



An Experimental Index for the *Business Outlook Survey*: Some Preliminary Findings*

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The Philadelphia Fed's *Business Outlook Survey* (BOS) receives considerable attention because it is viewed as both a regional and a national indicator of the manufacturing sector. The value of the survey as an important indicator is due, no doubt, to its unusual longevity (conducted monthly since 1968) and to the fact that manufacturing remains quite sensitive to shifts in overall economic activity. Several studies have shown that the survey's indexes are useful in quantitatively estimating how the manufacturing sector is doing along a variety of dimensions. These studies have been reported in the Philadelphia Fed's *Business Review* and other *Research Rap Special Reports*. This special report presents the preliminary results of a project in which we constructed a limited panel data set from survey responses to evaluate issues such as selecting the sample, monitoring reporting behavior, and evaluating alternative weighting schemes. Improving the survey's usefulness by constructing experimental indexes was a byproduct of this ongoing effort to enhance the statistical sample and general utility of the survey. Those results are summarized here. The work involving the construction of an experimental index, which is not yet ready for public release, is also described.

Overview of Survey and Diffusion Indexes

The BOS is a form of business survey that has often been referred to, especially outside the U.S., as a business "tendency survey."¹ The BOS consists of a number of qualitative questions about business processes among manufacturing firms in the Third Federal Reserve District.² The survey's monthly questionnaire asks participants two sets of questions on 10 measures of business: general activity, shipments, new orders, unfilled orders, delivery times, inventories, prices paid, prices received, employment, and work

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¹ See OECD (2003).

hours. The first set of questions pertains to the current pace of business at the participant's plant. The participant is asked to indicate whether each measure has increased, decreased, or remained the same as it was the month before. The second set of questions addresses expectations for future business activity, that is, whether they expect each measure to be higher, lower, or about the same over the next six months.

To gauge how widespread the changes are among firms, we calculate a diffusion index for each of the indicators. For each question, we first calculate the percentages of firms reporting increases, decreases, and no change. Then we create a diffusion index by subtracting the percentage decrease from the percentage increase. The resulting diffusion index can vary from +100 if all firms report an increase, to -100 if all firms report a decrease. The midpoint is 0: the percentage of firms reporting increases equals the percentage reporting decreases. Responses have never been unanimous, so the diffusion indexes take on a value between -100 and +100. The closer the index is to either of these two extremes, the more diffuse, or widespread, is the change (either decrease or increase).

The use of diffusion indexes is common for these kinds of business surveys. For example, similar surveys are being conducted in the manufacturing sector by the Federal Reserve Districts of New York, Richmond, Dallas, and Kansas City, and each District produces monthly diffusion indexes. The Institute of Supply Management (ISM) also publishes a closely watched index for the manufacturing sector based on very similar questions. The ISM's Purchasing Managers Index (PMI) is computed differently, however. Instead of subtracting the percentage decrease from the percentage increase, the ISM forms its PMI index by adding one-half of the percentage of firms reporting no change to the percentage reporting an increase. As a result, the PMI can vary from 0 to 100, with 50 being the midpoint. Another difference among the surveys is that the general activity index for the BOS is calculated based on a separate question that measures manufacturers' assessments of overall business conditions; in the other surveys, the overall index is a composite of indexes for specific questions.

Surveys of change have several advantages compared with other methods of gathering economic statistics. They are usually less intrusive and easier for firms to fill in, since they do not require specific numbers but only an indication of an increase, decrease, or no change. This contributes to a better response rate among the firms surveyed and allows a quicker compilation of results compared with other types of surveys that involve more detailed questions. The BOS for the current month is always released on the third Thursday of that month. Therefore, by the time the official government data for a given month are released (for example, industrial production, manufacturing employment, shipments and new orders), the BOS has already been published for that month and in some cases for the month that follows.

In summary, these types of surveys offer a low-cost means of data collection that can be made quickly available, and the diffusion indexes based on these surveys reflect how changes in economic

² The Third Federal Reserve District includes the eastern two-thirds of Pennsylvania, southern New Jersey, and Delaware.

conditions actually develop, as the spread between the percentage of firms reporting increases and decreases widens. All of these factors contribute to the success of these surveys in evaluating economic conditions and in forecasting trends.

A Same Reporter Hybrid Index: T2

This special report focuses on the preliminary results from constructing an experimental BOS index based on a panel data set consisting of monthly observations of individual respondents for the period 2002 to present. Because participants are not compelled to respond to the survey, firms' participation varies from month to month. During this nearly 10-year period we have maintained the unique identifiers for reporting institutions, along with each firm's associated structural information (industry, business type, and location) as well as each firm's monthly reported data. This data set enables us to track an individual firm's participation over time. Additionally, we can monitor the influence of reporting behavior on the published indexes. The panel data also allow us to determine if a particular movement in the published index can be attributed to special factors, such as new respondents in a given month or a shift in industry mix. Thus, the impact and potential bias of firms' exit and entry into the respondent pool can be gauged over time. Moreover, construction of alternative indexes might prove useful in evaluating the choice of past and future respondent panels and may shed light on the importance of maintaining a consistent, representative sample of adequate size.

To these ends, one of our experiments was to construct a diffusion index based entirely on respondents that submitted reports in the previous month. We refer to this new index as T2, because it was compiled using only the respondents that answered the survey in two consecutive months. Therefore, for each time period, we constructed the usual set of increase, decrease, and no change percentages for the actual reporters and calculated a diffusion index. We followed the same process for the subset of firms that had also reported in both the current and previous month.

We are aware of only one survey that has used a similar approach to the one we chose here. Intuit, which publishes the Intuit small business employment index, controls for changes in the composition of its payroll customer base from month to month.³ That is, since its set of customers changes each month, its customer index is constructed so "the measurement is the change, for each pair of months, for customers who are present in both the earlier and the later month."

Our experimental T2 index is depicted in the chart 1, which plots the published BOS general activity index against the new T2 index. Descriptive statistics are provided in the table. On average, 77 percent of the firms reported in two consecutive surveys each month over the 10-year period. One very interesting and useful result was that the material declines exhibited by the BOS indexes this past summer were nearly identical using the T2 hybrid index. Another result was that the average **levels** of the two indexes over the

³ See the Intuit Small Business Employment Index Whitepaper.

nearly 10-year period were almost identical, as were their corresponding standard deviations. While the average diffusion index level differs little from the published index, the chart suggests that the hybrid T2 series is somewhat more volatile in **month-to-month changes**. Indeed, while the average monthly differences are nearly the same, the standard deviations were notably higher for the T2 index. This was true whether we used the seasonal factors for the existing published indexes or created new seasonal adjustments for the hybrid T2 series. The standard deviation is 9.4 for the published BOS general activity index, 11.2 for the series seasonally adjusted using the published seasonal adjustment, and 11.6 with a new X-11 seasonal adjustment.

At present, the Philadelphia Fed is using the T2 index as a check on whether changes in the sample might be affecting the level of the diffusion index. Until we have a longer data set spanning multiple business cycles (periods of data before we had more complete tracking through use of identifiers), we do not believe we have sufficient data to use T2 or other indexes for estimation purposes.

Nevertheless, we may ask whether the volatile index noticeably worsens our ability to estimate the current state of manufacturing. If it did so consistently, it might not make sense to use the T2 index as an internal check on the validity of certain data points. Using regression models, we get quite mixed results.⁴ In two cases, our estimation is improved (albeit only slightly), but in three cases, it is not. This suggests that this particular methodology is unlikely to improve forecasts over the long run, but on the other hand, it is useful to compute such indexes as a check of validity on any given index point.

Summary

Using a new panel data set for the BOS, we constructed a set of alternative indexes based on two-month repeat respondents. The alternative indexes exhibited similar cyclical characteristics and were, on average, quite close to our published BOS indexes. The approach, while heuristic, does suggest that information contained in a panel data set based on BOS history could prove useful for creating similar experimental indexes that use information about shifting reporting behavior as well as weighting by industry and size.

We plan to continue to expand the scope of the panel data and to make explorations like the ones presented here. The construction of the alternative indexes summarized here, although not yet ready for public release, have been useful in interpreting month-to-month survey results and should enhance our thinking about the survey with regard to improving panel selection and considering firms' reporting behavior.

⁴ Autoregressions of the forms presented in Trebing and Schiller (2003) and Nakamura and Trebing (2008) were employed to forecast monthly changes in U.S. industrial production (total index and for manufacturing, shipments, new orders and employment). These regressions used the published BOS indexes as independent variables, then results were compared when using their T2 equivalents.

References

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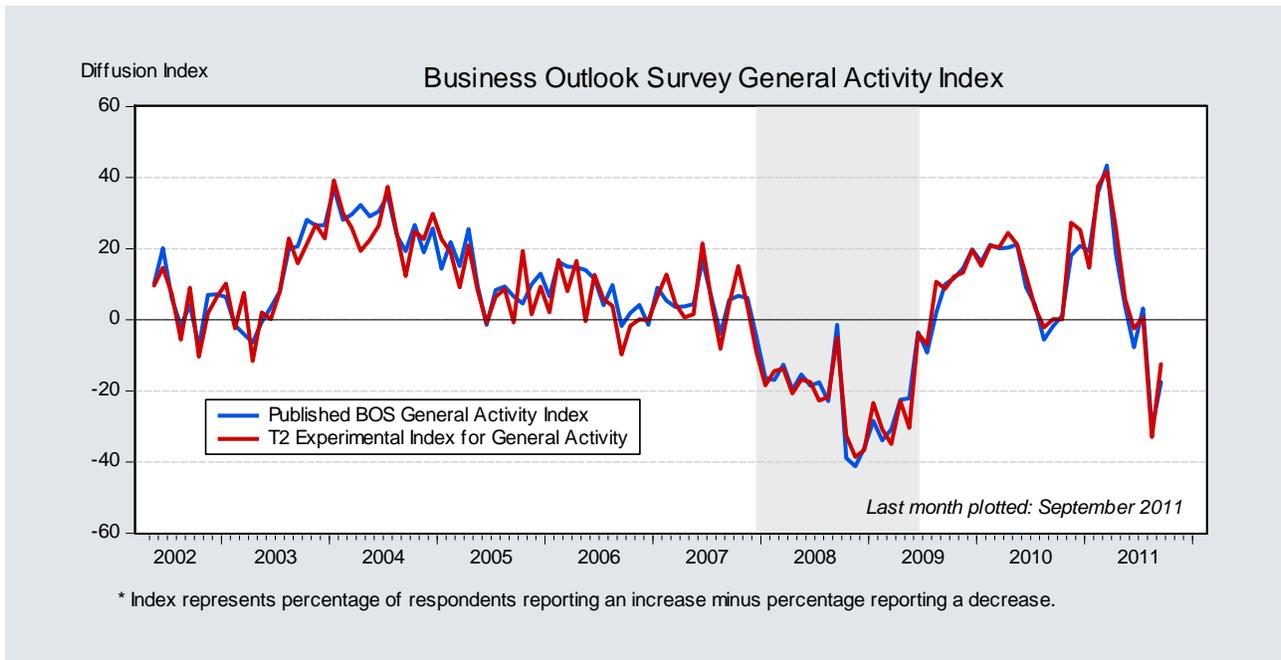
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Chart



Table

Descriptive Statistics for Experimental Diffusion Index T2 and Published Current Activity Index (2002-2011)						
	Index Average (SA)	Index Standard Deviation	Average Difference from Published BOS	Maximum Positive Value	Maximum Negative Value	Avg. Share of Sample
BOS Activity Index (Published)	5.9	17.4	-	43.4	-41.2	100%
BOS T2 Index	5.4	17.3	-0.49	41.7	-39.8	77.3