide some insight into how a Fed rate hike later this year may affect consumer spending. We begin with an analysis of the links between credit availability and consumer spending and then explore the relationship between several measures of interest rates and real spending behavior. Finally, we look at expectations for future interest rates to see if they have any predictive power in forecasting real consumer spending.

In order to explore the relationship between interest rates and the credit market to consumer spending we employ a cross-correlation analysis and standard OLS regressions to understand the relationship between interest rate and credit related variables and real consumer spending.¹ We find that among the credit market indicators that we surveyed that the best coincident indicator is the interest rate expectations component of the University of Michigan consumer confidence survey. As we discovered with our survey of income measures, expectations play an important role in understanding real consumer spending behavior.² Among the leading indicators we found, the real 10-year U.S. Treasury yields (the 10-year yield adjusted for inflation) served as a good leading indicator but explained very little of the variability in consumer spending behavior. We concluded that the best leading indicator of real consumer spending is credit availability, which provided, on average, a two-month lead time and explained about a quarter of the variability in real consumer spending.

Credit Availability and Its Effect on Real Spending

Prior literature has pointed to the positive impact of credit growth on real consumption growth.³ Most of this literature tracks changes in credit growth by looking at lending practices and other measures of the availability of credit to consumers. To gauge credit availability in our analysis, we utilized the net percent of banks reporting increased willingness to make consumer installment loans from the Senior Loan Officer Opinion Survey. Our cross-correlation analysis suggests that movements in credit availability tend to lead movements in real spending by roughly one quarter (Figure 1). Moreover, a simple linear regression suggests the one-quarter lead time of credit availability explains roughly 25 percent of the variation in real spending, one of the highest figures for explanatory power in our sample (Table 1, Appendix). Thus, we view credit availability as a reliable leading indicator of real spending growth.

Our analysis suggests that movements in credit availability tend to lead movements in real spending by roughly one quarter.

¹ For more on the econometric techniques we employ, see appendix. The sample period for all of our quarterly analysis is Q1-1995:Q4-2014. For monthly analysis, the sample period is Jan. 2000:Jan. 2015.

² Silvia, J.E., Brown, M.A. and Nelson, E. (2015). "Drivers of Consumer Spending Part I: Which Income Measure Is the Best?"

³ Bacchetta, P. and Gerlach, S. (1997). "Consumption and Credit Constraints."

Ludvigson, S. (1999). "Consumption and Credit: A Model of Time-Varying Liquidity Constraints."



As another means of analyzing the relationship between credit and consumer spending, we looked at growth in outstanding consumer credit and real spending growth. Our cross correlation analysis suggests that consumer credit growth tends to lag growth in real spending by roughly nine months, but is the most highly correlated of any variable in our sample with movements in real spending (Figure 2). The nine-month lag of consumer credit growth explains roughly 75 percent of the variation in real consumer spending, more than double the explanatory power of any variable in our sample (Table 1). However, given such a significant lag, we conclude that growth in consumer credit is not useful in explaining real spending behavior.

The most recent recession provides some insight into why this lag exists—leading up to the Great Recession, consumers were able to reduce their spending more immediately than they were able to pay down their outstanding credit. Once the recovery began, consumers then began to ramp up spending again but continued to pay down existing debt, part of a phenomenon that eventually became known as the “Great Deleveraging.” This, in turn, caused movements in consumer credit outstanding to lag movements in overall real spending.

Figure 1

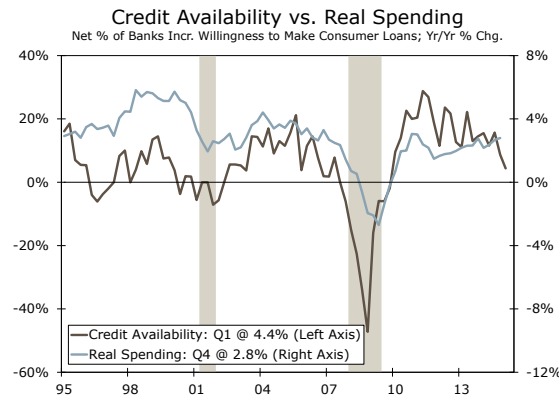
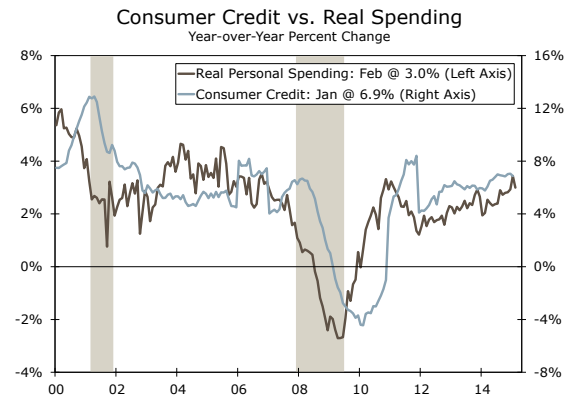


Figure 2



Source: Federal Reserve Board, U.S. Department of Commerce and Wells Fargo Securities, LLC

Measures of Interest Rates and Real Spending

We find that credit card rates serve as a leading indicator, providing some insight into real consumer spending.

We next turn to the links between interest rates and real spending activity. Traditionally, the economic literature focuses on real interest rates to determine real spending behavior. While utilizing real interest rates is an interesting perspective, this information is not readily available to consumers to use as an input into decision making. As Wilcox (1990) points out, nominal interest rates also play an important role in explaining real consumer spending behavior.⁴ The first measure of rates we examined was the credit card rate as published by the Federal Reserve’s consumer credit report.⁵ We find that these credit card rates serve as a leading indicator, providing some insight into real consumer spending on average about one quarter in advance. However, even with its leading indicator status, a simple regression showed that only 21 percent of the variance in consumer spending was explained by credit card rates.

As another proxy for consumer rates overall, we looked at the nominal 10-year Treasury yield and its relationship with real consumer spending. The 10-year Treasury rate was found to lag movements in real spending by one period, and explained roughly 20 percent of the variance in real spending activity.

⁴ Wilcox, J.A. (1990). “Nominal Interest Rate Effects on Real Consumer Expenditure.” *Business Economics*.

⁵ The Federal Reserve publishes its G.19 Consumer Credit report monthly—the latest release is available here: <http://www.federalreserve.gov/releases/g19/current/>.

Given that both nominal rate variables we looked at were roughly coincident, we decided to also look at the real 10-year yield, defined as the 10-year Treasury yield adjusted for the year-over-year percent change in the PCE deflator. Although the measure showed some signs of serving as a leading indicator, the strength of the correlation was weak, and thus did not prove to be very useful as a leading indicator. Furthermore, it was clear that the nominal interest rates we discussed above did a better job of explaining current spending patterns than real interest rates.

In part one of our series, we discussed some of the issues with finding a proxy indicator to measure future income expectations in the permanent income hypothesis (PIH). Another result that stems from the permanent income hypothesis is that consumption growth is determined, in part, by the real interest rate.⁶ The real interest rate represents the cost of borrowing for a consumer unit, while the discount rate is used to determine the present value of future income for a consumer. Our findings suggest that real interest rates are not particularly useful for helping to explain real consumer spending activity, consistent with Carroll and Summers (1991), who also found that this result from the PIH is incorrect.⁷

Nominal interest rates did a better job of explaining current spending patterns than real interest rates.

Figure 3

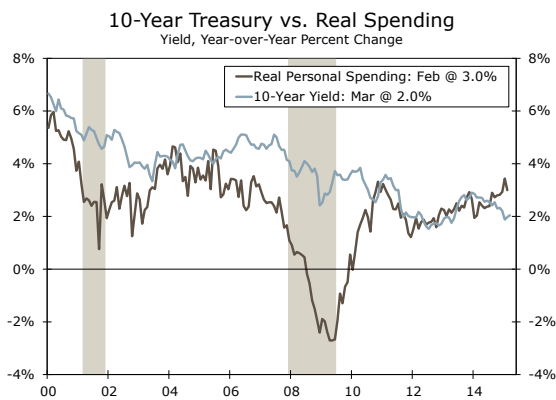
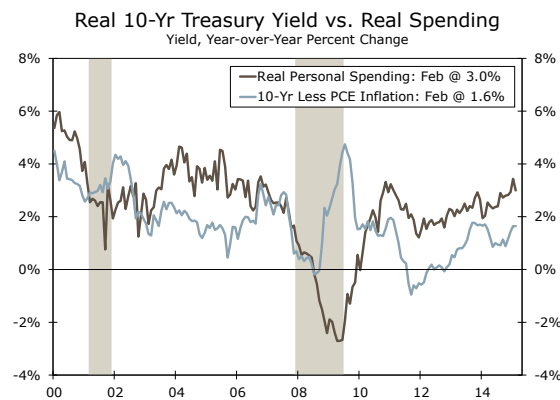


Figure 4



Source: Federal Reserve Board, U.S. Department of Commerce and Wells Fargo Securities, LLC

Interest Rate Expectations and Real Spending

Given that nominal interest rates are a fairly reliable coincident predictor of real spending behavior, consumers' expectations of future interest rates should, in theory, offer some leading indication of real spending. In order to represent consumers' expectations of future interest rates, we utilize data from the University of Michigan's survey of consumer sentiment. Specifically, we looked at the percentage of respondents expecting rates to increase in the next 12 months (Figure 5). Our cross-correlation analysis shows that consumers' interest rate expectations are a coincident gauge of real spending activity, and explain about 32 percent of the variation in real spending, the second-highest figure of any variable in our sample (Table 1). Interestingly, consumers' rate expectations explain more of the variation in real spending than current nominal rates do.

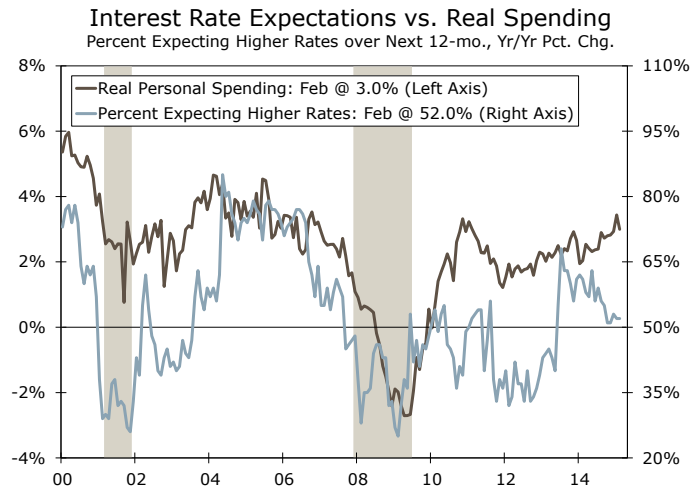
In theory, rate expectations can work in two ways for consumers. In the classic consumption/saving decision, consumers should prefer consumption to saving in the current period if they expect higher rates in the future, as this would imply a higher cost of obtaining credit in the future. At the same time, there is also an income effect, such that, if an individual is a net saver, a higher interest rate should increase the return on saving and thus allow that

^{6,8} Romer, D. (2006). *Advanced Macroeconomics* (Third Edition). p.370-371. McGraw-Hill Irwin.

⁷ Carroll, C.D. and Summers, L.H. (1991). "Consumption Growth Parallels Income Growth: Some New Evidence." *National Saving and Economic Performance*, p.305-343. University of Chicago Press.

individual to increase his or her consumption path.⁸ However, the income effect is more dependent upon a long-run structural shift in interest rates, which is less likely to be captured in a survey of consumers. In practice, we see the former effect prevail, as our analysis shows that consumers' expectations of higher future interest rates are positively correlated with current-period real spending (Table 1).

Figure 5



Source: University of Michigan, U.S. Dept. of Commerce and Wells Fargo Securities, LLC

Results and Conclusions

Throughout our survey of both income and interest rate indicators we have seen the importance of expectations on real spending.

Throughout our survey of both income (from part one) and interest rate indicators (part two) we have seen the importance of consumers' income and interest rate expectations on real spending behavior. As forecasters, we like to focus on leading indicators that help us identify growth rates in real spending and other key macroeconomic variables. We found that consumers' income expectations and consumer credit availability serve as two important leading indicators for real consumer spending. While no one single variable can stand alone as a forecasting tool, these two indicators should assist decision makers in understanding some of the fundamental factors that drive consumer spending.

Appendix

Table 1

	Real PCE Analysis		
	<u>Cross-Correlation</u>	<u>Lag-Period</u>	<u>R²</u>
Consumer Credit	0.85	9	0.76
10-Year Treasury Yield	0.45	1	0.21
Real 10-Year Treasury Yield	0.23	-9	0.07
Interest Rate Expectations	0.57	0	0.32
Credit Card Interest Rate*	0.43	-1	0.21
Credit Availability*	0.50	-2	0.25

* These are quarterly data, so lag-periods represent number of quarters.
 Coefficients of all regressions are significant at $\alpha = 0.01$

Source: Federal Reserve Board, Univ. of Michigan, U.S. Dept. of Comm. and Wells Fargo Securities, LLC

Methodology:

The cross-correlation technique used in our analysis helps to identify leading and lagging indicators of a particular time series. One of the main advantages of the cross-correlation over a simple correlation analysis is that it holds constant the autocorrelation between the two time series and, therefore, allows for the “cleaner” identification of relationships between two variables over time.⁹

The cross-correlation between y_t and z_{t-i} is defined as

$$\rho_{yz}(i) = \frac{\text{COV}(y_t, z_{t-i})}{(\sigma_y \sigma_z)}$$

Where

σ_y is the standard deviation of y_t

σ_z is the deviation of z_t

⁹ Enders, W. (2004). Applied Econometric Time Series, Second Edition. p. 248-249 John Wiley & Sons, Inc.

Wells Fargo Securities, LLC Economics Group

Diane Schumaker-Krieg	Global Head of Research, Economics & Strategy	(704) 410-1801 (212) 214-5070	diane.schumaker@wellsfargo.com
John E. Silvia, Ph.D.	Chief Economist	(704) 410-3275	john.silvia@wellsfargo.com
Mark Vitner	Senior Economist	(704) 410-3277	mark.vitner@wellsfargo.com
Jay H. Bryson, Ph.D.	Global Economist	(704) 410-3274	jay.bryson@wellsfargo.com
Sam Bullard	Senior Economist	(704) 410-3280	sam.bullard@wellsfargo.com
Nick Bennenbroek	Currency Strategist	(212) 214-5636	nicholas.bennenbroek@wellsfargo.com
Eugenio J. Alemán, Ph.D.	Senior Economist	(704) 410-3273	eugenio.j.aleman@wellsfargo.com
Anika R. Khan	Senior Economist	(704) 410-3271	anika.khan@wellsfargo.com
Azhar Iqbal	Econometrician	(704) 410-3270	azhar.iqbal@wellsfargo.com
Tim Quinlan	Economist	(704) 410-3283	tim.quinlan@wellsfargo.com
Eric Viloría, CFA	Currency Strategist	(212) 214-5637	eric.viloría@wellsfargo.com
Sarah House	Economist	(704) 410-3282	sarah.house@wellsfargo.com
Michael A. Brown	Economist	(704) 410-3278	michael.a.brown@wellsfargo.com
Michael T. Wolf	Economist	(704) 410-3286	michael.t.wolf@wellsfargo.com
Mackenzie Miller	Economic Analyst	(704) 410-3358	mackenzie.miller@wellsfargo.com
Erik Nelson	Economic Analyst	(704) 410-3267	erik.f.nelson@wellsfargo.com
Alex Moehring	Economic Analyst	(704) 410-3247	alex.v.moehring@wellsfargo.com
Donna LaFleur	Executive Assistant	(704) 410-3279	donna.lafleur@wellsfargo.com
Cyndi Burris	Senior Admin. Assistant	(704) 410-3272	cyndi.burris@wellsfargo.com

Wells Fargo Securities Economics Group publications are produced by Wells Fargo Securities, LLC, a U.S. broker-dealer registered with the U.S. Securities and Exchange Commission, the Financial Industry Regulatory Authority, and the Securities Investor Protection Corp. Wells Fargo Securities, LLC, distributes these publications directly and through subsidiaries including, but not limited to, Wells Fargo & Company, Wells Fargo Bank N.A., Wells Fargo Advisors, LLC, Wells Fargo Securities International Limited, Wells Fargo Securities Asia Limited and Wells Fargo Securities (Japan) Co. Limited. Wells Fargo Securities, LLC ("WFS") is registered with the Commodities Futures Trading Commission as a futures commission merchant and is a member in good standing of the National Futures Association. Wells Fargo Bank, N.A. ("WFBNA") is registered with the Commodities Futures Trading Commission as a swap dealer and is a member in good standing of the National Futures Association. WFS and WFBNA are generally engaged in the trading of futures and derivative products, any of which may be discussed within this publication. Wells Fargo Securities, LLC does not compensate its research analysts based on specific investment banking transactions. Wells Fargo Securities, LLC's research analysts receive compensation that is based upon and impacted by the overall profitability and revenue of the firm which includes, but is not limited to investment banking revenue. The information and opinions herein are for general information use only. Wells Fargo Securities, LLC does not guarantee their accuracy or completeness, nor does Wells Fargo Securities, LLC assume any liability for any loss that may result from the reliance by any person upon any such information or opinions. Such information and opinions are subject to change without notice, are for general information only and are not intended as an offer or solicitation with respect to the purchase or sales of any security or as personalized investment advice. Wells Fargo Securities, LLC is a separate legal entity and distinct from affiliated banks and is a wholly owned subsidiary of Wells Fargo & Company © 2015 Wells Fargo Securities, LLC.

Important Information for Non-U.S. Recipients

For recipients in the EEA, this report is distributed by Wells Fargo Securities International Limited ("WFSIL"). WFSIL is a U.K. incorporated investment firm authorized and regulated by the Financial Conduct Authority. The content of this report has been approved by WFSIL a regulated person under the Act. For purposes of the U.K. Financial Conduct Authority's rules, this report constitutes impartial investment research. WFSIL does not deal with retail clients as defined in the Markets in Financial Instruments Directive 2007. The FCA rules made under the Financial Services and Markets Act 2000 for the protection of retail clients will therefore not apply, nor will the Financial Services Compensation Scheme be available. This report is not intended for, and should not be relied upon by, retail clients. This document and any other materials accompanying this document (collectively, the "Materials") are provided for general informational purposes only.

SECURITIES: NOT FDIC-INSURED/NOT BANK-GUARANTEED/MAY LOSE VALUE

