



Purchasing and supply managers provide early clues on the direction of the US economy: An application of a new market-timing test

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ARTICLE INFO

Article history:

Received 24 August 2012

Received in revised form 7 September 2013

Accepted 9 September 2013

Available online 16 September 2013

JEL classification:

C53

E17

E37

Keywords:

Directional analysis

Institute for Supply Management

Purchasing Managers' Index

Nonmanufacturing index

Survey data

ABSTRACT

We evaluate the directional accuracy of Institute for Supply Management (ISM) indices in predicting the direction of the US economy direction; to do so, we make use of a method developed by Pesaran and Timmermann (2009). By illustrating an application of the new market-timing test and extending it to a joint evaluation of increase/decrease and acceleration/deceleration, we show that while the ISM indices are useful predictors of industrial production and employment with regard to monthly economic activity and to business cycle expansion/recession, they are not useful predictors of real gross domestic product or hours worked. Our findings suggest that the ISM indices broadly provide early qualitative information on the US economy. Our findings also suggest that the importance of the nonmanufacturing sector becomes clear when examining business cycles in the U.S.

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1. Introduction

The Purchasing Managers' Index (PMI) is widely recognized as the earliest indicator of the US economy (e.g., Koenig, 2002; Sarte, 2010). The PMI is released for a given month on the first business day of the following month; it usually provides the earliest information on changes in the US economy's performance, which is customarily measured in terms of the gross domestic product (GDP).

Some studies show that the PMI is a good indicator of the entire US economy, as well as the index of industrial production (IP). Harris (1991) examines how well the PMI forecasts the GDP and IP; Koenig (2002) also discusses whether the PMI can accurately forecast the GDP and IP. Dasgupta and Lahiri (1992, 1993) show that the PMI can be used to forecast the GDP and business cycles. Kauffman (1999)² concludes that the PMI has many desirable qualities as an indicator of business and economic activity; he shows that there is a close relationship between the PMI and the federal funds rate, which is an instrument of monetary policy determined by the Federal Reserve's Federal Open Market Committee. Pelaez (2003a, b) also reveals that financial markets may react to changes in the PMI, partially from expectations that the Federal Reserve may change its policy stance. Lindsey and Pavur (2005) provide a regression model to forecast turning points for the index and anticipate changes in the general business cycle. Cho and Ogwang (2006) examine the weighting scheme of the index and find that the PMI series they offer outperforms those proposed in other studies. Sarte (2010) examines sector-based data and explains why diffusion indices successfully track business

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² This study also reviews and summarizes early PMI studies.

cycles. [Lahiri and Monokroussos \(2012\)](#) provide evidence that the PMI assists in improving the nowcasting of current-quarter US GDP growth when the new information becomes available at the beginning of the month.

Therefore, the PMI may provide valuable information about the qualitative conditions of an economy, including directions of change, such as an increase/decrease in or acceleration/deceleration of economic activity. Furthermore, we examine the nonmanufacturing index (NMI) of the Institute for Supply Management (ISM), given the current lack of investigation by researchers (exceptions include [Cho and Ogwang \(2007\)](#) and [Lahiri and Monokroussos \(2012\)](#)). The NMI is also examined because of the increasing presence of the nonmanufacturing sector in the economy. To investigate whether the PMI accurately predicts directions of change in monthly US economic activity, we use the nonparametric tests of directional change (hereafter, HM tests) proposed by [Henriksson and Merton \(1981\)](#).³ [Schnader and Stekler \(1990\)](#) applied this technique to the evaluation of macroeconomic forecasts,⁴ and directional analysis is now recognized as an increasingly popular metric in forecasting performance⁵ ([Pesaran & Timmermann, 2004](#)). Forecasts are considered useful if they predict the directions of change, that is, increase/decrease or acceleration/deceleration, better than a naïve model. In the literature, analysis of directional accuracy focuses on whether forecasts are useful; there has also been separate focus on the increase/decrease and acceleration/deceleration of direction in the existing literature. We focus on both directional changes to determine the usefulness of the indices. Furthermore, we extend the directional analysis to 4×4 cases by jointly evaluating both increase/decrease and acceleration/deceleration.

To measure economic activity, we use two series of monthly GDP, IP, employment, and hours worked. We also investigate the business cycle expansion/recession chronology of the National Bureau of Economic Research (NBER); this represents those economic activities as a whole. The literature on the relationship between the ISM series and GDP focuses on quarterly data, given the unavailability of an official monthly GDP series. Although the monthly GDP is not an official series, we use it to evaluate the usefulness of the ISM series, since it is crucial that policymakers and market participants have a simple and (to some extent) reliable indicator of monthly economic situations in a timely manner. In line with the literature, we examine whether the PMI forecasts are useful indicators of IP. Moreover, we focus on the usefulness of the ISM series on employment and hours worked in both the manufacturing and nonmanufacturing industries. The relationship between the ISM series and indicators of labor markets has been overlooked; our investigation fills this gap in the research. Since we focus on the directions of change, quantitative aspects are disregarded; focusing on qualitative information is also likely to mitigate a large degree of noise among the variables. Typically, the more frequent a time-series variable occurs, the greater the noise is; this impedes the ability to undertake analysis.⁶ We investigate directional accuracy with not only the latest available (historical) data, but also initially published (real-time) data, in line with [Tsuchiya \(2013b\)](#).

Although much attention has been paid to the empirical applications of HM tests to various forecasts, few studies have focused on the directional accuracy of forecasts by corporate managers. [Easaw and Heravi \(2004\)](#) and [Easaw, Garratt, and Heravi \(2005\)](#) examined the directional accuracy of consumer sentiment indices in the United Kingdom and the U.S. and found that HM tests are useful predictors of household consumption growth.

However, recent studies (e.g., [Chu, Lu, & Shi, 2009](#)) show that HM tests are vulnerable to serial correlation. In many cases, macroeconomic variables are subject to serial correlation; directional changes in forecasts or outcomes may also be serially correlated. To address this issue, we use a new test developed by [Pesaran and Timmermann \(2009\)](#) that has been rarely applied to macroeconomics. [Tsuchiya \(2013a\)](#) is one of the few exceptions to apply the new test to the forecasts of the International Monetary Fund and the Japanese government.

Illustrating the advantage of the new test in comparison to the tests used extensively in the literature, we show that while the ISM indices are useful predictors of IP, as is NBER's business cycle chronology, they are not useful predictors of real GDP or hours worked. Although most of the ISM series are not useful in predicting acceleration/deceleration in most economic variables, they are useful in predicting increase/decrease in most economic variables, and the joint evaluation of IP and employment shows the joint usefulness. Our findings suggest that the ISM indices broadly provide early qualitative information on the US economy, and that the importance of the nonmanufacturing sector has been present in examinations of business cycles in the U.S.

The PMI is available in advanced and emerging markets.⁷ Further analysis benefits policymakers and practitioners by providing valuable information about the economic activity in each country.

The remainder of this paper is organized as follows. [Section 2](#) describes the data obtained. [Section 3](#) introduces the statistical methods of directional analysis, while focusing on the newly proposed test. [Section 4](#) presents the results of a separate evaluation, and [Section 5](#) presents those of a joint evaluation. [Section 6](#) concludes the paper.

³ [Henriksson and Merton \(1981\)](#) focus on decision-making with financial assets. Additionally, in the finance literature (e.g., [Baghestani & Khallaf, 2012](#); [Chen, Chen, & Huang, 2013](#)), HM tests are called "market-timing tests," whereas in macroeconomic forecast evaluations, they are referred to as "directional analysis."

⁴ Please refer to [Ash, Smyth, and Heravi \(1998\)](#), [Ashiya \(2006\)](#), [Artis \(1996\)](#), [Baghestani \(2011\)](#), [Greer \(2003\)](#), [Joutz and Stekler \(2000\)](#), [Leitch and Tanner \(1995\)](#), [Pons \(2000\)](#), and [Sinclair et al. \(2010\)](#).

⁵ There is also a considerable volume of literature on the marginal predictive power of economic indicators; while this seems relevant to ISM indices, the issue extends beyond the scope of this study. The literature examines whether economic indicators are informative at the margin at the time of their release (e.g., [Koenig, 2002](#); [Lahiri & Monokroussos, 2012](#)).

⁶ Some smoothing techniques are standard in noise removal. Our approach can be considered another way of rectifying this issue. Monthly series are usually volatile, and the moving average is practically used to filter out transitory components in those series. We examined the variables in a centered three-month moving average, and obtained results broadly consistent with those in our main analysis; however, they are not reported here in order to conserve space. All test results not reported hereafter are available on request. This may suggest that directional analysis that focuses only on the direction of change mitigates the harm of transitory components in month-to-month variations in the variables. This is consistent with the finding of [Blaskowitz and Herwartz \(2011\)](#).

⁷ Outside the U.S., PMI is compiled and released by Markit Economics. See <http://www.markiteconomics.com/Survey/Page.mvc/AboutPMIData> for details.

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