Small firms make up a large fraction of the total economy, producing half the private sector GDP and employing an even larger fraction of the private workforce. Recently, the Census reported that firms with fewer than 20 employees created 1.1 million net new jobs from March 2001 to March 2002 (latest data available). Firms with employment between 20 and 500 added 40,000 new jobs and firms with 500 or more employees lost 150,000 jobs\(^1\).

Because of their collective size and importance, indicators of small firm economic behavior should be reliable predictors of changes in macroeconomic indicators such as the unemployment rate.\(^2\)

Small and large firms are impacted by the same economic forces. Federal Reserve policy, tax-based fiscal policy, and shifts in consumer spending, for

---

\(^1\) The Census data are available on the SBA web site, [www.sba.gov/advo](http://www.sba.gov/advo).

\(^2\) Although estimates vary, the “small business sector” of the economy is estimated to produce 50 percent of the private Gross Domestic Product (GDP) and employ about 60 percent of the private sector labor force. Small business is also credited with producing the bulk of net new jobs created in the U.S. economy. See, [www.sba.gov/advo/stats](http://www.sba.gov/advo/stats) for the latest statistics on the contributions of small business to the American economy and Popkin (2003) for a description of methodologies used.
example, affect businesses of every size.\(^3\) The distribution of large and small firms differs by sector, with manufacturing dominated by larger firms and construction along with many services dominated by small firms. Large firms are heavily involved in international trade while small firms are domestically focused. So, from time to time, the economic fortunes of large and small firms may collectively diverge. But, since the same fundamental economic forces affect all firms, these differences should not seriously compromise the usefulness of small business based indicators for economic analysis. Small business owners with flatter organizations may even be quicker to sense changes in the economy than their large company counterparts.

The Data

This paper examines the predictive power of the employment variables included in the small business surveys conducted by the National Federation of Independent Business (NFIB). NFIB began quarterly economic surveys of its membership in 1973.\(^4\) Since that time, a virtually identical three-page questionnaire has been mailed to a sample of NFIB’s small-business owner members on a regular basis. From October of 1973 through 1985, the survey was mailed to a random sample of the NFIB membership on the first day of every quarter. This mailing was followed by a second about ten days later. Since

---

\(^3\) Some argue that the owners of small firms with flatter organizations might sense changes in economic conditions more quickly than their counterparts in large firms, making indicators of the economic health of small firms relatively more responsive to changes in economic conditions.

\(^4\) A description of the origin and content of NFIB’s economic survey can be found in Dennis and Dunkelberg (2000). NFIB has about 600,000 member firms.
January 1986, the same procedure has been followed monthly. Responses are collected for about 25 days, after which duplicate responses are eliminated. The yield is 1,300 to 1,800 responses in the first month of each quarter and 500 to 700 responses in the following two months. A monthly report, *Small Business Economic Trends*, based on the findings from the survey is available from NFIB (nfib.com/research).

The NFIB membership reasonably reflects the small-business population. (Dunkelberg and Scott, 1983). Members tend to be somewhat older and are over-represented in the Midwestern, Plains, and Mountain states. Although the industry composition of the NFIB membership has shifted toward services (following the overall U.S. business sector), the size distribution of employment of the membership has not changed since the surveys were started in 1973. As long as sample frame and response biases are relatively stable over time, thereby not disturbing the relationship between changes in the indicators and changes in the economic activity measures of interest, the NFIB indicators will be reliable predictors of macroeconomic statistics such as the unemployment rate.

The practical value of data from these surveys is that: (1) the data are not subject to revision because they are taken at one point in time; (2) they can be empirically related to changes in macroeconomic indicators that are historically correct (after all revisions are in) and, (3) the sample of units included need not
be representative of all units in the population nor do all units in the sample need to respond to the survey. 

**Predicting the Unemployment Rate**

Two survey measures are directly related to the unemployment measure that is computed by the Bureau of Labor Statistics: the net percent of owners who report plans to expand total employment at their firms, HIREPLAN, and the percent of owners who report at least one hard-to-fill job opening, JOBOPEN. The larger the percent of owners planning to expand total employment (a job creation frame of reference, many hires are just replacements) in the months following the survey, the larger the expected employment growth in current and future periods and thus the lower the unemployment rate. The higher the percent of owners reporting a hard-to-fill job opening, the tighter the labor market and the lower the unemployment rate will be. Expectations about growth should also affect hiring activity and, consequently, the unemployment rate. ERSALE, 

5 Early in the history of the surveys, NFIB experimented with industry weighted and employment weighted measures, but there was no significant improvement in the time series qualities of the measures.

6 The survey question for HIREPLN data reads: “In the next three months, do you expect to increase or decrease the total number of people working for you?”

7 The survey question for JOBOPEN data reads: “Do you have any job openings that you are not able to fill right now?”

8 The net percent of firms planning to increase total employment will be smaller than the number of firms hiring new employees, since many firms will be replacing workers, leaving total employment unchanged or might hire workers, but terminate even more workers, reducing total employment. In recent surveys, between 45% and 50% of the owners report looking for at least one employee each month.

9 The survey question for ERSALE data reads: “Overall, what do you expect to happen to the real volume (number of units) of goods and/or services that you will sell during the next three months?”
the net percent of owners expecting their own real sales volume to increase in the next three months, should reflect the firm’s need to increase employment to support growth and be inversely correlated with the unemployment rate (see Howrey (2001), Bram and Ludvigson (1998) and Cashnell (2003) for examples of empirical analysis using survey data).

Equation 1.1 in Table 1 reports the results of regressing the national unemployment rate (UNE) as reported by the Bureau of Labor Statistics on HIREPLAN, JOBOPEN, and ERSALE for the period January 1974 to October, 2003. The best fit is obtained with NFIB variables leading by one-quarter.¹⁰

Rising reports of hard-to-fill job openings and increases in the net percent of owners planning to expand total employment result in a lower unemployment rate. The equation is also estimated for 3 sub-periods to examine the possibility that the structure of labor markets may have changed over the 30 year period (e.g. more service firms, fewer manufacturing firms). Each sub-period includes a

¹⁰ A lag of one quarter means that the survey in the first month of a quarter is used to predict the value of the dependent variable in the following quarter. Thus the second quarter value of the dependent variable would depend on the January level of the NFIB variables. The lapse of time between the NFIB forecast and the release of preliminary data by Census could be as long as 5 or 6 months.
substantial period of growth and a recession.

<table>
<thead>
<tr>
<th>Table 1: U.S. Unemployment Rate as Dependent Variable</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Equation</strong></td>
</tr>
<tr>
<td><strong>HIREPLAN</strong></td>
</tr>
<tr>
<td><strong>JOBOPEN</strong></td>
</tr>
<tr>
<td><strong>ERSALE</strong></td>
</tr>
<tr>
<td><strong>Constant</strong></td>
</tr>
<tr>
<td><strong>SSQ</strong></td>
</tr>
<tr>
<td><strong>R-squared</strong></td>
</tr>
</tbody>
</table>

In Equation 1.1, all variables have the expected signs. Plans to create new jobs, HIREPLAN, is significant in the Equation 1.1, but not in the sub-periods and has the wrong sign in two of the three sub-periods (but is not significant). As the variance of the unemployment rate declines over time, the importance of HIREPLAN appears to fade. JOBOPEN is correctly signed and significant in all equations. ERSALE is correctly signed in all equations, but never significant. Explanatory power is highest in the 1994-2003 period (Equation 1.4), a period with less volatility in the unemployment rate. The average absolute error for Equation 1.4 is half that of Equation 1.1 and the error terms appear more randomly distributed throughout the sample period (Table 3).

Converting these parameters into Beta Coefficients provides coefficients that can be compared to each other to assess importance in determining the unemployment rate (see Table 2).11 Clearly, JOBOPEN is the major driver of

---

11 While regression coefficients cannot be compared to determine which is the most important predictor in an equation, standardized regression coefficients can be compared. Standardized coefficients can be computed as follows: Beta Coefficient = (Regression Coefficient x Standard Deviation of X) / Standard Deviation of Y. If all variables in a regression are converted to standard normal variables, then the resulting coefficients are Beta Coefficients.
the unemployment rate forecast, with a modest contribution (about one fourth the size) from HIREPLAN, and little contribution from ERSALE. The lags on the predictors indicate that the survey in the first month of each quarter will predict the unemployment rate for the following quarter.

### Table 2: Beta Coefficients

<table>
<thead>
<tr>
<th>Predictor</th>
<th>Standard Deviation</th>
<th>Regression Coefficients</th>
<th>Beta Coefficients</th>
</tr>
</thead>
<tbody>
<tr>
<td>HIREPLAN(_1)</td>
<td>5.4</td>
<td>-0.054</td>
<td>-0.2</td>
</tr>
<tr>
<td>JOBOPEN(_1)</td>
<td>5.9</td>
<td>-0.182</td>
<td>-0.75</td>
</tr>
<tr>
<td>ERSALE(_1)</td>
<td>10.2</td>
<td>-0.001</td>
<td>-0.01</td>
</tr>
</tbody>
</table>

STD. ERROR OF UNE = 1.43

Equation 1.1 fits well through 2000, but begins to over-predict the unemployment rate in 2001 (Exhibit 1). The unemployment rate remained surprisingly low through the most recent recession due to declines in the labor force following above-average labor force growth in the second half of the 1990s. Many workers attracted into the labor force during the hiring binge of the late 1990s exited the labor force during and after the recession. The model estimated for the period 1994-2003 does not make the same forecasting errors, tracking the actual unemployment rate with good precision (Equation 1.4). Forecasts based on this model are also shown in Figure 1 and Table 3. The coefficient on HIREPLAN in Equation 1.4 is very small compared to Equation 1.1, which is estimated over the entire period. Thus, historically weak job creation plans in the past recession period had much less impact on the predicted unemployment rate, while JOBOPEN -- for which the survey values remain historically high after the recession -- keeps the predicted unemployment rate lower than predictions from Equation 1.1. Based on the coefficients in each sub-
period, it is clear that the structure of the relationship changed over time. So did the amount of variation in the unemployment rate, clearly much lower in the 1990s than in earlier periods.

EXHIBIT 1
THE UNEMPLOYMENT RATE

The labor force grew by 4.1% (1.4% per year) from 1998-2000 but only 2.2% (0.7% per year) from 2001 to 2003. Absent this unusually slow post-recession growth in the labor force, the full model suggests that unemployment rates in the 2001 recession could have rivaled those experienced in the 1990-91 recession. The exuberance of the late 1990s encouraged labor force participation as the Internet-dot.com craze drove hiring and spending to record levels. It was common for a company that had just completed an initial public offering to rent 50,000 square feet of space and hire workers before it had any sales. But the rush to hire pervaded the entire economy, not just technology sectors. Plans to expand employment were also pervasive among small firms,
reaching a quarterly record 19% (net of those planning reductions – Figure 2) in 2000.\(^\text{12}\)

EXHIBIT 2

**JOB CREATION PLANS & JOB OPENINGS**

![Graph showing job creation plans and job openings over time.]

The build-up of accumulated labor was substantial going into 2000, creating an excess stock of labor by the second half of 2000 when GDP growth slowed substantially. Figure 3 shows the difference between the actual employment level and the predicted level of employment based on GDP levels\(^\text{13}\). Many firms employed labor (with IPO capital etc.) but never produced output prior to 2001\(^\text{14}\). Firms planned to create more jobs than they were able to. The NFIB job creation plans rose to a record 19 percent of all firms but much of this

---

\(^\text{12}\) The Quarterly data are from the first monthly survey in each quarter. Monthly surveys in this period of time indicated a high of 22% for net plans to expand employment.

\(^\text{13}\) The equation was Employment = 92745.6 + 4.3\(^*\)GDP, R\(^2\) = 96%.

\(^\text{14}\) The statistical discrepancy in the National Income Accounts became exceptionally large in 2000 and 2001:1, indicating that measured income substantially exceeded measured output. The income measure grew faster than the output measure from 1997 to 2001:1.
employment energy was unsuccessful at creating new jobs. Instead, the percent of firms with unfilled job openings rose to a record 35 percent of all firms (Exhibit 2), with the unemployment rate reaching 3.9 percent and the fraction of the labor force with a job reaching a record 64.6 percent of the population age 16 and over.

In comparison, the peak percent of firms planning to create new jobs in the 1980s was 6 points lower at 13 percent and the peak percent of owners reporting hard-to-fill job openings was 25 percent, 10 points lower than the most recent period. Had employers been successful in hiring enough employees in the late 1990s to keep the job openings statistic nearer the historical average, excess employment would have been even larger as the economy moved into recession in 2000. This disequilibrium is a major contributor to the sluggish recovery of employment since the 2001 recession ended as, according to the employment model, there were about 2.5 million unneeded workers employed in 2000.

Having hired workers faster than GDP growth required through mid-2000, the onset of the recession triggered a prolonged period of adjustments (similar to that observed in the early 1990s, but not as large), both to employment and to the labor force, which had expanded at abnormal rates in response to strong growth in compensation.\textsuperscript{15} Some of this excess was absorbed by modest economic growth after the end of the recession. And, unusually slow labor force growth as workers left the labor force also absorbed a large part of the excess

\textsuperscript{15} The percent of owners reporting higher average employee compensation peaked at 32\% in 2000.
labor inventory. Finally, productivity estimates were also likely biased upward, as firms shed employees that were producing little or nothing while the reduction in output during the recession was modest and economic growth resumed in the fourth quarter of 2001.

Overall, the NFIB employment variables do an excellent job of anticipating changes in the national unemployment rate (with a one quarter lag). The performance is driven primarily by the percent of firms with at least one “hard to fill” job opening, with minor contributions from plans to create new jobs and expectations about real sales growth for the company in the three months following the survey. However, when the model is estimated over the full 30 years of data, it does not perform well after 2001. This appears to be due to the unusual buildup of employment in the late 1990s through the first half of 2000, supported by unusually high growth in the labor force. This created excess labor
supply that was released reluctantly due to widespread belief that the recession
would be short, the recovery strong, and the difficulty of obtaining employees
during the previous expansion.\textsuperscript{16} The changing composition of the business
sector (e.g. more service firms etc.) may also have been a factor contributing to
the deterioration in forecasting performance, as evidenced by the superior
performance of the equation estimated using data only from 1993 to 2003. The
1995-2000 period was very unusual and unlikely to be repeated, possibly
restoring the performance of the equation based on all 30 years of data. An
alternative interpretation is that structural changes in the economy may have
made past empirical relationships less reliable, tilting the forecasting edge if favor
of equations estimated over more recent data.

\begin{table}
\centering
\begin{tabular}{|c|c|c|c|c|c|}
\hline
\textbf{Time Period} & \textbf{Actual} & \textbf{Predicted} & \textbf{Error} & \textbf{Predicted} & \textbf{Error} \\
\hline
Q1-2001 & 4.23 & 4.03 & 0.20 & 3.90 & 0.33 \\
Q2-2001 & 4.40 & 4.10 & 0.30 & 4.00 & 0.40 \\
Q3-2001 & 4.83 & 5.23 & -0.39 & 4.89 & -0.06 \\
Q4-2001 & 5.57 & 5.37 & 0.19 & 5.18 & 0.39 \\
Q1-2002 & 5.67 & 6.40 & -0.73 & 5.76 & -0.10 \\
Q2-2002 & 5.83 & 6.49 & -0.66 & 5.93 & -0.10 \\
Q3-2002 & 5.73 & 6.13 & -0.40 & 5.66 & 0.08 \\
Q4-2002 & 5.87 & 6.06 & -0.19 & 5.57 & 0.30 \\
Q1-2003 & 5.83 & 6.55 & -0.71 & 6.00 & -0.16 \\
Q2-2003 & 6.13 & 6.71 & -0.58 & 6.08 & 0.06 \\
Q3-2003 & 6.13 & 7.07 & -0.94 & 6.39 & -0.26 \\
Q4-2003 & 5.87 & 7.21 & -1.35 & 6.55 & -0.69 \\
Q1-2004 & 6.61 & & & 5.97 & \\
\hline
\textbf{AVERAGE ABSOLUTE ERROR} & 0.59 & & & 0.24 & \\
\hline
\end{tabular}
\caption{Forecast Errors}
\end{table}

\textsuperscript{16} The percent of owners reporting "the availability of qualified labor" as their number-one
business problem hit a record high 24 percent in 2000.
References


