



## Recession Dating and Real-Time Data \*

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### Introduction

The NBER is the accepted dater of the start and end of recessions in the U.S. When recessions are called by the NBER, they are generally marked by a downward trend in the following variables: real sales in manufacturing and retail, real personal income, payroll employment, and industrial production (NBER 2003). As explained by Novak (2008), the NBER typically makes the call well after the peak of economic activity. The NBER bases this call on the data available at the time of its decision. But these indicators are revised over time. Indeed, these revisions can be substantial, and in some cases, they can significantly change the way we view a period of economic history. This has led to extensive study of data revisions in an attempt to better understand how data are revised (Croushore and Stark, 2000).

As economic growth slows, analysts often want to determine whether the data suggest that the economy is in a recession. They typically compare the current behavior of the monthly statistics the NBER considers with how these statistics behaved around known NBER recession dates. But when looking at current data for past recessions, these analyses use data that incorporate revisions made after the NBER dated the recessions, rather than the data as they looked at the time the NBER made the call. In contrast, the Federal Reserve Bank of Philadelphia's real-time data set allows us to compare current levels of these variables with their values as they were known at the time past recessions were dated.<sup>1</sup> This paper presents this analysis, which allows us to assess whether the current data resemble what the NBER has previously perceived as recessionary.

### Summary

Comparing data on the current period with data available at the time the NBER made recession calls, we find that the growth rates of industrial production and payroll employment since December 2007 are comparable to growth rates seen at the start of the past six recessions. Personal income growth has been stronger than the median and at the top of the range seen at the start of past recessions.

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\* The views expressed here are those of the author and do not necessarily reflect those of the Federal Reserve Bank of Philadelphia or of the Federal Reserve System. Calvin Price is a research analyst and can be contacted at [Calvin.Price@phil.frb.org](mailto:Calvin.Price@phil.frb.org).

<sup>1</sup> The real-time data set is available on the Philadelphia Fed's website at: <http://www.philadelphiafed.org/econ/forecast/real-time-data/index.cfm>.

## Analysis

To make the relevant comparisons of the variables used by the NBER, we need to collect data from historical real-time vintages; i.e., the data as they were known to the dating committee and unaffected by later revisions, as well as the latest available vintage (at the time of this writing, 2008:Q2). The Federal Reserve Bank of Philadelphia's real-time data set includes monthly data on payroll employment and industrial production. We also construct a proxy for real personal income, based on quarterly data for nominal personal income and the output price deflator, both of which are in the real-time data set.<sup>2</sup>

An examination of the last six recessions shows that, on average, NBER announcements of recession dates have been made seven months after the start of each recession. For example, in July 1980, the NBER announced that a recession had started in January 1980, and in April 1991, the NBER announced that a recession had started in July 1990. Thus, to approximate the same real-time viewpoint as the NBER, our data are taken from vintages seven months after each recession start date for employment and industrial production, and three quarters after for real personal income. For example, for the January 1980 recession, we use the 1980:M8 and 1980:Q4 vintages of data. Based on this real-time data we then look at each variable's growth around the past six recessions. For comparison, we also present growth as computed from the latest available data, which incorporate data revisions. These data are typically the ones used by analysts trying to evaluate whether current values resemble past recessionary values.

## Results

We examine three main questions:

- (1) Do the economic indicators (real personal income, payroll employment, and industrial production) suggest that the economy entered a recession in December 2007? That is, is the behavior of these indicators similar to their behavior at the time the NBER dated past recessions?
- (2) Do any of the three indicators, individually, tend to be revised in the same direction during different recession episodes?
- (3) Do all of the indicators, together, tend to be revised in the same way across different recessions?

### *Data Comparison*

Figures 1a-3b show the historical range of growth for each variable around the past six recessions. The historical median is also shown, with the current growth of the variable overlaid. Time period zero for the current growth path refers to December 2007. For each variable, the top graph is constructed using real-time data, and the bottom graph is constructed using current revised data.

For both industrial production and payroll employment, we find a pattern of growth that resembles the growth seen in past recessions. For each, the most recent observation is above the median over the past six recessions, but within the range of growth seen in past recessions. This is true for both the real-time and revised data.

Real personal income growth since December 2007 has been running above the median and at the top of the range seen in past recessions. The revised data (Figure 3b) suggest that it is well above this range; however, the real-time data (Figure 3a) show that growth is not that much higher than the NBER dating committee would have seen at the time it dated past recessions.

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<sup>2</sup> The NBER also considers real sales in manufacturing and trade. This variable is not in our real-time data set, so we omit it from our analysis. Also note that these variables are not the sole indicators used by the NBER and that the case of current growth of these variables matching growth in recessionary periods is not a guarantee of a current recession.

## *Data Revisions*

In dating recessions, the NBER dating committee is aware that data are revised, which is one reason the dating comes several months after the onset of the recession. Of interest is whether there is a consistent pattern to the revisions for any or all of the variables during starts of recessions. If so, this would be useful information for the dating committee. Figure 4 shows the results of examining the revisions to each variable in the six months prior to each recession start (the “pre-recession period”) and in the six months after the start of each recession (the “recession period”). We find that growth in industrial production tends to be revised down pre-recession and up in recession periods, while real personal income tends to be revised down both pre-recession and during recession periods. Payroll employment tends to be revised up in the pre-recession period, but there is no clear pattern of revision during the first six months of recessions.<sup>3</sup>

Also of interest is whether the pattern of revisions across the three variables, together, is consistent across multiple recessions. Here the evidence is more ambiguous. In periods of recession, there is no discernible pattern seen among all three variables taken together. For pre-recession periods, downward revisions for industrial production and real personal income along with upward revisions for payroll employment occurred in three of the six periods.

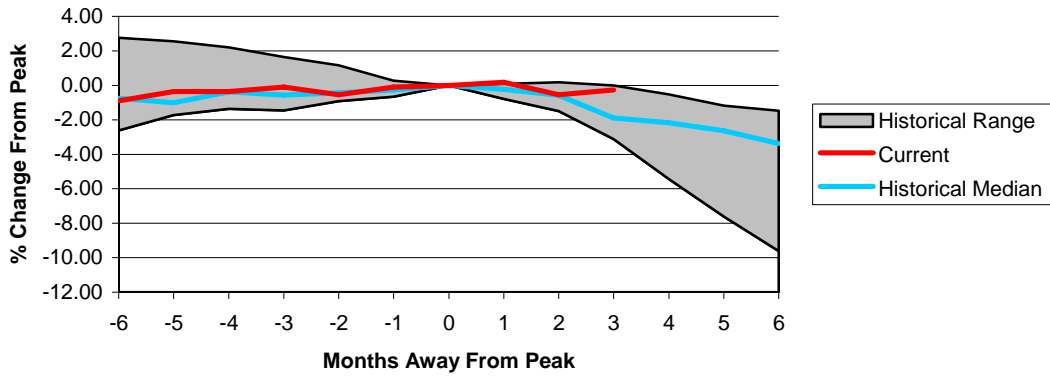
## **Summary and Conclusion**

This analysis considers whether the current values of industrial production growth, payroll employment growth, and real personal income growth — variables that are among those used by the NBER in dating recessions — are showing patterns similar to those seen at the time of past recession calls. In making this comparison, it is appropriate to use the values of these variables that were available to the dating committee when it made its call, rather than the data as they were subsequently revised. These real-time data are available in the Federal Reserve Bank of Philadelphia’s real-time data set. Our analysis suggests that the growth rates of industrial production and payroll employment since December 2007 have been similar to those seen at the start of the six past recessions, while real personal income growth has been somewhat stronger than that seen at the start of past recessions.

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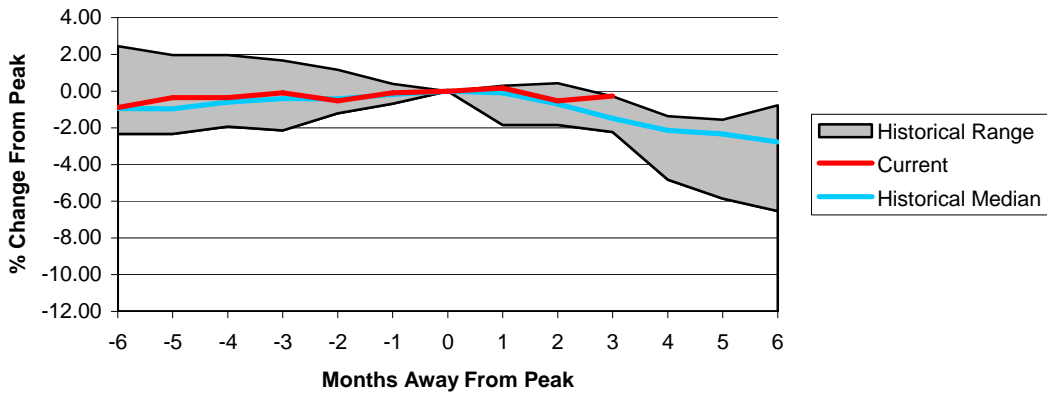
<sup>3</sup> Note that the signs shown for real personal income are based on only two observations. This makes it relatively easy, compared with the other variables, to view the entire pre-recession or recession period as having one-sided revisions.

Figure 1a. Growth of Industrial Production Around Recessions – Real-Time Data



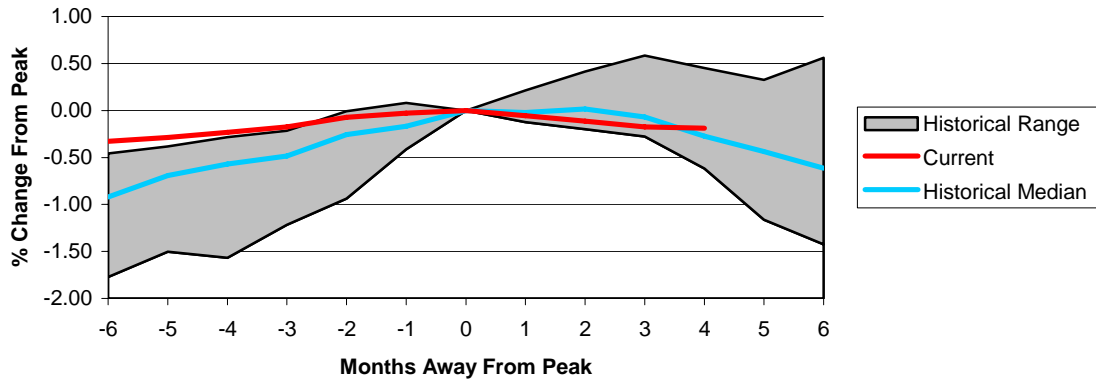
Note: Time period 0 for "Current" is December 2007.

Figure 1b. Growth of Industrial Production Around Recessions - Latest Vintage Data



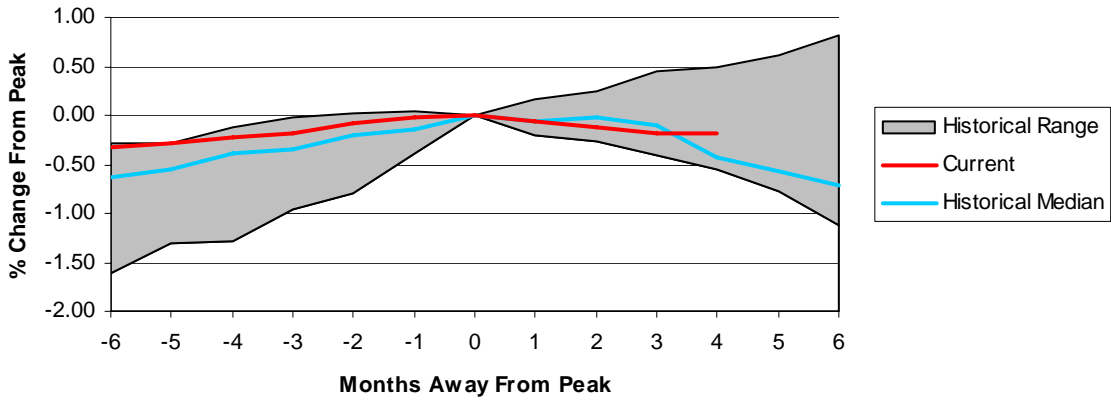
Note: Time period 0 for "Current" is December 2007.

Figure 2a. Growth of Nonfarm Payroll Employment Around Recessions – Real-Time Data



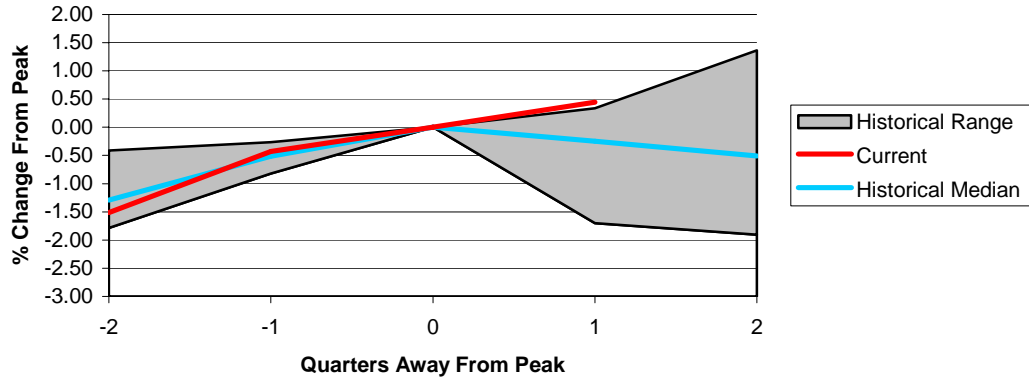
Note: Time period 0 for "Current" is December 2007.

Figure 2b. Growth of Nonfarm Payroll Employment Around Recessions – Latest Vintage Data



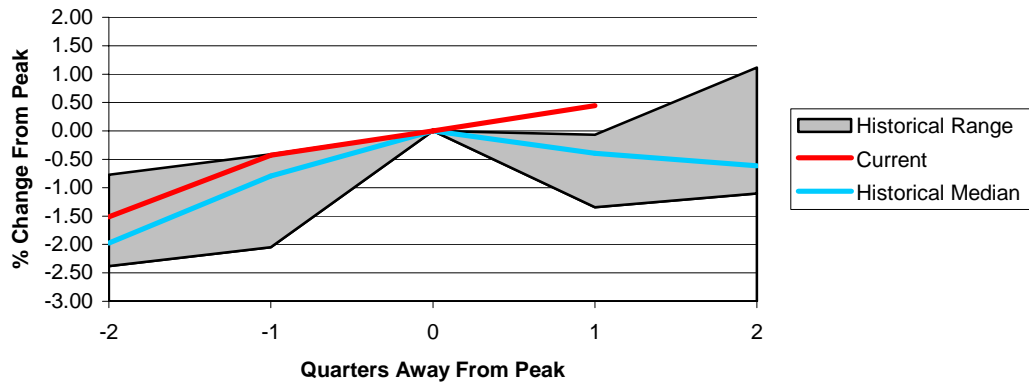
Note: Time period 0 for "Current" is December 2007.

Figure 3a. Growth of Real Personal Income Around Recessions – Real-Time Data



Note: Time period 0 for “Current” is fourth quarter 2007.

Figure 3b. Growth of Real Personal Income Around Recessions – Latest Vintage Data



Note: Time period 0 for “Current” is fourth quarter 2007.

Figure 4. Revisions to Growth, By Variable

Recession Year	Pre-Recession			Recession		
	Real Personal Income	Payroll Employment	IP	Real Personal Income	Payroll Employment	IP
2001	+	+	NC	-	-	NC
1990	-	+	+	-	NC	+
1981	-	+	-	-	-	+
1980	-	+	-	+	+	+
1973	-	+	-	+	+	+
1969	-	-	-	-	-	-

Note: This table reports the general direction of revisions made to the growth of the indicated variables. The periods considered are for the six months/two quarters prior to each recession peak (labeled "Pre-Recession"), and six months/two quarters after each recession peak (labeled "Recession"). A plus sign means the majority of revisions were upward; a minus sign means the majority of revisions were downward; and NC means there was no clear majority of upward or downward revisions or the revisions caused roughly no change in the variable's growth. Each sign for payroll employment and industrial production is based on six monthly observations, while each sign for real personal income is based on two quarterly observations.

## References

1. Croushore, Dean, and Tom Stark. "A Funny Thing Happened on the Way to the Data Bank: A Real-Time Data Set for Macroeconomists," Federal Reserve Bank of Philadelphia *Business Review* (September/October 2000).
2. Federal Reserve Bank of Philadelphia Real-Time Data Set, [www.philadelphiafed.org/econ/forecast/real-time-data/index.cfm](http://www.philadelphiafed.org/econ/forecast/real-time-data/index.cfm)
3. NBER. "The NBER's Recession Dating Procedure," October 21, 2003.  
<http://www.nber.org/cycles/recessions.html>
4. Novak, Jason. "Marking NBER Recessions with State Data," *Research Rap Special Report*, Federal Reserve Bank of Philadelphia (April 2008).