
Interpreting Business Sentiment Surveys: A Factor Analysis Approach

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This paper explores the information contained in a business sentiment survey conducted for a medium-sized, regional, Midwestern economy. We apply factor analysis techniques to the data in an effort to determine how firm expectations about local economic performance, firm performance, selling prices, labor, and capital are related to the formation of business sentiment. We find that expectations about overall firm performance, planned capital expenditures, and hiring plans proxy for a single, latent process while expectations about average selling prices and local economic performance represent a second latent phenomenon.

Sentiment indices are widely believed to contain predictive content on the performance of the macro economy. Empirical support for this belief is provided by research findings, which suggest that sentiment measures contain information about future changes in the economy beyond what is contained in past values of other available indicators (Potter, 1999). Interestingly, although business sentiment measures have a longer history than consumer sentiment indices, much of the empirical research on the predictive content of sentiment indices centers on consumer sentiment (Carroll, Fuhrer, and Wilcox, 1994; Batchelor and Dua, 1998; Bram and Ludvigson, 1998; Eppright, Arguea, and Huth, 1998; Howrey, 2001). However, recent research suggesting that business sentiment indices may outperform consumer sentiment indicators in predicting business cycle fluctuations has prompted renewed interest in business sentiment measures (Yew-Kuang, 1992; Bodo, Golinelli, and Parigi, 2000; McNabb and Taylor, 2000; Dunkelberg and Dennis, 2003).

Carroll, Fuhrer and Wilcox (1994) posit two possible explanations for the predictive content of sentiment indices. The first is that these indices represent independent determinants of key macroeconomic variables, while the second is that they foreshadow the overall outlook of the economy. According to the first explanation, changes in sentiment *cause* fluctuations in the economy. In the case of the second explanation, when economic agents are optimistic they provide positive responses about the economy, and their sentiment broadly reflects the overall state of the economy. However, it is not necessarily a causal relationship.

In reality, the explanation for the predictive content of sentiment indices is very likely a combination of these, or related, ideas. Carroll, Fuhrer and Wilcox (1994), for example, found that neither the simple habit formation model nor the precautionary savings model could individually explain why consumer sentiment accurately predicts household spending. However, they argue that a combination of these two models can be used to explain the predictive content of consumer sentiment. Regardless of which combination of models or rationale are used to explain the formations of business and consumer sentiment, the consensus of the literature is that consumers and producers likely form their expectations based on a set of criteria that remains latent, or unobserved, by the business researcher (Carroll, Fuhrer and Wilcox, 1994; Cotsomitis and Kwan, 2005; and Dunn and Mirzaie, 2006). These underlying factors represent one or more of the determinants of the current state of economic conditions. Identification of these unobserved factors, which are proxied by sentiment indices, consequently becomes of paramount concern.

Although researchers do not fully understand the rationale behind the predictive content of sentiment surveys, the fact that they do predict economic fluctuations has made their use widespread. There are a large number of sentiment surveys currently being administered, many of which are conducted by government agencies (such as the Federal Reserve Bank of New York), academic universities (including the University of Michigan, the University of Florida and the Ohio State University), or by industry associations, including the National Federation of Independent Business (Deitz and Steindel, 2005; Dun and Mirzaie, 2006). Once these organizations

collect and audit the survey responses, the data or its summary statistics are usually made a part of the public domain. As such, the intent of these surveys is to provide academics, policy makers and business owners with information that cannot be obtained from other sources, including government statistics. Thus, this information is highly valuable to many economic decision-makers.

Several features make the information contained in sentiment surveys unique and useful to decision-makers. First, many sentiment surveys are often conducted on a sub-annual (often a monthly or quarterly) basis (Vuchelen, 2004; Deitz and Steindel, 2005; Dun and Mirzaie, 2006). This information not only reaches economic decision makers quickly (often within a matter of weeks from the time of data collection), but the frequency of survey administration provides information about short-run business cycles not often found in other sources.

Second, sentiment surveys may target a very wide population (for example, an entire country or group of countries) or a very small region within a particular country (usually a State, Province, or metropolitan area). Holding the size of the country or economy constant, surveys may also focus on a wide array of industries, or one industry within an economy. Manufacturing industries, in particular, have received significant attention from business sentiment researchers (Deitz and Steindel, 2005; Dun and Mirzaie, 2006).

The third advantage of sentiment surveys is that questions in a given survey can ask respondents for expectations about different segments or markets within an economy. For example, a sentiment survey targeting small business owners may ask about managers' sentiment concerning capital markets, labor markets, output markets, and general economic activity, both for the firm and for the economy as a whole. Thus, such surveys contain unique predictive content for both the macro-economy and the micro-foundations of that economy.

Unfortunately, the factors that provide unique information in sentiment surveys also create a number of drawbacks. Most notably, because economies differ in industry composition, natural resource endowments and government regulation, there will be differences across these economies in terms of their growth and response to government policies and other exogenous shocks. Therefore, the formation of business sentiment will also vary across each of these economies (Dunn and Mirzaie, 2006). Thus, even if researchers are able to deduce the latent rationale behind the formation of business sentiment, that logic may not be transferable to other economies. Additionally, if the sentiment survey asks questions about expectations for a particular market within an economy, the means by which those market specific sentiments translate into aggregate macroeconomic sentiment will vary from one economy to the next.

This last point, however, provides a potential starting point not only to investigate the latent rationale underlying the formation of business sentiment, but also to gain insight into how differences in sentiment are related across economies. In particular, by examining the relationship between specific micro-economic expectations and those for the overall economy, it is possible to gain insights into whether consumers and producers view specific markets or aspects of production as more important to economic success than other factors. Moreover, this added

knowledge gives researchers a stronger basis on which to compare the formation of business sentiment across economies.

The purpose of this paper is to explore the information contained in a business sentiment survey conducted for a medium-sized, Midwestern economy.¹ We apply factor analysis techniques to data obtained from a quarterly business outlook survey from December 2003 to September 2004 in order to determine how firm expectations about local economic performance, firm performance, selling prices, labor, and capital are related to the formation of business sentiment. We find that expectations about overall firm activity, planned capital expenditures, and hiring plans proxy for a single, latent process while expectations about average selling prices and local economic performance appear to be influenced by a separate phenomenon.

This remainder of this paper proceeds in several steps. Section 2 provides a description of the data used in the paper, while Section 3 details our empirical methodology. In Section 4, we present our empirical results and discuss the implications of our findings. Section 5 concludes the paper by summarizing our findings, discussing our study's limitations, and presenting some recommendations for future research.

Data and Descriptive Statistics

The data used in our analysis come from a business outlook survey conducted in a mid-sized, regional, Midwestern economy. This economy has approximately 300,000 residents, and businesses within the economy produce a wide array of goods and services. There is a slightly higher emphasis on manufacturing, retail and wholesale services than other, similar-sized economies in the U.S.

This survey is conducted on a quarterly basis, and its structure and content is to other business sentiment surveys, including the National Federation of Independent Business' *Small Business Conditions Survey* (<http://www.nfib.com/page/sbc>). Our data come from the December 2003, March 2004, June 2004 and September 2004 editions of the regional survey. All surveys were endorsed by the local chamber of commerce and targeted at firms' upper-management (usually an owner, financial officer or chief executive) in order to obtain accurate responses. Each survey contains approximately 35 questions covering past, present and expected future trends in capital expenditures, employment patterns, employee compensation, selling prices, sales and after-tax profit. Appendix 1 contains a brief synopsis of the survey questions used in this study, while Appendix 2 contains the names and definitions for the variables specifically used in our analysis.²

A common problem plaguing mail-based business sentiment surveys, especially those that are conducted repeatedly over time, is low response rates (Sims, Breen and Ali, 2002; Morrison, Breen and Ali, 2003). Because surveys of this kind ask for information about sales, after tax profit and employment patterns, many business executives (particularly small business executives who are not required to publicly disclose the company's financial statements) are loathe to disclose this information,

even if anonymity is guaranteed and respondents are only asked to provide qualitative (as opposed to quantitative) information. As a result, Dennis (2003) notes that average response rates on such surveys are often well below 25 percent.

In our case, approximately 3,600 surveys were mailed (900 each quarter), 383 of which were returned, providing a response rate of approximately 11 percent. Of the 383 returned questionnaires, 278 were complete and able to be used in the final sample (see Table 1). The primary reason a respondent was eliminated from the sample was missing information for at least one of the questions germane to our study. However, a small number of respondents were eliminated because they responded “Don’t Know” or “Does Not Apply” to critical questions in our analysis.

A potential problem that arises when combining results from surveys conducted over time is heterogeneity across each of the time periods in which a survey is administered. This might be the case, for example, if the proportion (or number) of fully completed surveys (which are included in the analysis) varies systematically by quarter. To examine this issue, we present Table 1, which contains a cross-tabulation (and a chi-square test of homogeneity) comparing the included and excluded responses over the four quarters of the survey.

Table 1
Comparison of Full and Final Samples

	Dec. 2003	March 2004	June 2004	Sept. 2004	Total
Deleted from Sample	20	28	20	37	105
Included in Final Sample	71	71	55	84	278
Total	91	99	75	118	383
Chi-Square Test Statistic	2.331				
Degrees of Freedom	3				
Probability Value	0.507				

Notes: Chi-Square test, null hypothesis is homogeneity of sample size over time.

The September 2004 version of the survey contains a slightly higher number of responses than the other three quarters, while the June 2004 survey exhibits the lowest number of returned surveys. All four quarters have a relatively even proportion of returned surveys that were eliminated from the final sample due to incomplete information. The chi-square test also supports the notion that the proportion of survey responses with complete information is relatively equal over all four quarters, as we fail to reject the null hypothesis of homogeneity over time at any reasonable level of significance. Heterogeneity of fully completed responses over time does not appear to be a significant concern.

For executives who submitted a complete set of responses, we examine the distribution of responses disaggregated by quarter and firm-specific characteristics. Table 2 contains a series of cross-tabulations that provide this information.³ The first cross-tabulation disaggregates responses by their firm’s organizational form.

Table 2
The Distribution of Firms by Quarter and Firm-Specific Characteristics

Panel A: Firms by Quarter and Organization

	Dec. 2003	March 2004	June 2004	Sept. 2004	Total
Single Proprietorship	6	5	5	5	21
Partnership	14	14	5	17	50
Sub-S Corporation	29	31	28	39	127
Corporation	22	21	17	20	80
Total	71	71	55	81	278
Chi-Square Test Statistic	5.096				
Degrees of Freedom	9				
Probability Value	0.826				

Notes: Chi-Square test, null hypothesis is homogeneity of organizational type over time.

Panel B: Firms by Quarter and Size, as Measured by the Number of Employees

	Dec. 2003	March 2004	June 2004	Sept. 2004	Total
1 – 10 Employees	19	19	17	27	82
11 – 20 Employees	14	13	13	20	60
21 – 50 Employees	17	17	10	16	60
51 – 150 Employees	8	10	6	10	34
151 – 500 Employees	10	10	8	6	34
Over 500 Employees	3	2	1	2	8
Total	71	71	55	81	278
Chi-Square Test Statistic	5.750	(All rows included in the calculation)			
Degrees of Freedom	15				
Probability Value	0.984				
Chi-Square Test Statistic	5.016	(Bottom two rows combined to form a single category)			
Degrees of Freedom	12				
Probability Value	0.957				

Notes: Chi-Square test, null hypothesis is homogeneity of size over time

Panel C: Firms by Quarter and Aggregated Industry Group

	Dec. 2003	March 2004	June 2004	Sept. 2004	Total
Agriculture, Forestry, and Mining	5	8	6	8	27
Finance and Insurance	8	7	6	8	29
Wholesale and Retail	7	9	8	10	34
Utilities	2	6	3	7	18
Professional and Scientific Services	11	10	7	10	38

Table 2 continued

	Dec. 2003	March 2004	June 2004	Sept. 2004	Total
Transportation, Warehousing, Manufacturing, and Construction	14	15	11	10	50
Health Care, Arts/ Entertainment and Other Professional Services	13	8	8	20	49
All Other Industries	11	8	6	8	33
Total	71	71	55	81	278
Chi-Square Test Statistic	11.782				
Degrees of Freedom	21				
Probability Value	0.945				

Notes: Chi-Square test, null hypothesis is homogeneity of industry group over time

Sub-S corporations are the most common response (127) followed by corporations (80), partnerships (50) and single proprietorships (21). The chi-square test of homogeneity fails to find any significant evidence that the number and proportion of responses by organizational form vary systematically over the four quarters of the survey.

The second cross-tabulation disaggregates responses by quarter and the number of employees per firm. As expected, most firms tend to be small, having 50 or fewer employees. The most common response (81) is that the firm has 10 or fewer employees, followed by 11-20 employees and 21-50 employees (60 responses each). Thirty-four respondents employ 51 – 150 workers, while another 34 respondents employ between 151 and 500 workers. Only eight respondents report that their firm employs over 500 workers. As in the previous cross-tabulation, the chi-square test fails to reject the null hypothesis of homogeneity of firm characteristics over time, implying that these responses are relatively consistent across the time frame of our analysis.⁴

The final cross-tabulation in Table 2 compares the firm's industry, disaggregated by the survey quarter.⁵ The most common response was that a firm operates in a manufacturing, construction, warehousing or transportation industry (50), followed by health care, arts/entertainment and other personal services (49), professional and scientific services (38), wholesale and retail (34) and other industries (33). These results support our earlier assertion that the economy is reliant on manufacturing, wholesale and retail industries, and also suggest (but do not prove) that our final sample of 278 responses is representative of the universe of firms in the economy.

Having examined the characteristics of firms reporting information germane to our analysis and illustrating that they are a reasonable representation of a medium-sized, regional, Midwestern economy, we are now in a position to examine

Table 3
Basic Descriptive Statistics

Variable	Mean	Std. Dev.	1st Quartile	Median	3rd Quartile
Firm	2.42	0.54	2	2	3
Economy	2.32	1.53	1	1	4
Prices	2.39	0.55	2	2	3
Labor	2.78	1.48	1	4	4
Capital	2.23	0.59	2	2	3

expectations about future firm and economy-wide performance. Table 3 contains this information.

We first consider the Economy, Labor and Capital expectation variables, which take values between one and five. A score of one implies extreme pessimism, while three implies the status quo. The Capital variable's mean and median are 2.23 and 2, respectively, while the Economy variable's mean and median are 2.32 and 1, respectively. Mean and median values for the Labor variable are 2.78 and 4, respectively. These statistics suggest a degree of pessimism, particularly for the local economy as a whole, and for capital expansion plans, which are inherently tied to external capital markets. There is less pessimism about labor markets, whose mean is just below and median above the status quo.

The remaining three variables are based on a scale of one to three, with two representing the status quo and one expressing a pessimistic expectation about the future. In these cases, the mean and median scores for the Firm variable (2.42 and 2, respectively) and the Price variable (2.39 and 2, respectively) suggest a much more optimistic expectation for future firm performance, as well as the ability to increase prices.

A final issue is whether firms of different size, organizational forms or industries have different outlooks about the overall economy and factors affecting their firm. Table 4 provides conditional descriptive statistics and Kruskal-Wallis tests (the nonparametric analog of analysis of variance) to investigate this issue.⁶

We first consider the interaction between a firm's organizational form and its expectations. The results in Table 4 indicate no significant differences across any of the expectation variables by firm organization. This implies that the distribution of responses is not highly skewed, and that many executives have similar (qualitative) expectations about both their firm's performance and the local economic performance as a whole.

However, we find that firms of different size have significantly different expectations for their business' success and for expected price changes. In particular, firms with more than 500 employees are more likely to have a higher

degree of optimism with regard to expected price increases, while firms with more than 150 employees are likely to be more optimistic about their business' success. We found no significant differences in expectations with regard to labor markets, capital markets and for the economy in general.

Lastly, we find a number of significant differences in expectations by industry group. With regard to expected firm success, we find a much higher degree of optimism from firms in the wholesale and retail, utility, and professional and scientific industries. The expectations in the finance and insurance and personal service industries are more pessimistic. However, when examining expectations for the local economy, wholesale and retail firms are extremely pessimistic, compared

Table 4
The Distribution of Expectations by Firm Characteristics

Variable	Firm			Economy			Prices		
	Mean	Median	SD	Mean	Median	SD	Mean	Median	SD
<i>Firm Organization</i>									
Single Proprietorship	2.43	2	0.51	2.14	1	1.39	2.29	2	0.46
Partnership	2.46	2	0.54	2.36	1	1.56	2.42	2	0.61
Sub-S Corporation	2.39	2	0.52	2.24	1	1.49	2.34	2	0.52
Corporation	2.46	2.50	0.57	2.46	1	1.61	2.48	3	0.57
Kruskal-Wallis Stat (3 dof)		1.649			0.881			5.004	
Probability Value		0.648			0.830			0.172	
<i>Firm Size</i>									
1-10 Employees	2.34	2	0.53	2.40	1.50	1.53	2.26	2	0.54
11-20 Employees	2.38	2	0.52	2.20	1	1.48	2.48	3	0.57
21-50 Employees	2.52	3	0.50	2.42	1	1.57	2.43	2	0.53
51-150 Employees	2.29	2	0.52	2.03	1	1.53	2.32	2	0.47
151-500 Employees	2.62	3	0.60	2.41	1	1.58	2.44	2.50	0.61
Over 500 Employees	2.63	3	0.52	2.50	2.50	1.60	2.75	3	0.46
Kruskal-Wallis Stat (5 dof)		12.806			2.576			11.922	
Probability Value		0.025			0.765			0.036	
<i>Firm Industry</i>									
Agriculture, Forestry and Mining	2.44	2	0.51	2.22	1	1.50	2.41	2	0.50
Finance and Insurance	2.34	2	0.55	2.59	2	1.57	2.48	3	0.63
Wholesale and Retail	2.68	3	0.47	1.35	1	0.98	2.56	3	0.56
Utilities	2.50	2.50	0.51	2.56	3	1.50	2.50	2.50	0.51
Professional and Scientific	2.47	2.50	0.56	2.34	1	1.51	2.42	2	0.55
Transportation, Warehousing, Manufacturing and Construction	2.34	2	0.52	2.30	1	1.52	2.26	2	0.53
Health Care, Arts/ Entertainment and Other Personal Services	2.45	2	0.54	2.53	2	1.61	2.31	2	0.55
All Other Industries	2.21	2	0.55	2.73	4	1.63	2.33	2	0.54
Kruskal-Wallis Stat (7 dof)		15.029			19.966			10.001	
Probability Value		0.036			0.006			0.188	

Table 4, continued

Variable	Labor			Capital		
	Mean	Median	SD	Mean	Median	SD
<i>Firm Organization</i>						
Single Proprietorship	3.00	4	1.45	2.33	2	0.48
Partnership	2.84	4	1.49	2.30	2	0.61
Sub-S Corporation	2.80	4	1.49	2.22	2	0.62
Corporation	2.66	4	1.49	2.17	2	0.55
Kruskal-Wallis Stat (3 dof)		1.113			2.170	
Probability Value		0.774			0.538	
<i>Firm Size</i>						
1-10 Employees	2.84	4	1.44	2.23	2	0.55
11-20 Employees	2.87	4	1.46	2.18	2	0.57
21-50 Employees	2.67	4	1.53	2.23	2	0.59
51-150 Employees	2.76	4	1.50	2.26	2	0.71
151-500 Employees	2.79	4	1.59	2.26	2	0.57
Over 500 Employees	2.50	2.50	1.60	2.25	2	0.71
Kruskal-Wallis Stat (5 dof)		0.981			0.858	
Probability Value		0.964			0.973	
<i>Firm Industry</i>						
Agriculture, Forestry and Mining	2.56	4	1.53	2.11	2	0.42
Finance and Insurance	2.86	4	1.48	2.17	2	0.71
Wholesale and Retail	2.74	4	1.52	2.24	2	0.50
Utilities	2.72	4	1.60	2.67	3	0.49
Professional and Scientific	2.55	3	1.54	2.21	2	0.58
Transportation, Warehousing, Manufacturing and Construction	3.00	4	1.41	2.26	2	0.56
Health Care, Arts/Entertainment and Other Personal Services	2.61	4	1.51	2.27	2	0.64
All Other Industries	3.18	4	1.36	2.06	2	0.61
Kruskal-Wallis Stat (7 dof)		5.417			15.123	
Probability Value		0.609			0.034	

to the other groups. With regard to capital markets, we find that utilities are much more optimistic about being able to finance capital and physical equipment than firms in other industries. No significant differences exist across firms with regard to expected price increases and planned labor force changes.

Empirical Methodology

Our approach is one of exploratory factor analysis. We choose this approach for several reasons. First, factor analysis is a commonly used technique to determine the number of underlying factors among a series of variables (Hair *et al.*, 1998; Johnson and Wichern, 2002). Second, an exploratory factor analysis places virtually no *a priori* assumptions on the relationship(s) between the variables being analyzed. Common factors or relationships are identified using correlations within the data itself. Issues of endogeneity or specification error that are common in

parametric, empirical approaches (such as regression analysis) are not of significant concern. Additionally, factor analysis does not, in general, rely on statistical inference. Thus, issues of non-normality or sampling error impact the results only if additional statistical analyses is performed, or the implications of the factor analysis results are applied beyond the scope of the data being analyzed.

Based on the information obtained from the survey, five variables are included as indicators in the factor analysis: firm expectations about the local economy's performance; expectations about their own activity in general, as well as firm-specific expectations about labor force changes; plans for capital expenditures; and plans to change selling prices. These indicators provide a broad coverage of expectations for key macro-economic factors often considered external to the firm. They also incorporate expectations for factors that are at least partially controlled by the firm's management.

Because our analysis in the previous section indicated that the data is both representative of the local economy, and is also relatively consistent across each of the quarters of our study, we choose to aggregate the data and conduct a single factor analysis on the entire set of 278 observations. As a robustness check, we conducted separate factor analysis on each of the four quarters of data and found results that were virtually identical to those of the aggregated sample.⁷

In order to ensure the appropriateness of factor analysis, we must first examine the characteristics of the data. Factor analysis is a data reduction technique that assumes the variables of interest are empirical proxies for one or more common, latent processes. Under this assumption, these variables should be highly correlated, and this correlation can be used to identify the latent process(es) of interest. If they are not highly correlated, then there is no statistical relationship between the indicators and no common latent process relating these variables exists. Statisticians have developed several heuristic measures to determine whether the data are appropriate for factor analysis. We employ four of the most commonly used measures, which are contained in Table 5 (Sharma, 1996; Hair *et al.*, 1998; Johnson and Wichern, 2002).⁸

First, we examine the size and significance of the correlation coefficients between each of the empirical indicators. Strong and statistically significant correlations indicate factor analysis is appropriate for the data. Weak correlations indicate that factor analysis is not an appropriate technique. Of the ten unique correlations contained in Table 7, seven are statistically significant at a five percent level, and thus support the use of factor analysis. In particular, there are strong positive correlations between expectations about the firm's success and expectations about price changes and capital expansion plans. There is also a strong negative correlation between expectations about the firm's success and plans to change the size of its labor force. Concomitantly, expectations about the local economy's success is only significantly (and positively) associated with a firm's expectation to change the price of its goods and/or services. Capital expansion plans are negatively and significantly related to planned changes in a firm's labor force, and positively related to planned changes in selling prices.

Table 5
Pearson Correlations (with two-tailed significance)

	Firm	Economy	Prices	Labor	Capital
Firm	1.000	-0.069	0.136**	-0.528***	0.239***
Economy	-0.069	1.000	0.139***	0.075	0.030
Prices	0.136**	0.139***	1.000	-0.065	0.113**
Labor	-0.528***	0.075	-0.065	1.000	-0.254***
Capital	0.239***	0.030	0.113**	-0.254***	1.000
Number of observations					278
KMO Measure					0.585
Bartlett Chi-Square Test Statistic (10 degrees of freedom)					128.482***
Probability Value					0.000

* indicates statistical significance at the 10% level

** indicates statistical significance at the 5% level

*** indicates statistical significance at the 1% level

A second heuristic indicating the appropriateness of factor analysis is the Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy. This is a statistic that is bounded between zero and one and, in general, this measure must be above 0.5 for factor analysis to be applied to the data. In our case, the KMO measure of sampling adequacy is 0.585, and therefore also lends support for the use of factor analysis.

The Bartlett test of sphericity is a third statistic used to determine the appropriateness of factor analysis. This is a chi-square test intended to determine whether significant correlation jointly exists among the variables. Since this test follows the chi-square distribution, it takes values between zero and infinity, with larger test statistic values indicating rejection of the null hypothesis of no joint correlation among the empirical indicators.⁹ The Bartlett test result provides a strong indication in favor of analyzing the data with factor analysis. The test statistic rejects the null hypothesis (of no significant joint correlation) at a one percent level of significance.

A final consideration is the size of the data set relative to the number of variables utilized in the analysis. As the number of variables in the analysis increases, the number of correlation coefficients grows disproportionately. A larger number of variables consequently requires a larger sample size to ensure that the correlation coefficients are constructed accurately and precisely. Most commonly used multivariate analysis textbooks posit that factor analysis can be applied to a data set when the sample size is at least 50 and the sample size exceeds the number of variables by a margin of at least five to one (Hair et al., 1998). Our dataset exceeds this requirement, as it exhibits a ratio in excess of 55 to 1.

Having verified that the data are, in fact, appropriate for factor analysis, we must also address several other issues, including the specific factor analysis techniques we employ to generate our results. The two most common techniques

used to isolate the latent factors are principal components factoring and principal axis factoring. In this study, we initially employed both techniques; however, the principle axis factoring did not converge. The results presented are generated via the principle components technique. Latent factors were considered significant only if their values were greater than one (Sharma, 1996; Johnson and Wichern, 2002). A second technical issue is the rotational method used to generate the factor scores. Our results are based on the Varimax rotational method, which is one of the most common rotational techniques (Sharma, 1996). We also tried several other rotational techniques (such as Quartimax rotation) and obtained virtually identical results.

Results

Table 6 presents the results of our principal components factoring. Only two of the five eigenvalues (or latent factors) have values greater than one, and these two factors jointly explain 58 percent of the variance in the data.

Table 7 presents the unrotated and final (rotated) factor loadings using the Varimax rotation method. The final factor loadings indicate that expectations about firm success, expectations about capital expansion, and hiring plans load very highly on the first factor. The remaining expectation variables (price changes and macro-economic activity) load on to the second latent factor. Four of the five empirical indicators exhibit positive factor scores, indicating a positive relationship with their latent variable. The expectation about labor force changes is the only proxy that is negatively associated with its latent factor.

Taken in tandem, these results imply that the formation of business sentiment in this economy (and during this time frame) is a two-fold process. The first relates the management's sentiment and expectations about factors internal to the firm, including the firm's overall success, its capital expansion plans, and its labor force expansion plans. What is particularly interesting is that expectations about overall firm and capital expansion plans are positively associated with this measure, while labor force expansion plans are negatively associated. This implies (but in no way proves) that firms may view capital and labor as substitutes, but also view capital expansion as more conducive to long-term economic growth than labor force expansion. That is, management may view labor force expansion as a "second-best" means to increase output and profitability. Because labor is often considered a variable input (as opposed to capital, which is fixed in the short run), firms may employ labor force expansion when they are more pessimistic about the firm's future growth potential. This allows management more flexibility to cut costs and manage the production process if their firm (as expected) does not grow in the near future.

The second latent factor relates to pricing decisions and the overall economic performance of the local economy. The majority of the firms in our sample (and in the economy) are small manufacturing, wholesale/retail and service firms. This implies that price changes and local economic activity are factors external to the firm. That is, these firms likely serve consumers within the local area. Their ability

Table 6
Percent of Variance Explained

Panel A: Initial Eigenvalue Extraction using Principal Components

Component	Eigenvalue	Percent of Variance Explained	Cumulative Percent Explained
1	1.747	34.931	34.931
2	1.153	23.060	57.990
3	0.840	16.808	74.799
4	0.794	15.882	90.681
5	0.466	9.319	100.00

Panel B: Rotated Eigenvalues using Varimax Rotation

Component	Eigenvalue	Percent of Variance Explained	Cumulative Percent Explained
1	1.740	34.801	34.801
2	1.159	23.190	57.990

Table 7
Factor Matrices

	Un-Rotated Factor Loadings		Rotated Factor Loadings		Extracted Communalities
	Factor 1	Factor 2	Factor 1	Factor 2	
Firm	0.817	-0.110	0.824	-0.024	0.680
Economy	-0.080	0.788	-0.162	0.775	0.627
Prices	0.292	0.674	0.220	0.701	0.539
Labor	-0.808	0.183	-0.823	0.097	0.687
Capital	0.578	0.179	0.556	0.239	0.366

Transformation Matrix

Factor	1	2
1	0.995	0.105
2	-0.105	0.995

to raise prices depends on consumer incomes, which are fundamentally tied to local economic growth in general. Thus, both of these forces are external to the firm, and represent business sentiment about the economy in general.

This presents an interesting implication for local policy makers and business executives. Often, local economic growth is measured by Federal and state government agencies, and there is a substantial lag time between the collection and dissemination of government data. However, our results suggest that an alternative proxy is simply to poll local businesses and determine whether (and how much) these firms are raising their prices. If prices, on aggregate, are rising quickly then it is also likely that the economy as a whole will also be growing in the near future.

Discussion and Conclusions

The purpose of this paper is to present an exploratory empirical analysis using data on a quarterly business outlook survey for a medium-sized, regional, Midwestern economy. Our primary objective was to identify the number of different latent measures of business sentiment that are inherent in responses provided by business managers. Another objective was to identify which of the empirical indicators commonly used to measure economic activity contribute to each of these underlying factors. The results of our analysis indicate that there are at least two underlying sentiment forces. One of these is explained primarily by the hiring plans, planned capital expenditures, and planned changes in activity of firms, while the other is explained by local economic activity and price expectations.

Our findings present several implications for the analysis of business sentiment. First, it appears that business sentiment is a two-fold phenomenon with the unique characteristics of firms and their immediate to medium term plans represented as one latent process. The other latent process reflects pricing expectations and forces that are impacted by developments in the overall economy. Our findings also indicate that the hiring plans of firms, capital spending plans, and their own levels of activity contribute relatively evenly to one underlying aspect of the determination of overall business sentiment. However, when evaluating the second latent measure underlying business sentiment, economic agents should consider firm pricing expectations, as well as the outlook for the overall economy.

Our study provides an initial analysis of latent factors in understanding the determination of business sentiment and is preliminary in nature. Therefore, the findings should be viewed with caution. However, the limitations of this study provide some suggestions for future research. While our data form the basis for an interesting case study, other business sentiment measures for the national economy or other regional economy may obtain different results. Thus, replications of our study that utilize a nationally representative group of respondents would provide a valuable additional to our understanding of the determinants of business sentiment.

Another limitation of our study is one that characterizes the factor analysis literature, in general. Factor analysis identifies how many latent processes there are, but does not specifically identify what those processes represent. Our study, for example, found two major latent factors, one of which was closely associated with each firm's planned future activity and by extension its hiring plans and one that was associated with the remaining expectation indicators that are influenced more by factors beyond an individual firm's control. We can think of labeling the meaning of the first factor as "internal" firm-specific plans. However, in the latter, the meaning of this "catch-all" factor is not clear; we choose to call this factor expectations about "external" forces facing the firm. Unless those interested in using sentiment indices can intuitively identify what this factor is, it is difficult to ignore the argument that available aggregate indicators may not represent all the information that can be used to make predictions about future economic performance.

References

- Batchelor, R., and P. Dua. (1998). "Improving Macro-Economic Forecasts: The Role of Consumer Confidence." *International Journal of Forecasting*, 14 (1): 71-81.
- Bodo, G., R. Golinelli, and G. Parigi. (2000). "Forecasting Industrial Production in the Euro Era." *Empirical Economics*, 25 (4): 541-561.
- Bram, J., and S. Ludvigson. (1998). "Does Consumer Confidence Forecast Household Expenditures? A Sentiment Index Horse Race." *Federal Reserve Bank of New York Research Paper #9708*.
- Carroll, C., J. Fuhrer, and D. Wilcox. (1994). "Does Consumer Sentiment Forecast Household Spending? If So, Why?" *American Economic Review*, 84 (5): 1397-1408.
- Cashell, B. (2003). "Measures of Consumer Confidence: Are They Useful?" *Congressional Research Service Manuscript RL31942*, Library of Congress, June.
- Cotsomitis, J., and A. Kwan C.C. (2006). "Can Consumer Confidence Forecast Household Spending? Evidence from the European Commission Business and Consumer Surveys." *Southern Economic Journal*, 72 (3): 597-610.
- Deitz, R., and C. Steinde. (2005). "The Predictive Abilities of the New York Fed's *Empire State Manufacturing Survey*." *Current Issues in Economics and Finance*, 11 (1): 1-7.
- Dennis, W. J., Jr. (2003). "Raising Response Rates in Mail Surveys of Small Business Owners: Results of an Experiment." *Journal of Small Business Management*, 41 (3): 278-295.
- Dunkelberg, W., J. Scott, and W. Dennis Jr. (2003). "Small Business Indicators of Macroeconomic Activity." *National Federation of Independent Businesses Report*, (<http://www.nfib.com>).
- Dunn, L., and I. Mirzaie. (2005). "Turns in Consumer Confidence: An Information Advantage Linked to Manufacturing." *Economic Inquiry*, 44 (2): 343-351.
- Eppright, D., N. Arguea, and W. Huth. (1998). "Aggregate Consumer Expectation Indices as Indicators of Future Consumer Expectations." *Journal of Economic Psychology*, 19 (2): 215-235.

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- Hair, J., R. Anderson, R. Tatham, and W. Black. (1998). *Multivariate Data Analysis* 5th Edition, Prentice Hall, Upper Saddle River, NJ.
- Howrey, P. (2001). "The Predictive Power of the Index of Consumer Sentiment." *Brookings Papers on Economic Activity*, (1): 175-216.
- Johnson, R., and D. Wichern. (2002). *Applied Multivariate Statistical Analysis* 5th Edition, Prentice Hall, Upper Saddle River, NJ.
- Kvanli, A., R. Pavur, and C.S. Guynes. (2000). *Introduction to Business Statistics* 5th Edition, Southwestern Publishing, Cincinnati, OH.
- Matsusaka, J., and A. Sbordone. (1995). "Consumer Confidence and Economic Fluctuations." *Economic Inquiry*, 33 (2): 296-318.
- McNabb, B., and K. Taylor. (2000). "Business Cycles and the Role of Confidence: Evidence from Europe." (<http://www.le.ac.uk/economics/research/RePEc/lec/leecon/econ02-3.pdf>).
- Morrison, A., J. Breen, and S. Ali. (2003). "Small Business Growth: Intention, Ability and Opportunity." *Journal of Small Business Management*, 41 (4): 417-425.
- Potter, S. (1999). "Fluctuations in Confidence and Asymmetric Business Cycles." *Domestic Research Function Report*, Federal Reserve Bank of New York.
- Sharma, S. (1996). *Applied Multivariate Techniques*, John Wiley and Sons, New York, NY.
- Sims, R., J. Breen, and S. Ali. (2002). "Small Business Support: Dealing with the Impediments to Growth." *Journal of Enterprising Culture*, 10 (4): 241-256.
- Vuchelen, J. (2004). "Consumer Sentiment and Macroeconomic Forecasts." *Journal of Economic Psychology*, 25 (4): 493-506.
- Yew-Kuang, N. (1992). "Business Confidence and Depression Prevention: A Meso-economic Perspective." *American Economic Review*, 82 (2): 379-385.

Footnotes

¹ In doing so, we also provide a starting point for future research that examines how the formation of business sentiment differs across industries and economies.

² The questions are listed in the order in which they are utilized in this paper, instead of the order in which they appear in the survey. The spacing, font size and general layout of the questions also differ from that utilized in the survey.

³ It would also be interesting to conduct similar cross-tabs comparing the characteristics of a typical respondent's firm by whether or not the firm returned a fully completed survey. This would allow us to check whether smaller or larger firms, for example, were more likely to skip questions they did not feel comfortable answering. Unfortunately, because many respondents failed to provide a complete set of firm-specific characteristics, such a comparison was impossible.

⁴ A common problem with the chi-square test of homogeneity is that small values in each of the interior elements of the cross-tabulation tend to increase expected values, and thus inflate the magnitude of the test statistic (Kvanli *et al.*, 2000). To avoid this possibility, it is also common to combine one or more of the rows or columns of the table and re-compute the chi-square test statistic (see Table 2). This increases cell counts and expected values, thereby reducing the possibility that the test statistic is inflated. A comparison of the two test statistics gives a prima fascia measure of the inflation. In this case, we combined firms with more than 500 employees with those firms employing more than 150 workers and calculated a new chi-square test statistic. In both cases the test statistics are similar, and we fail to reject the null hypothesis, implying that low counts are not of significant concern.

⁵ Because we allowed firms to classify themselves into one of 16 categories, there are a number of categories with very low cell counts. As a result, we combined categories to ensure that the cross-tabulation is more easily interpreted, and that the chi-square test statistic is not inflated. A full cross-tabulation by industry can be found in Appendix 3.

⁶ We use the Kruskal-Wallis test instead of analysis of variance because the discrete nature of the data, *a priori*, makes the assumptions of analysis of variance (i.e., normality) unlikely to hold. We note in passing that we did perform analysis of variance tests, and those results were virtually identical to the Kruskal-Wallis tests.

⁷ Further details are available upon request.

⁸ We emphasize that these measures are primarily heuristic. Consequently, the data analyst must apply his/her experience when interpreting these measures in order to make an appropriate decision.

⁹ One drawback to the Bartlett test is that large sample sizes may inflate the test statistic, thereby increasing the likelihood of Type I error. Since our data set is relatively small ($n = 278$), this is not a significant concern.

Appendix 1

Questions Taken from the Business Survey

- (1) What is your form of business organization?
 Proprietorship Partnership (LLC; LLP) Sub-S Corporation
 Corporation
- (2) Indicate the total number of employees in your firm (full-time, part-time and yourself):
 1 – 10 11 – 20 21 – 50
 51 – 150 151 – 500 Over 500
- (3) Please classify your major business activity using one of the categories below. If more than one applies, mark the one which contributes most towards your gross sales or total revenue.
 Agriculture/Forestry Construction Finance and Insurance
 Health Care and Social Services Wholesale Trade Manufacturing
 Utilities Arts and Entertainment Retail Trade
 Real Estate and Rental Professional and Scientific Mining Services
 Communications and Information Transportation and Warehousing Other Services including
 Other Goods Personal Care and Automotive
- (4) Do you think that in the next six months your firm is likely to expand, contract or maintain its existing level of activity?
 Expand Contract Remain the Same
 Don't Know
- (5) About the local economy in general, do you think that six months from now general business conditions will be better than they are now, about the same, or worse?
 Much Better Somewhat Better About the Same
 Somewhat Worse Much Worse Don't Know
- (6) In the next six months, do you plan to change the average selling prices of your goods and/or services?
 Yes, Raise Prices Yes, Lower Prices No Change
 Don't Know Does Not Apply
- (7) In the next six months, do you expect to increase or decrease the total number of people working for you?
 Increase Significantly Increase About the Same
 Decrease Decrease Significantly Don't Know
- (8) Looking ahead to the next six months, do you expect that capital expenditures for plant and/or physical equipment by your firm will increase, decrease or stay about the same?
 Increase Stay About the Same Decrease
 Don't Know

Appendix 2

Names and Definitions for Variables used in the Factor Analysis

Variable	Definition
<i>Firm Characteristic Variables</i>	
Organization	Variable identifying whether a firm is a single proprietorship, partnership, Sub-S corporation or corporation
Size	Variable characterizing firm size, as measured by the number of employees
Industry	Variable identifying one of eight possible industry groups in which a firm operates and earns a majority of its revenue

Appendix 2 continued on the next page

Appendix 2, continued

Business Sentiment Variables

Firm	Variable that takes a value of 1 if the firm expects firm contraction, 2 for status quo and 3 for expansion
Economy	Variable that takes a value of 1 if the firm expects significant local economic contraction, 2 for some local economic contraction, 3 for no local contraction, 4 for some expansion and 5 for significant expectations of local economic expansion
Prices	Variable that takes a value of 1 if the firm expects to lower average selling prices, 2 for no change, and 3 for an expected increase in average selling prices
Labor	Variable that takes a value of 1 if the firm expects significant contraction of employees, 2 for some employee contraction, 3 for no contraction, 4 for some expansion and 5 for significant expectations of firm labor force expansion
Capital	Variable that takes a value of 1 if the firm expects significant decrease in capital expenditures over the next 6 months, 2 for expectations of the status quo, and 3 for firm expectations of increased capital expenditures over the next 6 months

Appendix 3

The Distribution of Firms by Quarter and Disaggregated Industry Group

	Dec. 2003	March 2004	June 2004	Sept. 2004	Total
Agriculture and Forestry	1	0	0	0	1
Finance and Insurance	8	7	6	8	29
Wholesale	4	4	2	3	13
Utilities	2	6	3	7	18
Retail					
Professional and Scientific Services	3	5	6	7	21
Communications and Information	0	0	0	0	0
Transportation and Warehousing	1	1	1	2	5
Construction	4	4	1	1	10
Manufacturing	9	10	9	7	35
Real Estate and Rental	0	0	0	0	0
Health Care and Social Services	2	0	2	1	5
Arts and Entertainment	4	2	2	6	14
Mining	4	8	6	8	26
Other Professional Services	7	6	4	13	30
All Other Industries	11	8	6	8	33
Total	71	71	55	81	278
