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## *Economics Group*

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# Drivers of Consumer Spending Part I: Which Income Measure Is the Best?

## Executive Summary

Consumer spending is the cornerstone of the U.S. economy, accounting for roughly two-thirds of GDP. In this report series, we will explore some of the key drivers of real consumer spending activity and determine which economic indicators are the best leading predictors of real spending activity. In part one of this series, we examine various measures of income to determine the best measure for predicting spending behavior. In particular, we will look at the income proxy derived from the employment report, nominal and real personal income and wages and salaries from the personal income and spending release, wage measures from the Employment Cost Index and the income expectations component within the Conference Board consumer confidence index.

*We examine which income measure best gauges spending activity.*

We employ the use of cross-correlation analysis and standard OLS regressions (including forward and lagged variables where appropriate) to understand the relationship between our target income measures and real consumer spending growth.[1] Through our analysis, we find that there are three measures that provide the best gauge of current spending activity: wages and salaries, real disposable income and real disposable income per capita. Among the income measures that we examined, the only leading indicator of future real spending activity was the income expectations component of the Conference Board's Consumer Confidence Survey. We conclude that income expectations can serve as a leading indicator of real consumer spending, but prior studies have shown that current economic theory does not help to explain this dynamic.

## Income Proxy: A Lagging Indicator

First on the chopping block is the income proxy, calculated by multiplying average hourly earnings by average weekly hours worked (Figure 1). This measure provides a gauge of average weekly wage income per capita using data from the Bureau of Labor Statistics' (BLS) comprehensive monthly establishment employment report.[2] Based on our cross-correlation analysis, the income proxy tends to lag real spending by roughly four periods, and the correlation is weak relative to other income measures we examine later in this report.

*The income proxy is correlated with spending but has a significant lag.*

Adding to the unreliability of the income proxy in gauging real spending, we find that the four-period lag of the income proxy only explains 54 percent of the variance in real spending, one of the lowest values among the variables we tested (Appendix, Table 1). This indicates that the income proxy is correlated with spending, but does not explain as much of the variation in spending as other income variables in our sample do. This relatively insignificant result corroborates some of the divergence we have seen between average hourly earnings growth and real spending growth in recent months (Figure 2).

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[1] **For more on the econometric techniques used, see the appendix.**
[2] **The BLS releases the establishment and household employment reports once a month. The PDF with the most recent reports can be found here: http://www.bls.gov/news.release/pdf/empsit.pdf**

Together we'll go far

**Figure 1**

Income Proxy vs. Real Spending
Year-over-Year Percent Change of 3-Month Moving Average



**Figure 2**

Average Hourly Earnings vs. Real Spending
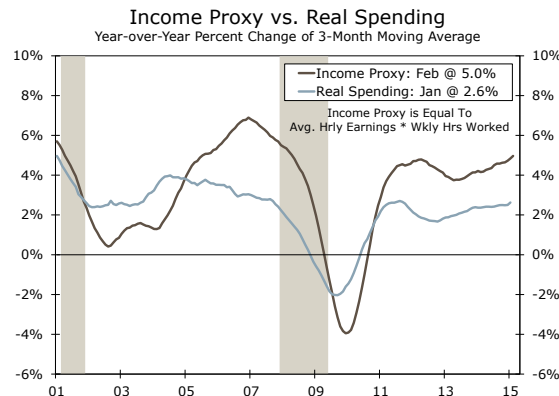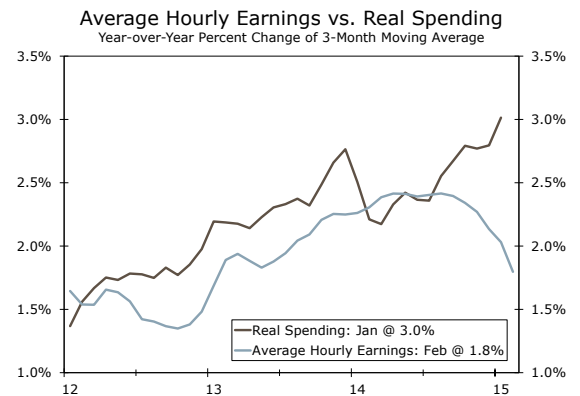Year-over-Year Percent Change of 3-Month Moving Average



Source: U.S. Department of Labor, U.S. Department of Commerce and Wells Fargo Securities, LLC

## Wages and Salaries and Other Wage Data: Coincident Measures

*Wages and salaries are the best gauge of real spending.*

Wages and salaries, defined as any non-benefit compensation paid to employees on a regular basis, are the most closely correlated with real spending of all the income measures (Figure 3). Notably, this measure of income only has a two-period lag, shorter than the four-period lag observed in the income proxy variable (Table 1). This corroborates research we have done which demonstrates that growth in wages and salaries tends to lead average hourly earnings growth.[3] Regression analysis between the two-period lag of wages and salaries and real spending shows that this variable explains 72 percent of the variation in real spending, the most of any income variable in our sample. Thus, we believe that wages and salaries growth is one of, if not the best, determinants of current real spending activity.

*ECI is not a worthwhile gauge of real spending.*

As another means of examining the relationship between wages and spending, we analyzed the wages and salaries component of the employment cost index (ECI). The ECI report defines wages and salaries the same way the personal income report does, but ECI data are only published quarterly and the methodology differs substantially.[4] While this analysis produced a meaningful cross-correlation value, movements in the ECI lag real spending by roughly seven periods, or nearly two years (Table 1). Given such a significant lag, we expect that this correlation is spurious in nature, and thus, we do not believe that ECI is a worthwhile indicator to rely upon when looking at real-time drivers of real consumer expenditures.

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[3] **Silvia, J. and House, S.** *"Hourly Earnings Underperform—As an Indicator of Spending."* **Oct. 23, 2014.**
[4] **ECI data are collected as a survey from a probability sample of roughly 40,000 occupational observations. The personal income report uses the Quarterly Census of Employment and Wages (QCEW), a virtual census of nonagricultural employment and wages, which should thus make it a more comprehensive measure of wages and salaries.**

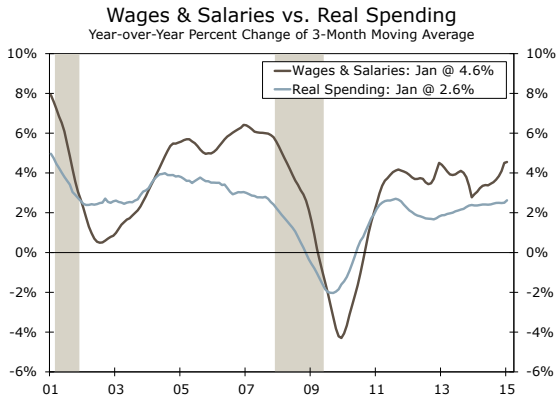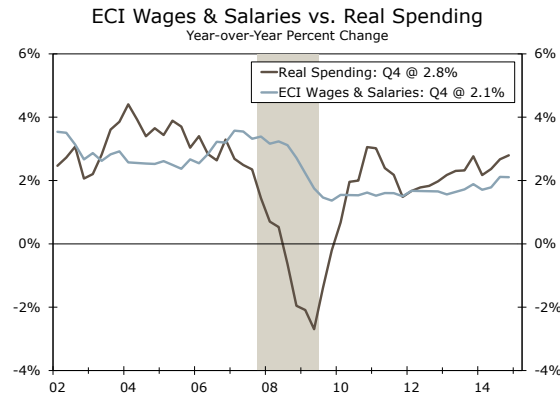Part I: Which Income Measure Is the Best?
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**Figure 3**

Wages & Salaries vs. Real Spending
Year-over-Year Percent Change of 3-Month Moving Average

—Wages & Salaries: Jan @ 4.6%
—Real Spending: Jan @ 2.6%

**Figure 4**

ECI Wages & Salaries vs. Real Spending
Year-over-Year Percent Change

—Real Spending: Q4 @ 2.8%
—ECI Wages & Salaries: Q4 @ 2.1%

Source: U.S. Department of Commerce, U.S. Department of Labor and Wells Fargo Securities, LLC

## Nominal Personal Income: A Coincident Indicator

When examining drivers of consumer spending, perhaps it is more appropriate to consider consumers' *income*, which includes wages and non-wage income, such as transfer payments and benefits. Since consumers have access to this non-wage income, it seems reasonable to assume that they would consider their entire income when making consumption decisions. In addition, non-wage income, particularly transfer payments, has come to constitute a more significant share of income over time, and now accounts for more than half of total personal income (Figure 5). Within non-wage income, transfer payments have increased to 16 percent of income from 11 percent in 1980. With the average age of the population projected to rise as the Baby Boomers age, we expect this trend to continue.

To get a sense of the relationship between total nominal income and real spending, we ran our cross-correlation analysis on nominal personal income, which revealed a strong cross-correlation and a three-period lag (Figure 6, Table 1). In a simple linear regression, the three-period lag of nominal personal income explains 69 percent of the variation in real spending, the second-highest of all income measures. Nominal personal income thus seems to be one of the most reliable gauges of current real spending activity, despite having a slightly longer lag than wages and salaries.

Due to the increasing share of total income comprised by transfer payments, we went a step further and ran our cross-correlation analysis on the transfer payments series. The analysis did not produce a significant cross-correlation, suggesting transfer payments alone are not a useful predictor of real spending activity. However, research shows that significant increases in the dollar amount of federal transfers, such as Social Security payments, have a significant effect on aggregate consumer spending.[5] These increases in spending tend to only occur in the immediate period following an increase in payments and do not persist over time. Finally, given that we expect transfers to make up a greater share of total income going forward, it is possible that transfer payments will begin to have a more significant effect on real spending activity in the future.

*Personal income includes transfer payments, which may affect spending behavior.*

*Transfer payments alone are not a reliable gauge of real spending.*

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[5] See Romer, Christina and David Romer. *"Transfer Payments and the Macroeconomy."* Sept. 16, 2013.

**Figure 5**

Personal Income Sources



**Figure 6**

Personal Income vs. Real Spending
Year-over-Year Percent Change of 3-Month Moving Average
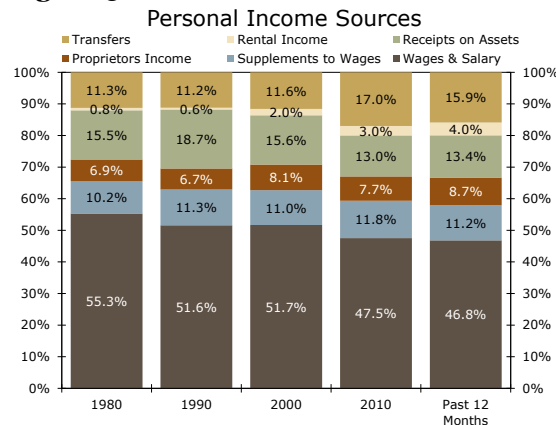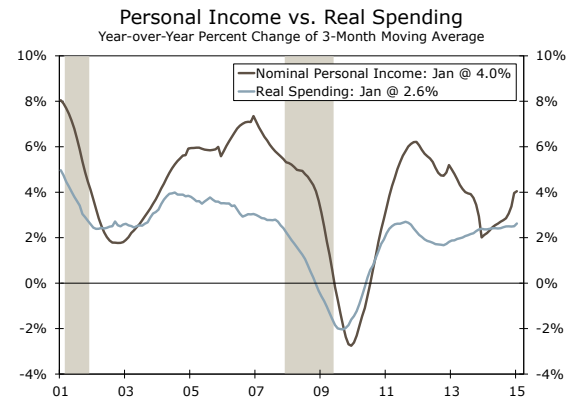


Source: U.S. Department of Commerce and Wells Fargo Securities, LLC

## Real Disposable Income: A Coincident Indicator

While we considered total nominal personal income in the prior section, we now turn to two inflation-adjusted measures of income growth: real disposable personal income and real disposable personal income per capita. Real disposable personal income controls for inflation and subtracts out current taxes from total personal income.[6] Statistical examination of the relationship between real consumer spending and real disposable income shows that, on average, there is a two-month lag between real disposable income and real spending activity (Figure 7, Table 1). While it may not be the best leading indicator of spending behavior, real disposable income does a fairly good job of explaining current real spending behavior, accounting for 65 percent of the variance in real spending.

*Real disposable income is a reliable gauge of real spending.*

Turning to the per capita real disposable income measure, which goes a step further and controls for changes in population, the relationship does not change much. The lag between per capita disposable income and real spending activity remains about two months and provides only a very slight improvement in explanatory power, explaining roughly 66 percent of the variance in the real spending (Figure 8, Table 1).
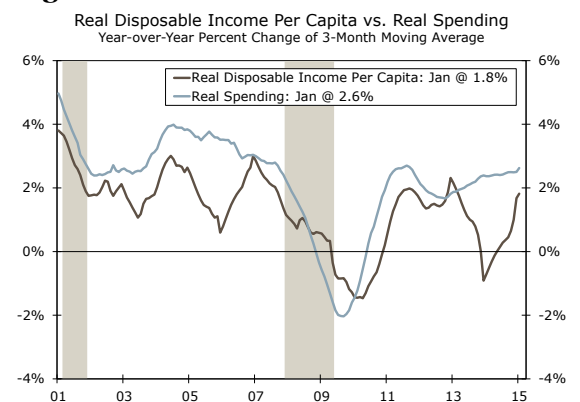
**Figure 7**

Real Disposable Income vs. Real Spending
Year-over-Year Percent Change of 3-Month Moving Average



**Figure 8**

Real Disposable Income Per Capita vs. Real Spending
Year-over-Year Percent Change of 3-Month Moving Average
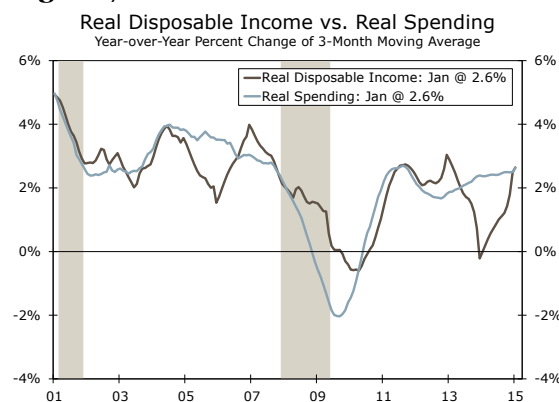


Source: U.S. Department of Commerce and Wells Fargo Securities, LLC

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[6] **The Bureau of Economic Analysis defines personal current taxes as income taxes, taxes on personal property and payments for licenses.**

## The Leading Indicator: Consumer Confidence Income Expectations

Throughout our analysis, we have continually looked for measures that serve as a good current and/or leading indicator of real consumer spending activity. Of the income-related economic indicators that we surveyed, the six-months ahead income expectations component of the Conference Board's Consumer Confidence Survey was the only measure that provided a leading signal to the pace of real spending. Our statistical analysis suggests movements in this series tend to lead movements in real spending by roughly one month. In addition to providing a leading signal of real spending, the income expectations component explained roughly 57 percent of the variance in real consumer spending activity.

While our focus in this report is on income measures, it is worth noting that both measures of general consumer confidence we looked at, the Conference Board's and the University of Michigan's, proved to be reliable leading indicators of real consumer spending. The Conference Board index provided, on average, a five month lead time and explained about 41 percent of the variance in real spending five-months ahead. The University of Michigan consumer confidence index provided about nine months of lead time in predicting real consumer spending, but only explained about 32 percent of the variance in real spending. The important takeaway, however, is that overall trends in consumer confidence measures and income expectations serve as the best barometer of future trends in real consumer spending activity.

*Income expectations and consumer confidence are reliable leading indicators of spending.*

Our first thought was that the leading nature of both the consumer confidence measures and the income component was consistent with the macroeconomic framework of the permanent income hypothesis (PIH), which suggests that expected income over one's lifetime is a better predictor of consumer spending than current income. In other words, income growth today is only important if there is the expectation that an increase in current income will continue in the future.[7] This link has been studied before by Ludvigson (2004), Carroll et al. (1994) and Lahiri et al. (2012).[8] These papers explored the links between the predictive power of consumer confidence and the PIH and point out that the links are weak at best. Lahiri et al. (2012) concluded that the links between consumer confidence measures and real consumption cannot be readily explained by current macroeconomic theory.[9] Even with some of the challenges of linking current economic theory with proxy measures of income expectations of consumers, we still conclude that consumer's expectations do play an important role in explaining real spending activity.

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[7] **Friedman, M. (1957). "*A Theory of the Consumption Function: The Permanent Income Hypothesis.*" p. 20-37. Princeton University Press.**
**Romer, D. (2006). Advanced Macroeconomics (Third Edition). p.349-352. McGraw-Hill Irwin.**
[8] **Ludvigson, S.C. (2004). "*Consumer Confidence and Consumer Spending.*" Journal of Economic Perspectives, 18 (2).**
**Carroll, C.D., Fuhrer, J.C., and Wilcox, D.W. (1994). "*Does Consumer Sentiment Forecast Household Spending? If So, Why?*" The American Economic Review, 84 (5).**
**Lahiri, K, Monokroussos, G. and Zhao, Y. (2012). "*Forecasting Consumption in Real Time: The Role of Consumer Confidence Surveys.*" Discussion Papers, University of Albany, SUNY.**
[9] **Ibid**

**Figure 9**

Income Expectations vs. Real Spending
% Expecting Higher Income Within 6 Mo.; Yr/Yr of 3-MMA

**Figure 10**

Consumer Sentiment vs. Real Spending
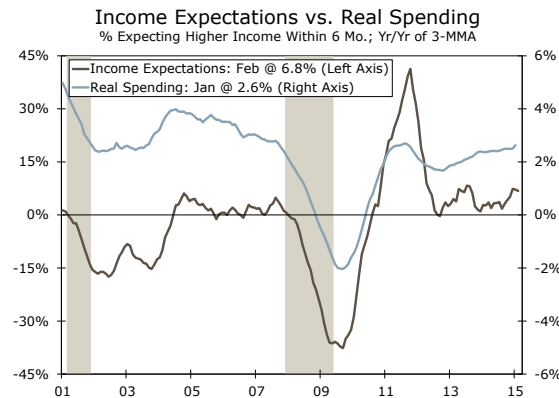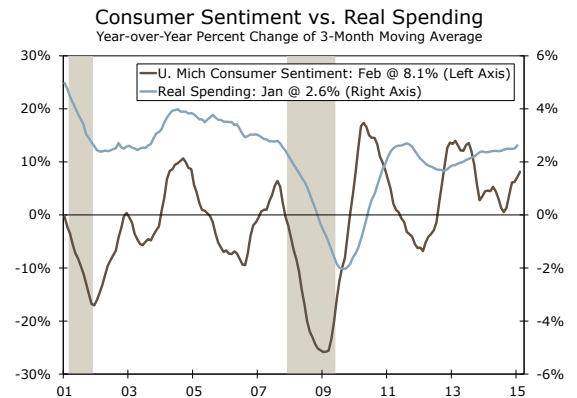Year-over-Year Percent Change of 3-Month Moving Average

Source: Conference Board, University of Michigan, Wells Fargo Securities, LLC

## Conclusion and Key Findings

Accounting for roughly two-thirds of real GDP, consumer spending is one of the most important gauges of domestic economic activity. Due to its high relative importance in the world of economics, forecasters search for economic variables that may help predict future consumer spending activity. Based on our own statistical analysis, we conclude that wages and salaries, real disposable personal income and real disposable income per capita are the best coincident gauges of real consumer spending. Interestingly, consumers' income expectations serve as a reliable leading indicator of real spending, and overall measures of consumer confidence also tend to provide some future insight into spending activity, even if current macroeconomic theory cannot precisely explain the link.

*Wages and salaries and real disposable income are the most reliable gauges of real spending.*

# Appendix

**Table 1**

| Real PCE Analysis | | | |
|---|---|---|---|
| | Cross-Correlation | Lag-Period | $R^2$ |
| Income Proxy | 0.73 | 4 | 0.54 |
| Wages & Salaries | 0.83 | 2 | 0.72 |
| ECI Wages & Salaries[1] | 0.61 | 7 | N/A |
| Nominal Personal Income | 0.81 | 3 | 0.69 |
| Real Disposable Income | 0.78 | 2 | 0.65 |
| Real Disposable Income Per Capita | 0.79 | 2 | 0.66 |
| Income Expectations | 0.56 | -1 | 0.32 |

[1] ECI data are quarterly, so 7 indicates a 7-quarter lag.
   N/A indicates values excluded due to spurious correlations.

**Source: U.S. Dept. of Labor, U.S. Dept. of Commerce 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.[10]

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

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

Where

$\sigma_y$ is the standard deviation of $y_t$

$\sigma_z$ is the deviation of $z_t$

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

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