Introducing the Philadelphia Fed Nonmanufacturing Survey

BY ELIF SEN

To assess the health of the economy, it sometimes helps to look beyond the numbers and listen directly to business managers. That is why the Federal Reserve Bank of Philadelphia and a handful of other regional Reserve Banks and private firms such as the Institute for Supply Management conduct a variety of monthly surveys of business activity. Such qualitative surveys offer the advantage of providing timelier insight into economic activity prior to the official monthly employment and quarterly gross domestic product data releases as well as insight into regional and local trends. And now economy-watchers have a new survey in their toolkits: To complement our Manufacturing Business Outlook Survey — the nation's oldest regional manufacturing survey — the Philadelphia Fed has introduced a survey of nonmanufacturing firms in Pennsylvania, New Jersey, and Delaware called the Federal Reserve Bank of Philadelphia Nonmanufacturing Business Outlook Survey.[1]

Surveys gather "soft" data in the form of responses from business owners, executives, and managers. These sometimes-subjective responses supplement or confirm the signals being sent by the hard numbers — say, the dollar value of exports or the average number of hours worked per employee — that economists use to measure the performance of a sector, region, or country.

Despite their qualitative nature, manufacturing survey results tend to be tightly correlated with overall economic conditions. This close relationship between movements in manufacturing survey results and movements in aggregate economic data means the survey results are closely watched not only by economic forecasters but also by investors and the news media. Although little research has been done on the correlation between nonmanufacturing surveys and the ups and downs of the overall economy, the long-term shift from manufacturing to services as the main driver of U.S. economic growth may make nonmanufacturing surveys increasingly valuable for gaining a fuller picture of the economy.

MANUFACTURING SURVEYS OFTEN TRACK THE ECONOMY

The value of manufacturing surveys. Manufacturing is cyclically sensitive, with activity rising during economic expansions and falling during contractions, so there is reason to believe that surveys of manufacturing activity can provide useful information for tracking the business cycle. As a result, manufacturing surveys have been widely used at the national and regional levels in this vein for quite some time. The national Institute for Supply Management (ISM) manufacturing survey has been in existence since 1948. Six Federal Reserve Banks produce regional manufacturing surveys. The Business Outlook Survey of local Third District manufacturers has been conducted by the Philadelphia Fed since 1968 and is the nation's oldest regional manufacturing survey.[2]

By preceding the releases of national economic data, the ISM survey can provide early insight into the state of the economy, which can be valuable information for forecasters formulating gross domestic product (GDP) predictions or for businesses deciding whether to expand. The monthly ISM manufacturing survey asks respondents to qualitatively assess the change in various business indicators and conditions, such as new orders or employ-

[1] Formerly named simply the Business Outlook Survey, our manufacturing survey is now formally called the Manufacturing Business Outlook Survey (MBOS) to differentiate it from our new Nonmanufacturing Business Outlook Survey (NBOS).

[2] The Federal Reserve Bank of Philadelphia serves the Third District, which comprises eastern Pennsylvania, southern New Jersey, and Delaware.

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ment, as better, worse, or the same. The results are released as diffusion indexes for each indicator, which the ISM calculates by adding the percentage of respondents reporting improvements (better) and half of the percentage of respondents reporting no changes (the same).[3] Values above 50 indicate expansion, while values below 50 indicate contraction. Results are released on the first business day of the month after the survey was conducted. More often than not, this day occurs before the first Friday of that month, which is when the Bureau of Labor Statistics usually releases national employment data. GDP data, on the other hand, are released quarterly, with the third estimate for a quarter made available near the end of the following quarter.[4]

Many researchers have shown that monthly national manufacturing surveys do provide value in explaining current-quarter economic activity. In his study, Evan Koenig found the ISM purchasing managers index, a composite of five subindexes, to be a useful indicator of economic activity and GDP growth.[5] Matthew Harris, Raymond Owens, and Pierre-Daniel Sarte found that the ISM national survey of purchasing managers at manufacturing firms tracks real-time GDP movements and can be used to forecast real (that is, inflation-adjusted) growth. More recently, Kajal Lahiri and George Monokroussos found that certain ISM indicators improved the accuracy of GDP "nowcasts" — that is, forecasts for the current quarter's GDP growth rate.

The value of regional manufacturing surveys. Regional Fed surveys have been found to provide useful information on their local economies. Leonard Nakamura and Michael Trebing found that the diffusion indexes from the Philadelphia Fed's survey of Third District manufacturers significantly predict changes in the Philadelphia Fed's state coincident indicators.[6] In some cases, these survey results also reflect national trends, boosting their usefulness as gauges of broader economic activity. Timothy Schiller and Trebing found the MBOS to be as accurate as national manufacturing surveys in predicting the monthly change in the U.S. industrial production index for manufacturing. This finding is particularly significant because the MBOS is released earlier than the national ISM survey, on the third Thursday of the month rather than the first business day of the following month, providing an even earlier clue about the state of the national economy despite the regional focus of the survey.

William Keeton and Michael Verba examined the relationship between the Federal Reserve Bank of Kansas City's Manufacturing Survey and national and regional conditions. Although they found that the Kansas City Fed's survey provided little additional information about national activity beyond that provided by the ISM survey, Keeton and Verba showed that the employment indexes from the Kansas City survey are useful indicators for current and future manufacturing employment in the 10th Federal Reserve District (consisting of Colorado, Kansas, Nebraska, Oklahoma, Wyoming, northern New Mexico, and western Missouri). Harris, Owens, and Sarte found that the monthly indexes published in the Federal Reserve Bank of Richmond's Survey of Manufacturing Activity are highly correlated with the ISM's. Richmond's regional manu-

[3] For example, if 20 percent of ISM survey respondents report that conditions are better, 70 percent report no change, and 10 percent report worse conditions, the diffusion index value would be 55 (20% + (1/2 × 70%)). The construction of these indexes can vary among institutions.

[4] In 2009, the Bureau of Economic Analysis ceased using the term "final" to designate the third of the three estimates it releases for a given quarter of GDP growth. Its first estimate remains known as the "advance" figure, after which come the "second" (formerly "preliminary") and "third" estimates, followed by comprehensive annual and multiyear revisions. See http://blog.bea.gov/tag/gdp-revisions/.

[5] The five subindexes are new orders, production, employment, supplier deliveries, and inventories.

[6] The MBOS diffusion indexes are calculated differently from the ISM diffusion indexes and represent the percentage of respondents reporting increases in activity less the percentage reporting decreases. If, for example, 20 percent of respondents report increases and 10 percent report decreases, the MBOS diffusion index value would be 10 (20% – 10%).

Follow Our New Survey

To more fully capture economic activity in the tristate region, the Federal Reserve Bank of Philadelphia has created the Nonmanufacturing Business Outlook Survey, with results posted monthly at http://philadelphiafed.org/nonmanufacturing-BOS/. This new monthly survey complements our monthly survey of factory activity, now called the Manufacturing Business Outlook Survey, http://philadelphiafed.org/manufacturing-BOS/. Visit www.philadelphiafed.org/newsroom/economic-release-calendar/ for the release schedule.

Participants in our surveys provide valuable feedback about regional conditions that Fed economists use in preparing their economic assessments for the Federal Open Market Committee, which conducts the nation's monetary policy. Nonmanufacturing firms in the Third District interested in participating in the new survey should contact Elif Sen at elif.sen@phil.frb.org or go to http://philadelphiafedresearch.org/surveyparticipationform.htm.

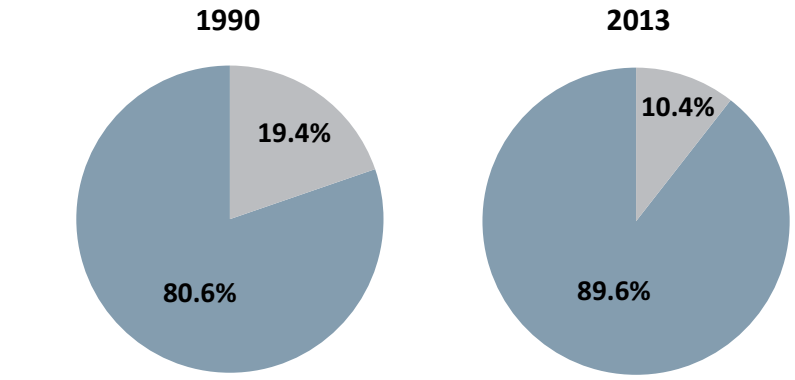
facturing index also showed a high correlation with personal income in the Fifth District (covering Maryland, Virginia, North and South Carolina, and most of West Virginia), and the employment index led changes in district manufacturing employment by one quarter.

Output and employment shift away from manufacturing. The markets and the news media pay a lot of attention to manufacturing surveys, both national and regional in scope, since these surveys provide valuable information on current economic conditions. To the extent that manufacturing is more cyclical than other sectors, manufacturing surveys remain helpful to economists in tracking the business cycle. However, the manufacturing sector also accounts for increasingly smaller shares of employment and output as the U.S. continues to shift toward a service economy. In 1990, nonmanufacturing businesses represented less than 81 percent of total national private nonfarm employment, and the manufacturing sector represented 19 percent, on average (Figure 1).[7] By 2013, the share of manufacturing employment had fallen 9 percentage points, to roughly 10 percent, as the nonmanufacturing share had grown to nearly 90 percent. As we will see, our regional economy has also shifted toward nonmanufacturing.

Because of this trend, it is reasonable to assume that nonmanufacturing or service sector surveys can help provide a more complete picture of economic activity. Acknowledging this, in 1998 the ISM began publishing a monthly survey of nonmanufacturing purchasing managers to complement its manufacturing survey. Other Federal Reserve Banks also publish nonmanufacturing survey results.[8]

FIGURE 1

Distribution of U.S. Employment



Sources: Bureau of Labor Statistics; author's calculations.

NONMANUFACTURING SURVEYS HAVE VALUE

The monthly ISM nonmanufacturing survey is released a few days after the release of the ISM manufacturing survey. The nonmanufacturing survey asks questions similar to those of its manufacturing counterpart; questions cover changes (increase, decrease, or no change) in business activity, new orders, employment, supplier deliveries, prices, inventory change and sentiment, backlog of orders, export orders, and imports. As it does with the manufacturing survey, the ISM calculates a diffusion index for each category and a composite nonmanufacturing index, which is composed of four equally weighted diffusion indexes: business activity, new orders, employment, and supplier deliveries.

Unlike the case with the manufacturing survey, little research has been done on the relationship between the nonmanufacturing survey indexes and national aggregate economic data, partly because the nonmanufacturing series is much newer than the manufacturing data. However, limited research does suggest that the ISM nonmanufacturing survey provides valuable information about the current state of the economy. Lahiri and Monokroussos found that current-quarter nowcasts of GDP using ISM nonmanufacturing information are as good as or better than nowcasts of GDP using composite index data from the ISM manufacturing survey.

Let's examine the relationship between aggregate economic data, mea-

[7] Nonmanufacturing sectors include construction, natural resources, and mining; trade, transportation, and utilities; information services; financial activities; professional and business services; education and health services; leisure and hospitality services; and other services.

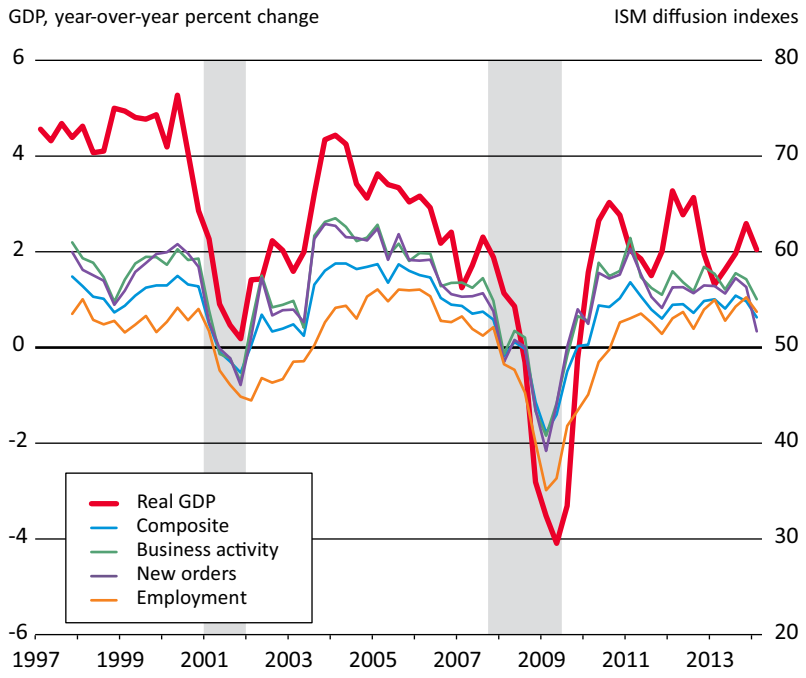
[8] The Dallas Fed publishes the Texas Service Sector Outlook Survey, and the Richmond Fed publishes the Fifth District Survey of Service Sector Activity. In January 2014, the New York Fed began publishing the Business Leaders Survey.

sured by real GDP, and corresponding ISM nonmanufacturing survey indexes. The more closely the ISM nonmanufacturing indexes track with the business cycle, the more useful they are as indicators of economic activity. Figure 2 shows the relationship between GDP growth and selected indexes from the ISM nonmanufacturing survey. The graph plots the year-over-year change in quarterly real GDP on the left vertical axis against the four nonmanufacturing survey indexes on the right vertical axis.[9] The ISM nonmanufacturing composite index, shown in blue, tracks with GDP growth, shown in red, particularly between 2001 and 2006. The ISM nonmanufacturing composite index also indicates a recession (index values below 50) during 2008 and 2009. Real GDP decreased roughly 4.3 percent from its peak in the fourth quarter of 2007 to its trough in the second quarter of 2009; in a similar period, the quarterly nonmanufacturing composite index fell 12.6 points, to a historical low of 41.1.[10] Similar patterns are evident between real GDP growth and the ISM nonmanufacturing indexes for business activity, new orders, and employment.

Table 1 shows the cross-correlations between annual GDP growth and the various indexes of the ISM nonmanufacturing survey as a way to quantify the relationship at different times. A correlation value closer to 1 indicates a stronger relationship between the two measures and that

FIGURE 2

ISM Nonmanufacturing Indexes Track GDP



Note: The ISM expansion/contraction threshold is 50.
Sources: Institute for Supply Management; Bureau of Economic Analysis.

they move in the same direction. The table includes lags and leads of the survey data, measured in quarters, and the largest correlation for each index is in bold. For instance, the first column of Table 1 shows the correlations between the annual GDP growth rate in a given quarter and the composite ISM nonmanufacturing index value from the same quarter as well as the index values from preceding and subsequent quarters. The current-quarter composite index value is more tightly correlated with annual GDP (0.8603) than is the prior quarter's composite index value (0.7994).

The ISM nonmanufacturing indexes are highly correlated with GDP growth, particularly in the quarters immediately before, during, and after a given quarter of GDP.[11] The highest correlations occur concurrently for each index. This may indicate that the ISM nonmanufacturing indexes offer little advance insight into economic activity in future quarters, thus limiting their predictive power. Yet, the indexes may provide valuable insight into the revised GDP values for a given quarter. As Harris, Owens, and Sarte point out in a similar analysis focusing on the ISM manufacturing indexes,

[9] The ISM nonmanufacturing indexes (NMI), which are monthly, were converted to quarterly observations using the following formula to calculate quarterly weighted averages, per the article by Koenig:
nmi(t) = (1/9)NMI(t-1,2) + (2/9)NMI(t-1,3) + (3/9)NMI(t,1) + (2/9)NMI(t,2) + (1/9)NMI(t,3), where NMI(t,i) is the level of the NMI in the *i*th month of quarter *t*.

[10] Peak and trough quarterly readings of the ISM nonmanufacturing index occurred in the third quarter of 2007 and the first quarter of 2009, respectively.

[11] Interestingly, over the same period, the correlations between GDP growth and similar ISM manufacturing survey indexes (composite, new orders, and employment) are weaker than the correlations with the nonmanufacturing survey indexes. The average of the highest correlation for each of the three manufacturing indexes is 0.6420, compared with 0.8344 for their nonmanufacturing counterparts. This result could indicate that although the manufacturing indexes have been shown to be cyclical, they are potentially noisier than the nonmanufacturing indexes in this period.

it is important to bear in mind that these correlations use revised GDP data, which are not released until after the end of each quarter. On average, the ISM data are available one month earlier.[12] Table 2 shows similar cross-correlations between the ISM nonmanufacturing indexes and real-time annual GDP growth at the time of initial release.[13] The correlations between the nonmanufacturing indexes and real-time GDP growth are smaller than those between the indexes and revised GDP growth. These results and the timing of the GDP data releases suggest that the ISM nonmanufacturing indexes provide more useful information in real time about revised GDP figures — which are more accurate because they incorporate additional incoming data — than they do about the initial figures.

Drawbacks to nonmanufacturing surveys. The ISM nonmanufacturing survey is much younger than the

[12] Data used in this article are current as of the second estimate of first quarter 2014 GDP, released May 29, 2014.

[13] Initial release data for real GDP were obtained from the Philadelphia Fed's Real-Time Data Research Center.

TABLE 1

Cross-Correlation of GDP with Nonmanufacturing ISM

Revised annual GDP growth rates and nonmanufacturing index values, 1997Q4–2014Q1

	Composite	Business activity	New orders	Employment
3-quarter lag	0.4767	0.5047	0.5177	0.3803
2-quarter lag	0.6592	0.6769	0.6929	0.5722
1-quarter lag	0.7994	0.7938	0.8064	0.7277
Current quarter	**0.8603**	**0.8332**	**0.8285**	**0.8145**
1-quarter lead	0.8035	0.7386	0.7309	0.8130
2-quarter lead	0.6644	0.5711	0.5628	0.7239
3-quarter lead	0.4931	0.3849	0.3861	0.5862

Sources: Institute for Supply Management; Bureau of Economic Analysis.

TABLE 2

Cross-Correlation of GDP with Nonmanufacturing ISM

Initial annual GDP growth rates and nonmanufacturing index values, 1997Q4–2014Q1

	Composite	Business activity	New orders	Employment
3-quarter lag	0.4516	0.4758	0.4980	0.3456
2-quarter lag	0.6753	0.6930	0.7189	0.5504
1-quarter lag	0.8239	**0.8152**	**0.8395**	0.7090
Current quarter	**0.8447**	0.8077	0.8127	**0.7739**
1-quarter lead	0.7417	0.6716	0.6642	0.7309
2-quarter lead	0.5630	0.4666	0.4589	0.6170
3-quarter lead	0.3849	0.2768	0.2873	0.4764

Sources: Institute for Supply Management; Bureau of Economic Analysis.

ISM manufacturing survey (by about 50 years), making its usefulness as an indicator of overall economic activity more difficult to evaluate. The longer the time series, the better the understanding researchers will have of the relationship between the survey results and aggregate economic data, as well as any seasonality — predictable movements tied to the time of year — in the data. Additionally, unlike the manufacturing sector, the service sector is less cyclical and so may not signal turning points as strongly. This may be due to the size and diversity of the service sector: Signals from data on a firm that provides services that are sensitive to business cycles may be muted by data from another firm that is less sensitive to the business cycle.

Federal Reserve Bank nonmanufacturing surveys. Despite these potential shortcomings, some Federal Reserve Banks see the value in nonmanufacturing surveys. The Dallas Fed began collecting data in 2007 and started publishing results for the Texas Service Sector Outlook Survey in 2011. Recent research by Jesus Cañas and Emily Kerr found that the survey indexes are a good fit for explaining service sector employment, retail industry employment, and retail sales in Texas. Richmond's Fifth District Service Sector Survey of Business Activity dates back to November 1993, and its service sector index of revenues moves with the ISM nonmanufacturing business activity index in a similar pattern, according to Robert Schnorbus and Aileen Watson.

How well do these regional indexes move with a national index? Table 3 shows the correlations between the seasonally adjusted monthly Federal Reserve regional nonmanufacturing indexes and the ISM composite nonmanufacturing activity index, as well as the dates of coverage for each survey. Both the Dallas Fed's general business activity index and the Richmond Fed's revenues index are positively and strongly correlated with the nonmanufacturing ISM, with correlations above 0.75.[14]

A NEW PHILADELPHIA FED SURVEY

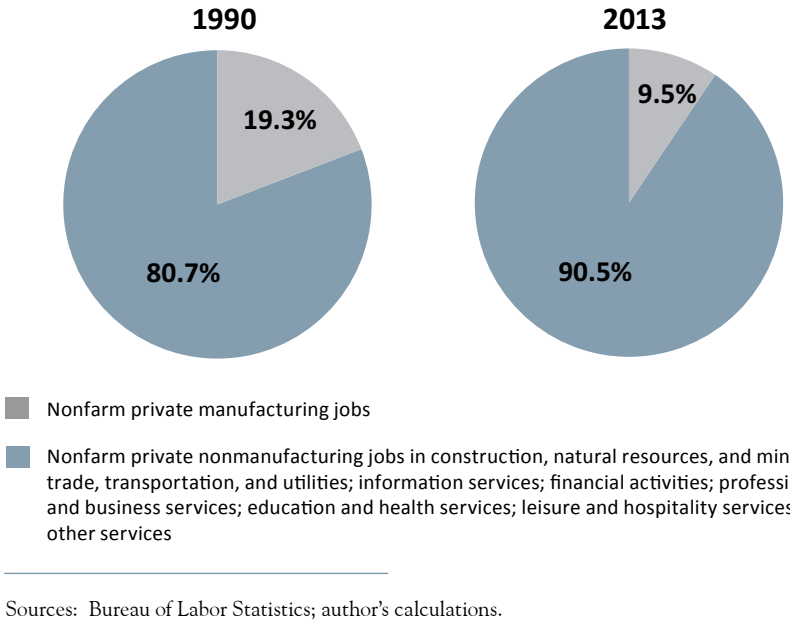
The shift away from manufacturing toward services is slightly more pronounced in our region compared with the nation. The three states in the Third District — Pennsylvania, New Jersey, and Delaware — had a higher share of employment in the service sector from 1990 to 2013. The share of total private nonfarm employment in the manufacturing sector fell roughly 10 percentage points in that period, from 19.3 percent to 9.5 percent, as shown in Figure 3. In 2013, nonmanufacturing sectors represented 90.5 percent of total private nonfarm employment in the three-state region, up from 80.7 percent in 1990.

The Philadelphia Fed recently developed the Nonmanufacturing Business Outlook Survey to complement its manufacturing survey and more fully capture economic activity in the Third District. The survey asks respondents to categorize the change from the previous month to the current month in general business activity as well as 12 specific indicators as higher, lower, or the same. Respondents also provide their assessment of general business conditions over the next six months. As with our manufacturing survey, the diffusion indexes for our nonmanufacturing survey represent the percentage of firms reporting increases minus the percentage reporting decreases. Values above zero indicate expansion, and those below zero indicate contraction. All nonmanufacturing sectors except natural resources and mining are represented among the respondents, with

[14] The Richmond Fed's survey does not include a general business activity index, so the revenues index was used instead.

FIGURE 3

Distribution of Third District States' Employment



Sources: Bureau of Labor Statistics; author's calculations.

TABLE 3

Cross-Correlation of Regional Fed Indexes with Nonmanufacturing ISM

	Coverage	Correlation
Dallas general business activity index	January 2007–May 2014	0.8564
Richmond revenues index	July 1997–May 2014	0.7572

Note: Data are seasonally adjusted.

TABLE 4

Cross-Correlation of Regional Fed Indexes with Nonmanufacturing ISM

March 2011–May 2014	
Philadelphia general activity index (region)	0.5364
Philadelphia general activity index (firm level)	0.5855
Dallas general business activity index	0.6343
Richmond revenues index	0.5847

Note: Data are not seasonally adjusted.

greater representation from the professional and business services, financial activities, and health and education services sectors. Survey participants include company presidents, CEOs, CFOs, managers, and partners. Table 4 includes correlations of two measures of general activity from the new survey with the ISM composite nonmanufacturing index.[15] The Philadelphia nonmanufacturing indexes are not seasonally adjusted because of an insufficient number of observations; therefore, for consistency, these correlations use an unadjusted ISM composite series.[16] It is important to note that the results shown here are preliminary and are based on a small sample of respondents. Though preliminary, the results are promising: The nascent indexes are positively correlated with the ISM nonmanufacturing composite, with a correlation of 0.5364 for the index of general activity in the region and 0.5855 for the index of general activity at the firm level. For comparison, Table 4 also includes the correlations for the nonseasonally adjusted Dallas and Richmond indexes with the ISM nonmanufacturing composite index over the same time frame. The correlations for the Philadelphia indexes are comparable to those for the established indexes.

[15] The Philadelphia Fed indexes begin in March 2011.

[16] A nonseasonally adjusted series for the ISM nonmanufacturing index was constructed using the formula for the construction of the seasonally adjusted nonmanufacturing index series: a weighted average of the nonseasonally adjusted business activity, new orders, employment, and supplier deliveries indexes, with each component equally weighted at 25 percent.

CONCLUSION

Although U.S. nonmanufacturing is generally not as cyclically sensitive as manufacturing, nonmanufacturing firms make up a growing share of the U.S. economy in terms of both GDP and employment. Nonmanufacturing indexes are highly correlated with national economic data. Useful information can be gleaned from survey data focusing on the service sector to complement the information from national and regional manufacturing surveys. Since activity can vary from region to region, it is also important to develop a regional nonmanufacturing survey to better capture a significant portion of the Third District's economy. Accordingly, the Philadelphia Fed has launched a monthly survey of nonmanufacturing activity in the Third District.

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