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THE STOCK MARKET'S REACTION TO UNEMPLOYMENT NEWS: WHY BAD NEWS IS USUALLY GOOD FOR STOCKS

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ABSTRACT

We find that on average an announcement of rising unemployment is "good news" for stocks during economic expansions and "bad news" during economic contractions. Thus stock prices *usually* increase on news of rising unemployment, since the economy is *usually* in an expansion phase. We provide an explanation for this phenomenon. Unemployment news bundles two primitive types of information relevant for valuing stocks: information about future interest rates and future corporate earnings and dividends. A rise in unemployment typically signals a decline in interest rates, which is good news for stocks, as well as a decline in future corporate earnings and dividends, which is bad news for stocks. The nature of the bundle – and hence the relative importance of the two effects – changes over time depending on the state of the economy. For stocks as a group, and in particular for cyclical stocks, information about interest rates dominates during expansions and information about future corporate earnings dominates during contractions.

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1. Introduction

This study investigates the short run response of stock prices to the arrival of macroeconomic news. The particular news event we consider is the Bureau of Labor Statistic (BLS)'s monthly announcement of the unemployment rate. We establish that the stock market's response to unemployment news arrival depends on whether the economy is expanding or contracting. On average, the stock market responds positively to news of rising unemployment in expansions, and negatively in contractions. Since the economy is *usually* in an expansion phase, it follows that the stock market *usually* rises on bad news from the labor market.[2]

We next provide an explanation for this seemingly odd pattern of stock price responses. Campbell and Mei (1993) point out that, conceptually, three primitive factors determine stock prices: the risk-free rate of interest, the expected rate of growth of corporate earnings and dividends (hereafter, "growth expectations"), and the equity risk premium. Thus, if unemployment news has an effect on stock prices — which it clearly does — that must be because it conveys information about one or more of these primitives.

We begin our explanation by determining whether the pattern of stock price responses can be explained solely by the information about future interest rates that is contained in the unemployment news. If this were the case, stock and bond prices would respond in the same way (save, possibly, for differences that arise due to differences in their durations). They don't. During contractions stock prices react significantly and negatively to rising unemployment, but bond prices do not react in any significant way. Since bond prices *don't* respond during contractions, it must be the case that unemployment news contains little or no information about future interest rates in that business cycle phase. Since stock prices *do* respond significantly during contractions, it must also be the case that the unemployment news contains information about growth expectations and/or the equity risk premium in that business cycle phase.

During expansions, things are rather different. *Both* bond and stock prices rise significantly on news of rising unemployment. Given the bond response, it must be the case that during expansions, bad labor market news causes expected future interest rates to decline. This could also be what causes stock prices to rise during expansions, but needn't (since growth expectations and the equity risk premium could be changing also).

The next step to understanding the pattern of stock price responses over the business cycle is to examine the effect of news arrival on the other two primitive factors: growth expectations and the equity risk premium. We must use proxy measures for both variables since neither is directly observable.

In brief, we find no evidence that proxy measures for the equity risk premium are affected by unemployment news in any significant way. However, we do find evidence that growth expectations change in response to the unemployment news. Specifically, we find that unemployment news is helpful in predicting the actual growth rate of the Index of Industrial Production (IIP) — our proxy measure for growth expectations — over several months following an unemployment news release. Rising unemployment is always followed by slower growth. But this relationship is much larger during contractions than it is during expansions. Thus, if (as is widely believed) equity investors are rational agents who study the real sector data, they would be expected to revise their growth expectations more significantly during contractions than during expansions.

Next, we construct two portfolios of stocks. Stocks in the first group consist of public utilities with earnings that are less sensitive to fluctuations in macroeconomic growth than is the average stock. Stocks in the second group consist of cyclicals with earnings that are more sensitive than the average stock. The price effect that arises due to revisions in the growth expectations should be *small* for utility stocks and *large* for cyclical stocks when compared to stocks in general. This is exactly what we find. For cyclical stocks, growth revisions are relatively more important than for the average stock. Therefore, the difference between the cyclicals' price response patterns in contractions and expansions is even more pronounced that the S&P 500's. Their price responses have the same signs as the S&P 500, which also depend on business cycle phase, but are larger in absolute magnitude. For utility stocks, growth revisions are relatively unimportant compared to the average stock. Therefore, interest rate effects dominate and the utilities respond in much the same manner as do government bonds. Like bonds (but unlike the S&P 500 and the cyclical stocks) the utilities either rise on rising unemployment, or are unaffected.

These findings complete our explanation of stock price responses to the unemployment news. As mentioned above, rising unemployment is always bad for growth, and presumably for investors' growth expectations. During expansions the bad news effect of rising unemployment (a downward revision in growth expectations) is not sufficiently strong to cancel out the good news effect (a downward revision in expected future interest rates). Consequently, stock prices respond positively to an increase in unemployment. During contractions, the relative importance of the two effects is reversed. The bad news effect of rising unemployment on growth expectations is relatively strong. However, interest rates do not respond significantly to unemployment news during contractions. Therefore, the good news effect of falling interest rates is weak or nonexistent. The net effect is that during contractions the bad news effect dominates and stocks fall on news of rising unemployment.

Related literature

Our study differs from previous work in this area in a number of ways. We investigate only the unemployment rate announcement and do not rely on private forecast data. Hence, we are able to employ much longer time series than used previously. We compare the differences in the price responses for both stocks and bonds, and for stocks with different earnings/dividends growth characteristics. Perhaps most important, we investigate the relative magnitude of earnings growth rate revisions and interest rate effects, conditional on the state of the economy.

McQueen and Roley (1993) also found that there is a strong relationship between stock prices and macroeconomic news, such as news about inflation, industrial production, and the unemployment rate based on their own definition of business conditions. However their purpose was to demonstrate the state dependence of stock price responses to all macroeconomic news. Krueger (1996) studied the market rationality of bond price responses to labor market news. His focus was on market reaction to the availability of more reliable information, as the unemployment data were revised. His study found (as we do) that market prices were strongly affected by the unemployment announcements. Fleming and Remolona (1999) analyzed the response of U.S. Treasury yields across the maturity spectrum to different types of macro-economic announcements using high frequency data over four-and-a-quarter years. They found that the yields on intermediate term bonds were more sensitive to unemployment news.

Veronesi (1999), based on theoretical arguments, showed that bad news in good times and good news in bad times would generally be associated with increased uncertainty and hence an increase in the equity risk premium investors require for investing in stocks.

Jagannathan and Wang (1993) found that monthly stock returns are negatively correlated with the per capita labor income growth rate. Jagannathan, Kubota and Takehara (1998) report similar findings using Japanese data. Since most of the variation in per capita labor income arises from variation in hours worked and not the wage rate, these findings are consistent with the unconditional positive correlation between the growth rate in unemployment and stock returns that we find in our data set.

The Rest of the Study

Very briefly, the rest of the study proceeds as follows. Section 2 describes the data set, and the empirical methods for forecasting unemployment rates. Section 3. examines the effect of unemployment news on the S&P 500 stock index portfolio returns and on government bond returns. Section 4 examines how unemployment news affects growth expectations and the equity risk premium. Finally, Section 5 summarizes and concludes.

2. Data and Methodology

Unemployment Announcements

Although there are a variety of macroeconomic information releases we could have considered, we chose the unemployment rate because it is viewed as newsworthy. It has frequently been the reference point of Federal Reserve policy and the target of wide speculation on Wall Street. Perhaps no economic report exerts as much impact on speculative prices or is as closely followed by market participants. In addition, and important for our purposes, this release has a long and accurately dated time series.

The monthly unemployment announcements used in this paper cover the period from February 1948 through December 1995. The announcements were usually made at 8:30 am on a Friday, although during earlier years some announcements were made on other days. All announcement dates, Friday or not, are included in our study. On announcement days, the Department of Labor releases other information besides the most recent unemployment rate. This includes the total number of employed and its distribution across regions and industries. It also releases revisions of past unemployment announcements for the previous three months, after which the announcement is considered final. It also releases employment totals, weekly and hourly earnings and weekly hours worked. This study focuses on unemployment rate announcements only.

McQueen and Roley (1993) and Kreuger(1996), used forecasts made by Money Market Services International (MMS) to identify the surprise element of the unemployment rate announcement. We do not follow this procedure since MMS forecasts have only been available since November 1977, whereas our data set goes back to January 1962. Seeking to employ as much data as possible, we used our own time-series models to forecast the unemployment rate announcement and its unanticipated component.

Measuring Unemployment News

Our focus in this paper is to examine how stocks respond to unemployment news. For that purpose we need a model to measure the anticipated and the unanticipated (news) component of the unemployment figures that are announced every month. We use the following statistical model to forecast the unemployment rate change on announcement dates:

$$\begin{aligned} DUMP_t = b_0 + b_1 \cdot IPGRATE_{t-1} + b_2 \cdot IPGRATE_{t-2} + b_3 \cdot IPGRATE_{t-4} \\ + b_4 \cdot DUMP_{t-1} + b_5 \cdot DTB3_t + b_6 \cdot DBA_t + e_t , \end{aligned} \quad (1)$$

where, $DUMP_t$ is the change in the unemployment rate, $IPGRATE_t$ is the growth rate of monthly industrial production, $DTB3_t$ is the change in the 3-month T-bill rate and DBA_t is the change in the default yield spread between Baa and Aaa corporate bonds, all for the period t-1 and t. The unemployment rate is very persistent so our forecasts are based on the first differences[3].

Note that for these (and most of the other) regressions presented in this paper, both heteroscedasticity and autocorrelation are present in the residuals. We therefore compute hetereoscedasticity and autocorrelation consistent (HAC) standard errors and t-statistics with the Bartlett kernel. The bandwidth parameter is chosen to match the degree of autocorrelation in the residuals, where the length of autocorrelation is first estimated by the Yule-Walker method. For many regressions (especially daily stock returns), autocorrelation is not an important factor, thus only White t-statistics are reported.

Forecasts for the change in the unemployment rate from month t-1 to month t were constructed by first estimating equation (1) using monthly observations up to month t-1. Adding back the unemployment rate at month t-1 to this forecast gives us the predicted unemployment rate in month t.

Actually, equation (1) was estimated in three different ways. The first estimation method is the "best", in the sense of achieving the smallest out-of-sample forecast errors. In this case, we used final release numbers for unemployment and industrial production and we also included a dummy variable which took on the value 1.0 during contractions, and 0.0 during expansions. This procedure could be criticized on two grounds. First, it takes account of the information conveyed by the state of the economy. However, it can be argued that agents do not necessarily know the state of the economy at the time a forecast is made — since the NBER's announcement of an official turning point typically comes months after the date. To address this criticism, our second estimation method omits the business cycle dummy variable that allows the intercept for contractions to be different than that for expansions. As shown in Table 1 (method two) this results in a small but significant bias in the forecasts – the average forecast error for the model is different from zero -- which is not present with method one.

A second criticism of our forecasting procedure relates to the use of final release data for both the unemployment rate and the IIP. Since the final release numbers come out about 3 months after the initial release, forecasts made in this way could not have been made in real-time. In view of this criticism, our third forecasting method uses final release figures for the unemployment rate and the IIP, but only employs data available up to one year before the estimation date. Then we employ the estimated parameters and the initial release numbers of the unemployment rate data to construct our estimate of the unemployment surprise. With this very conservative method, we can be sure we are using only information that was available to investors at the time the forecast was made.

As can be seen from Table 1 (method three) this method also has a small but significant bias in the forecasts.

As shown in Table 1, the three forecasting methods have the expected properties: method one results in smaller forecast errors than method two; and method two results in smaller errors than method three. We feel that these three estimating methods span the space of "reasonable" real-time unemployment forecasts. That is, estimates by the first method are undoubtedly better than market participants could actually have made, and estimates by the third method are clearly worse. What is most important for present purposes is that none of the results that follow are particularly sensitive to the choice of estimation methods.

Properties of Unemployment News

We classified every sample month as an expansion or contraction month, using the National Bureau of Economic Research (NBER)'s reference dating. The properties of the unemployment rate forecasts for each method are in Table 1. During the 408 month period February 1961 to December 1995, he US economy was in an expansion during 351 months and in a contraction during 57 months. There were 5 contractions and 6 expansions. The average duration of a contraction was 11 months and the average duration of an expansion was 59 months. Unemployment was higher at 6.8% during contractions and lower at 6.1% during expansions. On average the unemployment rate increased by 0.2% per month during contractions and declined 0.04% per month during expansions. The forecasted changes in unemployment rates are smaller in expansions than in contractions. For Method 1 the forecast errors are not statistically significantly different from zero. The average unanticipated change in the unemployment rate (forecast error) was –2 basis points during contractions and –0.4 basis points during expansions. However, there is a small but statistically significant bias in the forecasts made using Models two and three – the forecasts are biased downward during contractions and upward during expansions. The average forecast error was 8 basis points during contractions and –3 basis points during expansions for Model 2. The corresponding numbers for Model 3 were 4 basis points and –4 basis points.

Table 2 shows the distribution of unemployment surprises, when classified according to whether unemployment increased by less than forecast, or unemployment increased by more than forecast. When Model 1 forecasts are used, out of a total of 408 months, there are 207 negative surprises (good news) and 201 positive surprises (bad news). Given the bias in the forecasts made using Models 2 and 3, it is not surprising that, the split is much less even for these two models.

To see how our forecasts compared to the predictions of experts, we studied the period February 1992 to August 1994 during which Fleming and Remolona (1998) reported statistics for unemployment rate surprises, based on consensus forecasts published in the Wall Street Journal. Their mean was –6.3 basis points with a standard deviation of 17.1 basis points. The forecast errors for the three models we use have comparable properties.

Daily Returns on Stocks and Bonds

We ignore dividends when computing stock returns — daily stock returns are defined as the percentage change in the S&P 500 stock index. Daily bond returns are constructed from daily yields. Daily government bond price data were not available to us, so we converted the daily yields into bond prices. (See Appendix A.)

Table 3 reports average daily returns on announcement days and non-announcement days during contractions and expansions. Bond returns are on average higher in contractions than expansions, and stock returns are higher in expansions than in contractions. In Table 4 we partition the sample further, computing average daily returns for both Thursday (day before announcement) and Friday (day of announcement), when the data are sorted into "good news" and "bad news" unemployment surprises. For brevity, we only report results with unemployment forecasts made using Method One. With the finer sort, a near-perfect pattern emerges in the response of stock prices. In contractions, average stock returns are positive on good news and negative on bad news. In contrast, during expansions average stock returns are negative on good news and positive on bad news. The only exception to this pattern is on Thursdays during expansions, where stock prices rise (very slightly) during both business cycle phases. Bond price responses are much smaller than stock price responses, and show no obvious state-dependency.

3. Regression Results: Stock And Bond Price Responses to Unemployment News

The S&P 500

In this section, we further investigate the response of the S&P 500 stock price index to unemployment news arrival using the linear model given in equation (2).

$$SPRTRN_t = b_0 + b_1 \cdot D_t \cdot ERRUMP_t + b_2 \cdot (1 - D_t) \cdot ERRUMP_t + u_t, \qquad (2)$$

where $SPRTRN_t$ denotes the return on day t on the S&P 500 index ignoring dividends; D_t denotes the dummy variable that takes on the value one in contractions and zero otherwise; $ERRUMP_t$ denotes the proxy for unemployment news – the surprise component of the unemployment rate announcement, b_0 denotes the intercept, b_1 and b_2 denote slope coefficients, and u_t is the error term.[4]

We estimate equation (2) using data for the period January 1962 to November 1995. Table 5 presents the estimates when the dependent variables are: the stock index return on the day prior to the announcement day (Thursday), on the announcement day (Friday) and on Thursday and Friday taken together. For all of the three event windows, and for all three estimation methods, a consistent pattern emerges. The coefficients are negative in contractions and positive in expansions, and are usually statistically significant. Moreover, in all cases the difference between the expansion and contraction coefficients is statistically significant at the 95% confidence level. Also in all cases, the announcement effect is much larger (in absolute value) in contractions than it is in expansions.

Reaction of Bond Prices to Unemployment News

We next turn our attention to the bond market response to unemployment news. The analogue of equation (2) for the bond market is given by equation (2a) below:

$$BRTRN_t = b_0 + b_1 \cdot D_t \cdot ERRUMP_t + b_2 \cdot (1 - D_t) \cdot ERRUMP_t + u_t , \qquad (2a)$$

where $BRTRN_t$ is the return on the bond of interest on date t, and other variables in (2a) are defined in the previous section. In the regressions that follow, the dependent variables are the return on a hypothetical 1-year government bond, the three month T-bill, and the 10-year government bond. (See appendix A for a discussion of how we constructed these returns.) Table 6 shows the bond price responses for all event windows, forecasting methods, and for contractions and expansions. Notice that under all three estimation methods, unemployment news has no significant effect on bond prices in contractions. In expansions, it has a positive and significant effect for the one year and ten year bonds, but not for the three month T-bill. The difference in responses across the two states is only statistically significant with Method two, and for the one year bond return.[5]

To summarize results, government bond price responses to the unemployment news arrival look rather different from stock prices; therefore the former cannot "explain" the latter. A further implication of these findings is that the unemployment news must be conveying information about the other two primitive factors — growth rate expectations and the risk premium investors demand to hold stocks. These two factors may affect stock prices but not bond prices, and therefore account for the differences in their response to unemployment news. Next, we examine the role of growth expectations and the equity risk premium in determining how stock prices respond to unemployment news.

Unemployment News, Growth Expectations, and The Equity Risk Premium

To see how the three primitive factors influence stock prices, it is convenient to consider the Gordon constant growth model used for security valuation. Let *r* be the interest rate on long term risk free claims, P the price of a security or portfolio, D the last period dividend, g the expected (constant) rate of growth in D, and π the risk premium investors require to invest in stocks. Then according to the Gordon model,

$$P = D(1+g) / (r + \pi - g).$$

Let u denote the unanticipated surprise in the unemployment rate (ERRUMP), so that (dP/P)/du represents the percentage change in the price of the security in response to an unemployment rate surprise. Then from the Gordon Model it follows that,

$$(dP/P) / du = - \{P/D\}\{1/(1+g)\}\times\{dr/du + d\pi/du - (-1 + D/P)\times dg/du \}$$

$$\approx - \{P/D\}\{ dr/du + d\pi/du - dg/du\} \qquad (3)$$

It will be useful to estimate that part of the change in stock prices that is due strictly to the change in the interest rate factor *r*, in response to the unemployment news. Letting P_s denote stock index price and P_b denote bond price, we define that component of stock price response that is strictly due to a change in the interest rate factor as $(dP_s/P_s)/du\,|_{dg = d\pi = 0.0}$. From inspection of (3) it is clear that $(dP_s/P_s)/du\,|_{dg = d\pi = 0.0} = -(P_s/D)*(dr/du)$.

Here P_s/D is the inverse of the dividend yield, which we have calculated on average from the CRSP tapes (1962 – 1995) to be 27.62 in expansions and 21.1 in contractions.

The results presented in the last section (Table 6) suggest that for bonds $(dP_b/P_b)/du > 0$ during expansions, which of course implies that $dr/du < 0$. During contractions, on the other hand, our estimates of $(dP_b/P_b)/du$ are never statistically significant and change signs depending on the estimation method. Thus it seems reasonable to assume that during contractions, $(dP_b/P_b)/du \approx dr/du \approx 0.0$.

We must next estimate dr/du during expansions. To a first order, dr/du = - Duration * $(dP_b/P_b)/du$. Assuming a duration of 7.4 for the 10 year government bond, and using the results from Table (6) we obtain dr/du = - .10, - .10, and - .12, respectively, according to the first, second and third forecasting models, during expansions. Columns 3 and 4 of Table 7 shows estimates of the effect on stock returns due to interest rates alone, $(dP_s/P_s)/du\,|_{d\pi\ =\ dg\ =\ 0.0}$, as well as estimates of the total stock price response to unemployment news, $d(P_s/P_s)/du$ (from Table 6). There are three separate estimates of both variables, one for each of the models used to predict the unemployment rate (See Section 2.). In contractions there is obviously no predicted stock price change due to news-induced interest rate changes; e.g. $(dP_s/P_s)/du\,|_{d\pi\ =\ dg\ =\ 0.0} = 0.0$. However, the estimated total effect of unemployment news on stock prices, $(dP_s/P_s)/du$ is negative, suggesting that either the risk premium π must be rising, the expected future growth rate g must be falling, or both.

During economic expansions, on the other hand, the sensitivity of stock returns to unemployment news due to its effect on the interest rate alone is about 3. However, the total effect of unemployment news on stock prices is estimated to be about 1. That is, the predicted effect on stock prices through the interest rate factor is much larger than the actual combined effect of all the three factors. Thus, during expansions, either the equity risk premium must be rising, growth expectations must be falling, or both. That is a logical implication of the observed responses of bond prices, stock prices, and the Gordon Model.

Column 5 of Table 7 takes this exercise a bit further and solves for the values of [(-P/D)(dπ/du – dg/du)] which are implied by the Gordon equation and the estimated values of the bond and stock price responses to unemployment news. This exercise provides an answer to the question, "How large would the combined risk-premium and growth rate effect have to be, in order to jointly explain the observed responses in stock and bond prices?" Obviously, at this stage we cannot separate the effects of dπ/du and dg/du and for convenience we define dϕ/du = [(-P/D)(dπ/du – dg/du)]. Separate estimates of dϕ/du are provided for expansions and contractions, and for each of the three forecasting methods. The main feature to note from Column 5 in Table 7 is that all estimates of dϕ/du are negative, meaning that a bad unemployment shock causes the risk premium to increase, growth expectations to decline, or both. They are also much larger during contractions as during expansions. Suppose unemployment news has no effect on the equity risk premium -- i.e., dπ/du = 0. Then according to the first estimate, dg/du, the effect of unemployment news on growth expectations, should be 2.4 times as large during contractions as during expansions; according to the second method, about 2.4 times as large, and according to the third method about 1.6 times as large.

These findings — based solely on the stock and bond price responses to unemployment news — make predictions for other primitive variables' news responses.

And these are empirically testable. In the next section we separately examine the response of the equity risk premium, π, and the dividend growth expectation, g, to unemployment surprises.

4. The Equity Risk Premium and Growth Expectations: How They Are Affected by Unemployment News.

The Equity Risk Premium: Its Response to Unemployment News

The equity risk premium is not directly observable and therefore we use two different proxies for it, both of which have been employed elsewhere in the literature. The first proxy is a measure of stock price volatility. We assume that market participants know the future volatility of stocks and use the variance of stock returns during the 10 trading days following the unemployment rate announcement.[6] These results are in Table 8, where we report results with all three estimation methods. As shown there stock price volatility is about twice as large in contractions as in expansions, but there is no evidence of a significant relation between unemployment news and volatility in either state of the economy. To the extent that this stock price volatility measure is a useful proxy for the equity risk premium, these results suggest that the equity risk premium is not significantly affected by unemployment news.

Next, we use the interest rate spread between Baa and Aaa bonds, which reflects default risk in the bond market, as a proxy for the equity risk premium. The regression results are again shown in Table 8, where the change in the yield spread, is the dependent variable and the unemployment surprise is the independent variable.[7] The change in the yield spread is significantly larger in contraction months than it is in expansion months. However, similar to our findings with stock price volatility, the unemployment surprise has no statistically significant effect on the change in the yield spread. The relationship is positive, as expected, meaning that positive surprises in the unemployment rate are associated with increases in the spread. Also, the relationship is several times larger in contractions than in expansions. However, the effect is not statistically significantly.

Actually, the results reported in Table 8 are representative of a much large set of tests we conducted using different proxy measures of the equity risk premium. In no case, did we find a statistically significant relationship with the unemployment surprise. However, the equity risk premium is notoriously difficult to measure at high frequencies, and our results may simply reflect that problem[8].

Growth Expectations: Their Response to Unemployment News

There is no direct measure of growth expectations. Therefore, we were obliged to construct indirect measures and we proceeded in two different ways. The first approach assumed that equity investors are rational agents, who study the data and make good forecasts. On that basis, we estimated the *true* relationship between the announced unemployment rate (the actual rate, not the surprise component) and subsequent dividend growth, using the Index of Industrial Production (IIP) as a monthly proxy for corporate dividends.[9] The idea was to see if this real sector relationship is significantly different in contractions than it is in expansions. If that is true, then that fact should be reflected in the expectations formation of rational investors.

Since each month the announcement of the IIP is made around the 15th (about one week after the announcement of unemployment rate), we studied the relation between IP in the "same month" and one to four months following the reference month of the unemployment announcement. We estimated the following equation:

$$IPGRATE_s = a_0 + a_1 DUMP_t + a_2(1-D_t)UMP_t + v_{t,} \quad (4)$$

where IPGRATE is the change in the IIP, s is the number of leads before announcement dates ($s = t, t+1, t+2, t+3, t+4$) and v_t is an error term. The results with (4) are shown in Table 9, employing all three different estimates of the unemployment surprise. The coefficients a_1, a_2 in (4) are consistently negative in sign for all five forecast horizons, and most of the coefficients are significantly different from zero. For expansion periods, however, the coefficients are much smaller than they are during contractions. It is useful to compare coefficients in contractions and in expansions, dividing the former by the latter. Going from the "same month" to four-month-ahead forecasts, this ratio is: 4.1, 7.2, 9.0, 2.7 and 1.35. This suggests that rational equity investors would be revising their dividend growth forecasts much more strongly in response to the unemployment surprises in contractions than in expansions. Since it is widely accepted that investors are rational, good forecasters, this finding is consistent with the predictions from the previous section.

Tests With Different Classes of Stocks: Public Utilities and Cyclicals

As a second test, we examined the unemployment news responses of different classes of common stocks. For companies whose dividends are relatively independent of macroeconomic conditions, revisions in their growth expectations should be relatively less important than for the average stock. For this class of stocks we chose a sample of 89 public utility companies. For companies whose dividends are relatively more dependent on macroeconomic conditions, revisions in growth expectations should be relatively more important than for the average stock. To represent such firms, we chose a sample from cyclical industries, including 24 transportation equipment and machinery companies, 30 electronic equipment companies and 35 industrial equipment companies. All firms in these two samples had 34 years of complete daily stock return data over the period from July 1962 to December 1995[10].

Table 10 shows the results with two-day (Thursday-Friday) returns for the two stock samples and, for purposes of comparison, for the S&P 500 and for the 1-year government bond. Turning first to the public utilities sample, we see that like bonds, the utility stocks respond positively and significantly to the unemployment announcement during expansions, but exhibit no significant relationship during contractions. For the public utilities, the coefficient in expansions is only about half that for bonds but this could reflect the fact that there is some growth revision effect for utility stocks.

For the cyclical stocks, the pattern of signs is the same as that for the S&P 500. And, like the S&P 500 results, the expansion and contraction coefficients for the cyclical stocks are different from one another at a high level of statistical significance. The individual coefficients tend to be less significant for the cyclical stocks than for the S&P 500. This is to be expected since there are fewer stocks in the cyclical stock portfolio than in the S&P500 with the result that it has more nonsystematic variance. The coefficient of the cyclical stocks is always much greater (in absolute value) than that of the S&P 500. Specifically, it is more than two times larger both in contractions and expansions, for all three forecasting methods. Overall, this is exactly the pattern of coefficients one would expect, if revisions in growth expectations were greater for the cyclical stocks than for the S&P 500.

The price responses of the public utility stocks are also consistent with this story, assuming that their growth revisions are relatively less important than those of the S&P 500. The utility price responses look much more like those of bonds, responding positively to unemployment surprises in expansions and insignificantly during contractions. Even the fact that the utility stocks exhibit a smaller positive response in expansions than do bonds is consistent, since this could be due to the fact that the public utilities experience at least some revision in forecast growth during expansions.

5. Summary and Conclusions

We have documented that on average stock prices rise on bad labor market news during expansions, and fall during contractions. This pattern cannot be explained based solely on how bond prices react to unemployment news. On average, bond prices rise on bad unemployment news during expansions, but do not respond significantly during contractions. Stock price responses during contractions are therefore unexplained.

Logically, there are two factors that affect the price of stocks but do not affect the price of risk-free government bonds. One is the equity risk premium and the other is the expected future growth rate of dividends on stocks. Since stock prices respond differently from bond prices, unemployment news must contain information about these two factors in addition to information about interest rates. Since we cannot observe the equity risk premium, we used several different proxy measures for it. However, we found no evidence that any measure of the equity risk premium is affected by unemployment news.

Next, we investigated changes in growth expectations. To jointly explain the documented pattern in stock price and bond price responses, growth expectation revisions would have to exhibit a particular pattern: specifically, they would have to be much larger during economic contractions than during economic expansions. We found evidence that this is true, based on tests in which unemployment rate announcements were used to forecast the actual growth rate in the Index of Industrial production, (a proxy for the growth rate in corporate dividends). On average, rising unemployment is followed by a much greater reduction in IIP growth during contractions than during expansions. If shareholders are rational, good forecasters, as is widely believed, their expectations revisions should reflect the same state-contingent pattern revealed in the real sector data.

Then, employing data for public utility and cyclical stocks, we obtained independent supporting evidence that unemployment news contains relatively more information about growth expectations during contractions than during expansions. We found that utilities stocks (whose dividend growth is relatively independent of the state of the economy) are priced much like bonds. That is, their price responses to the unemployment news are largely driven by changes in interest rate expectations. Cyclical stocks (whose dividend growth is relatively most dependent on the state of the economy) exhibited price responses with the same pattern as the S&P 500, but with even greater differences between expansion and contraction phases of the business cycle.

Future Research

The facts we have reported raise two fundamental questions that are not addressed in this study. First, "Why is the response of bond prices to unemployment news so dependent on the state of the economy?" And second, "Why do changes in the rate of unemployment have a much larger (lagged) effect on real activity during contractions than during expansions?" There is a large literature on state contingencies in macroeconomic relationships (for example, Hamilton (1989) or Neftci (1984)), but such issues are beyond the limited scope of this study.

The facts we have reported also have interesting and potentially important implications for asset pricing factor models that need to be further investigated, too. "Factor models" are widely used in security valuation and risk management, and "factor betas", (i.e. the sensitivity of stock price changes to macro-economic news), play a central role in such models. In several of these models factor betas vary over time in a systematic and stochastic fashion.[11] Hence it is natural to seek an explanation for this time variation, especially the systematic component of it. Campbell and Mei (1993) have shown that it is convenient to decompose the information in a given macroeconomic factor into the three primitive types of news that are relevant for valuing any stock. We have shown that the amount of the different primitive types of news in an unemployment rate announcement (which is, itself, a specific macroeconomic factor) depends on the state of the economy. This would lead the corresponding factor beta of a stock also to depend on the state of the economy. Clearly then, the sensitivity of stock returns to the same type of macroeconomic news will change over time too. This is because other things such as the state of the economy are not the same. Whether “other things” can best be captured in the linear factor model by introducing other factors (such as the past growth rate in output) — or alternatively by modeling the stochastic process governing time variation in factor sensitivity — is an issue for future research.

In sum, all we claim for this study is that we have provided an explanation of the odd pattern in stock price responses to unemployment news, during both phases of the business cycle. This explanation is consistent with many features of the data and, if there is another such explanation in the literature, we have not seen it.

Appendix A: Data

Unemployment rate announcements

The unemployment rate report along with wage earnings, weekly hours and employment is the first indicator of economic trends announced in each month. They are often used to construct other macroeconomic variables such as personal income, industrial production and productivity, that are announced late in the month.

We obtained unemployment announcement dates for the period from 1957 to 1995 from the Bureau of Labor Statistics. These announcements were usually made at 8:30am on the first Friday of the following month. Fridays were chosen as the usual announcement days after 1970, and of 306 announcements made after 1970 only 11 were non-Fridays and 295 were Fridays. A distribution of all announcement days in our sample (376), when daily stock prices were available, is: 10 on Tuesdays, 17 on Wednesdays, 39 on Thursdays and 310 on Fridays.

The S&P 500 index returns

Data for the daily S&P 500 Index after July 2, 1962 and for the monthly S&P 500 Index are from CRSP. Data for the daily Index before July 2, 1962 are from G. William Schwert and Robert Stambaugh. The S&P 500 Index return is constructed from these indices. Stock prices for the sampled utility stocks and cyclical stocks are from CRSP. To identify cyclical stocks we searched under three SIC categories as listed in Compustat: 3500-3599 (for industrial machinery and equipment), 3600-3699 (for electronic and other electric equipment), 3700-3799 (for transportation equipment).

Monthly returns

Let $SPWED_t$ be the level of the S&P 500 Index on the Wednesday before the announcement is made for month t. Let $SPFRI_t$ be the S&P Index level on the announcement day. (Both are closing prices.) We define the monthly return after the announcement by:

$$ANMEXT_t = \frac{SPWED_{t+1} - SPFRI_t}{SPFRI_t}.$$

For instance, if t is April 1978, then the unemployment rate for April 1978 was announced on May 5, 1978. The unemployment rate for May 1978 was announced on June 2, 1978 (two days before that is May 31). The monthly return from May 5 to May 31, with respect to May 5's unemployment announcement, was

$$ANMEXT_{May5} = \frac{SPWED_{May31} - SPFRI_{May5}}{SPFRI_{May5}}.$$

If the Wednesday-before-announcement was a non-trading day, we lagged one more day and used the Tuesday's closing price.

Business cycle definitions

We use the National Bureau of Economic Research's (NBER's) dating of business cycles, which is published on their web site. For our sample period, from 1962 to 1995, there were 351 expansion months and 57 contraction months. Table A.1 provides a summary. The NBER states that a recession is a recurring period of decline in total output, income, employment, and trade, usually lasting from six months to a year, and marked by widespread contractions in many sectors of the economy.

The 3-month T-Bill, 1-year and 10-year Treasury bond with constant maturity

Data for historical yields on the 3-month T-Bill traded on the secondary market, and 1-year, 10-year Treasury bond yields with constant maturity are from the Federal Reserve Board. The daily changes of yields are used to construct the 1-year and 10-year government bond returns. The yield on the 10-year Treasury bond with constant maturity is interpolated by the U.S. Treasury from the daily yield curve. Such a yield can be found even if there is no outstanding security that has exactly 10 years remaining to maturity. The returns for the 10-year government bond are constructed from a duration model.

Returns for the 3-month T-bill and 1-year government bond are constructed by converting yields to prices. For the one-year government bond, the following formula for the bond equivalent yield: $r_{bey} = \frac{10{,}000 - p}{p} \times \frac{365}{n}$ is used. For the 10-year government bond, we compute daily returns from daily yield changes, using the approximate relation between the change in yield and the price: $\frac{dp}{p} = -D \cdot \frac{dy}{1+y}$. The duration of the 10-year government bond is assumed to be 7.4. For the 3-month T-bill, we convert quoted yields to prices using the discount yield formula: $r_{bd} = \frac{10{,}000 - p}{10{,}000} \times \frac{360}{n}$.

Table A.1: Business Cycle Timing

Period	State of the economy / Number of months
1961.02 – 1969.12	expansion/106
1970.01 – 1970.11	*contraction/11*
1970.12 – 1973.11	expansion/36
1973.12 – 1975.03	*contraction/16*
1975.04 – 1980.01	expansion/58
1980.02 – 1980.07	*contraction/ 6*
1980.08 – 1981.07	expansion/12
1981.08 – 1982.11	*contraction/16*
1982.12 – 1990.07	expansion/92
1990.08 – 1991.03	*contraction/8*
1991.04 – 1995.12	expansion/57

Appendix B: Forecasting unemployment rates

To get the surprise component in the announcement of unemployment rate, we required forecasts of the change in the unemployment rate. The variables used to forecast unemployment rates include the growth rate of industrial production, the past unemployment rate, inflation, stock and bond returns. We found that past changes of the unemployment rate, the growth rate of industrial production, and bond market variables are good predictors of unemployment rates. However, the inflation rate and stock market returns are not. We followed the Box and Jenkins (1976) method, and used the SAS ARIMA procedure to pick the best ARMAX model. The criteria include the AIC (Akaike's Information Criterion), SBC (Schwarz's Bayesian Criterion), and the t-statistics for those coefficient estimates. Specifically, we looked for a model that had the lowest AIC and SBC values, with all regression coefficients being statistically significant. The final model we used to forecast the unemployment rate is presented in the paper. The estimation method is simple OLS.

To obtain the forecasts, we first estimated coefficients month by month as more observations were added (Our forecasts started in 1962.01 using the first 60 months of data). The monthly forecasts of the change in the unemployment rate (called $DUMPF_t$) are the fitted values of $DUMP_t$ in the above model.

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Table 1

Properties of the forecasted unemployment the rate.

		Method 1**			Method 2			Method 3		
	Unemployment rate	DUMP	DUMPF	ERRUMP	DUMP	DUMPF	ERRUMPF	DUMP	DUMPF	ERRUMPF
whole sample	6.149	-0.0012	0.0056	-0.0066	-0.0012	0.013*	-0.0142	-0.0142	0.0348*	-0.0285*
	(0.0762)	(0.0091)	(0.0061)	(0.0076)	(0.0091)	(0.0056)	(0.0081)	(0.0081)	(0.0058)	(0.0091)
contractions	6.819	0.221*	0.2432*	-0.0222	0.221*	0.144*	0.077*	0.077*	0.144*	0.0361
	(0.2371)	(0.0253)	(0.0163)	(0.0219)	(0.0253)	(0.0220)	(0.0230)	(0.0230)	(0.0213)	(0.0282)
expansions	6.04	-0.037*	-0.033*	-0.0041	-0.037*	-0.008	-0.029*	-0.029*	0.0116*	-0.0396*
	(0.0785)	(0.0083)	(0.0036)	(0.0081)	(0.0083)	(0.0046)	(0.0084)	(0.0084)	(0.0047)	(0.0094)

* Means and Standard errors for the means (in paraenthesis) are reported. ”*” denotes significance at the 5% level. DUMP is the change of unemployment rate. DUMPF is the predicted value for the change of unemployment rate. ERRUMP is the unanticipated component of unemployment rate, i.e., DUMP – DUMPF.

** In this table and in many of the tables that follow, the unemployment rate surprise is estimated in three different ways (which are discussed in more detail in the main body of the draft.) With “Method One”, final release data are employed for both the Index of Industrial Production and the unemployment rate announcement for the purposes of estimating the equation used to predict unemployment. This equation also contains a dummy variable for the state of the economy so that, in effect, these estimates are state-dependent. With “Method 2”, the data are exactly the same as with method one, but the state-of-the-economy dummy variable is omitted. With “Method 3”, no state dummy variable is included in the estimation and different data are employed. The forecasting equation uses only final release data which were, as of the announcement date, at least one year old. This forecast of the unemployement rate is then combined with the current period preliminary unemployment rate release to compute the surprise component. As discussed in the draft of the paper, the first two estimates are probably “too good” in the sense that actual forecasters could not have done as well in historical real time. The third estimating is clearly “too bad” in the sense that historical forecasts could have made more precise forecasts employing only those data which were available. As will become clear, choice of the forecasting method has limitated quantative effect on our results and no qualitative effect on our conclusions.

Table 2

Properties of the Computed Unemployment Rate Surprises

(Period: 1962.02 - 1995.12. Units: %/year)

	Method 1*				Method 2				Method 3			
	"Good News" (Actual unemployment less than predicted)		"Bad News" (Actual unemployment greater than predicted)		"Good News" (Actual unemployment less than predicted)		"Bad News" (Actual unemployment greater than predicted)		"Good News" (Actual unemployment less than predicted)		"Bad News" (Actual unemployment greater than predicted)	
	Number of observations	Mean [Standard Deviation]	Number of observations	Mean [Standard Deviation]	Number of observations	Mean [Standard Deviation]	Number of observations	Mean [Standard Deviation]	Number of observations	Mean [Standard Deviation]	Number of observations	Mean [Standard Deviation]
Contractions	32	-0.1308 (0.1141)	25	0.1168 (0.1055)	19	-0.1088 [0.1297]	38	0.170 [0.1043]	21	-0.1406 (0.1204)	23	0.1975 (0.1362)
Expansions	175	-0.1220 (0.0970)	176	0.1132 (0.0936)	205	-0.1323 [0.1028]	146	0.115 [0.0950]	141	-0.1431 (0.1114)	85	0.1321 (0.1196)

* "Method" refers to the forecasting procedure for unemployment. (See notes to Table 1.)

Table 3

Returns on Announcement Days and Other Days During

Expansions and Contractions (Period: 1962.01 - 1995.12, in %)

Panel A: **All Days**

		mean	standard deviation
Announcement days	S&P 500 Index	0.0280	0.850
	1-year government bond	0.0153	0.1218
Non-announcement days	S&P 500 index	0.0290	0.866
	1-year government bond	-0.0010	0.0885

Panel B: **Only announcement days**

		mean	standard deviation
Contractions	S&P 500 index	0.0092	0.95
	1-year government bond	0.0715	0.1886
Expansions	S&P 500 index	0.0205	0.83
	1-year government bond	0.0075	0.1067

Table 4

Announcement Day (Friday) and Pre-Announcement Day (Thursday) Returns

(period: 1962.01 - 1995.11, figures in %)

S&P 500 Stocks:

Mean (Standard Deviation), Conditional on the state of economy+		
	*good news**	*bad news*
Thursday(expansion)	0.0109	0.0486
	(0.6788)	(0.7283)
Thursday(contraction)	0.3518	-0.4289
	(1.1360)	(1.044)
Friday(expansion)	-0.0804	0.1366
	(0.8362)	(0.8075)
Friday(contraction)	0.0622	-0.0592
	(1.009)	(0.8891)

One-year Government Bond:

Mean (Standard Deviation), Conditional on the state of economy+		
	*Good news**	*Bad news*
Thursday(expansion)	-0.0080	-0.0044
	(0.0577)	(0.0487)
Thursday(contraction)	0.0541	0.0033
	(0.1381)	(0.1467)
Friday(expansion)	-0.0063	0.0219
	(0.1067)	(0.1052)
Friday(contraction)	0.0785	0.0623
	(0.2324)	(0.1140)

* News is Good (Bad) when the announced unemployment rate is less (more) than forecasted using the model.
+ These computations rely on unemployment forecasts using method one (see notes to Table 1.)

Table 5

Change in the S&P 500 Index in Response to Unemployment News*

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	Method 1			Method 2			Method 3		
	Thursday	Friday	Thursday + Friday	Thursday	Friday	Thursday + Friday	Thursday	Friday	Thursday + Friday
Contraction	-2.1818	-1.2030	-3.385	-1.96	-1.40	-3.36	-1.4876	-1.3077	-2.795
(b_1)	(-2.31)	(-1.44)	(-2.12)	(-2.42)	(-2.14)	(-2.52)	(-1.71)	(-1.98)	(-1.97)
Expansions	0.4101	0.5761	0.9862	0.34	0.57	0.91	0.4691	0.5534	1.023
(b_2)	(1.51)	(1.82)	(2.11)	(1.31)	(1.89)	(2.01)	(1.60)	(1.57)	(1.98)
The difference	-2.5919	-1.7793	-4.3710	-2.30	-1.97	-4.30	-1.9566	-1.8611	-3.818
(b_1-b_2)	(-2.65)	(-1.99)	(-2.64)	(-2.70)	(-2.69)	(-3.00)	(-2.14)	(-2.43)	(-2.51)

* The table reports the estimated values of the slope coefficients in the equation, $SPRTRN_t = b_0 + b_1 \cdot D_t \cdot ERRUMP_t + b_2 \cdot (1 - D_t) \cdot ERRUMP_t + u_t$.
$SPRTRN_t$ denotes the return on day t on the S&P 500 index ignoring dividends; D_t is a dummy variable that takes on the value one in contractions and zero otherwise; $ERRUMP_t$ is the surprise component of the unemployment rate announcement. White t-statistics are reported in parentheses. The sample period is from 1962.01 to 1995.12. The sample size is 376, after deleting non-trading days.

Table 6

T-Bill and Bond Price Responses to Unemployment News*

	Method 1					Method 2					Method 3				
	Thursday (1-year bond)	Friday (1-year bond)	Th +Fr (1-year bond)	Th + Fr (3-month T-bill)	Th + Fr (10-year bond)	Thursday (1-year bond)	Friday (1-year bond)	Th +Fr (1-year bond)	Th + Fr (3-month T-bill)	Th + Fr (10-year bond)	Thursday (1-year bond)	Friday (1-year bond)	Th +Fr (1-year bond)	Th + Fr (3-month T-bill)	Th + Fr (10-year bond)
Contraction	-0.1537	0.0279	-0.1258	-0.0152	-0.4509	-0.044	0.1152	0.071	0.0194	0.4177	-0.0706	0.0170	-0.054	0.00	-0.3038
	(-1.79)	(0.23)	(-0.72)	(-0.34)	(-0.56)	(-0.45)	(1.12)	(0.42)	(0.43)	(0.49)	(-0.75)	(0.14)	(-0.30)	(0.02)	(-0.40)
Expansions	0.0161	0.1056	0.1222	0.0152	0.7623	0.0233	0.097	0.1209	0.0123	0.7767	0.0266	0.1155	0.1424	0.0065	0.8961
	(0.72)	(2.84)	(2.64)	(0.86)	(2.57)	(1.05)	(2.69)	(2.68)	(0.67)	(2.77)	(0.85)	(2.26)	(2.22)	(0.24)	(2.49)
Difference	-0.1698	-0.0777	-0.2481	-0.0304	-1.2133	-0.0674	0.0182	-0.0498	0.0072	-0.3590	-0.0972	-0.0985	-0.1961	-0.0056	-1.200
	(-1.92)	(-0.60)	(-1.37)	(-0.63)	(-1.42)	(-0.68)	(0.16)	(-0.28)	(0.14)	(-0.40)	(-1.00)	(-0.73)	(-1.01)	(-0.10)	(-1.41)

* This table reports the slope coefficients in equation (3a) for T-Bills and Bonds. The t-statistics given in parenthesis were computed as described in the text, allowing for both serial correlation and conditional heteroscedasticity. The sample size is 380. The dependent variables, from left to right, are the Thursday return of 1-year bond, Friday return of 1-year bond, Thursday plus Friday return of 1-year bond, Thursday plus Friday return of 3-month T-bill, Thursday plus Friday return of 10-year government.

Table 7
Stock Price Response to Unemployment News Arrival:
Predicted Response due *to Interest Rate Effects Only*
And Predicted *Total Response*

Forecasting method	Col(1) 10 Year bond price change	Col(2) 10 year interest rate change	Col (3) Implied stock price change due to interest rate effects only	Col (4) Actual total stock price change	Col(5) Implied stock price change due to changes in growth expectations and risk premium	Col(6) Implied change in growth, no change in risk premium	Col(7) Ratio of contractions to expansions from Col 6	Col(8) Average price / dividend ratio
Contractions								
Method 1*	0	0	0	-3.40	-3.40	-0.16	2.40	21.1
Method 2	0	0	0	-3.66	-3.66	-0.17	2.41	21.1
Method 3	0	0	0	-2.79	-2.79	-0.13	1.57	21.1
Expansions								
Method 1	0.76	-0.10	2.85	0.99	-1.86	-0.07		27.62
Method 2	0.78	-0.10	2.90	0.91	-1.99	-0.07		27.62
Method 3	0.90	-0.12	3.34	1.02	-2.32	-0.08		27.62

* Refers to the method employed in forecasting the unemployment rate. See footnote to Table 1.

Column 1. Change in 10 year government bond price due to news. In expansions, from Table 6; in contractions assumed to be 0.

Column 2. Change in 10 year government bond rate, computed from column 1, using duration. (e.g. (Column 1.) / 7.4). Formally dr/du.

Column 3. Change in stock price due to interest rate effects only . Formally, $(dP_s/ P_s)/du \,\big|_{dg = d\pi = 0.}$

Column 4. Actual total stock price change due to unemployment news. Formally , $(dP_s/ P_s)/du$. Entries are from Table 5.

Column 5. Total stock price change - stock price change predicted by interest rates. (Col. 4. - Col. 3.) Formally, $d\phi/du$.

Column 6. Implied change in growth , dg/du, assuming no change in risk premium. (Col. 5. / Col. 8).

Column 7. (Column 6, expansions) /(Column 6, contractions).

Column 9. Price/dividend ratio from CRSP. Average over period 1962 1995.

Table 8

The reaction of the risk premium to the unemployment surprise.*

	Method 1†		Method 2†		Method 3†	
	Ten-day volatility after the announcement (VAR)	The change in the monthly default yield spread (DBA)	Ten-day volatility after the announcement (VAR)	The change in the monthly default yield spread (DBA)	Ten-day volatility after the announcement (VAR)	The change in the monthly default yield spread (DBA)
Constant term (contractions)	1.0675 (9.11)	0.0479 (1.14)	1.030 (9.85)	0.0326 (0.98)	1.1469(9.20)	0.0386(0.79)
Constant term (expansions)	0.4963 (15.13)	-0.01084 (-1.50)	0.4975 (14.86)	-0.0065 (-1.37)	0.6211(13.52)	-0.0095(-1.17)
Coefficient (contractions)	0.2333 (0.46)	0.1833 (0.68)	0.4529 (0.98)	0.2250 (1.51)	0.3799(0.79)	0.1304(0.74)
Coefficient (expansions)	0.1277 (0.69)	0.0515 (0.93)	0.099 (0.57)	0.0469 (1.21)	0.2932(1.40)	0.0478(0.73)

* The sample period is from 1962.1 to 1995.12. For the volatility regressions, the dependent variable is the daily stock return variance in the ten days after the announcement including the announcement day. For yield spread regressions, the dependent variable is the change of monthly corporate bond yield spread between Baa and Aaa bonds.

† "Method" refers to the forecasting procedure for unemployment, (see notes to Table 1).

Table 9

Linear Relation Between Unemployment News and
Growth Rates of Industrial Production

	Same Month*	One Month Ahead	Two Months Ahead	Three Months Ahead	Four Months Ahead
Contraction	-4.14	-3.29	-2.71	-1.37	-0.73
	(-9.32)	(-5.47)	(-5.96)	(-1.91)	(-1.36)
Expansion	-1.02	-0.46	-0.30	-0.51	-0.54
	(-4.27)	(-2.03)	(-1.26)	(-2.12)	(-1.78)
The	-3.12	-2.83	-2.41	-0.87	-0.19
Difference	(-6.12)	(-4.29)	(-4.67)	(-1.13)	(-0.30)

Note: This table reports the slope coefficient in the regression of the growth rates in industrial production on the actual changes in unemployment rates. The t-statistics reported in parenthesis were computed as described in the text.

Table 10

Response of U.S. Government Bonds, Public Utility Stocks,

The S&P 500 Index and Cyclical Stocks to Unemployment News*

(The dependent variables are two-day returns, in %)

	Method 1†			Method 2†			Method 3†		
	Contraction	Expansion	Difference	Contraction	Expansion	Difference	Contraction	Expansion	Difference
One-year Govt. Bond	-0.1258	0.1222	-0.2481	0.071	0.1209	-0.0498	-0.054	0.1424	-0.1961
	(-0.72)	(2.64)	(-1.37)	(0.42)	(2.68)	(-0.28)	(-0.30)	(2.22)	(-1.01)
Utility stocks	0.3113	0.6994	-0.3882	0.24	0.64	-0.39	0.446	0.802	-0.356
	(0.14)	(2.61)	(-0.18)	(0.13)	(2.51)	(-0.22)	(0.24)	(2.64)	(-0.19)
S&P500 stocks	-3.385	0.9862	-4.371	-3.36	0.91	-4.30	-2.795	1.023	-3.818
	(-2.12)	(2.11)	(-2.64)	(-2.52)	(2.01)	(-3.00)	(-1.97)	(1.98)	(-2.51)
Cyclical stocks	-8.52	3.01	-11.53	-8.90	2.20	-11.16	-6.381	2.781	-9.161
	(-1.50)	(1.56)	(-1.94)	(-1.99)	(1.44)	(-2.33)	(-1.40)	(1.60)	(-1.87)

* This table reports the slope coefficient in equation (3) for each type of security. The t-statistics reported in parenthesis were computed as described in the text, allowing for both serial correlation and conditional heteroscedasticity

† "Method" refers to the forecasting procedure for unemployment (see note to Table 1).

Footnotes

1. The authors benefited from comments from workshop participants at the Federal Reserve Bank of New York, Federal Reserve Bank of Atlanta, McGill University, University of Akron, University of Vienna, and Frank Diebolt, Wayne Ferson, Narayana Kockerlakota, and Ross Levine. We particularly benefited from discussions with Gordon Alexander.

2. For example, on December 6, 1974, the Labor Department released substantial bad news: the unemployment rate had risen from 6.0% to 6.6%. Around the announcement, the S&P 500 index declined by about 3.6 percent. However, it is just as easy to find cases in which the stock market *rose* sharply in response to bad unemployment news. On August 3, 1984, the Labor Department announced that the unemployment rate had increased from 7.2% to 7.5%, and around that announcement the S&P 500 index gained 5.4 percent. It is no coincidence that the first case occurred during a contraction and the second during an expansion.

3. Regression model 1. can be expanded to include Friday and day of the week dummy variables to account for the fact that announcements were not always made on Fridays. We chose not to report these results since inclusion of these variables did not affect our results in any substantial way.

4. Note that unemployment news is not observed. Hence we use a forecasting model to construct a proxy for it. The use of a proxy gives rise to the well known "errors in variables" problem, meaning that the estimated slope coefficients will be biased towards zero. The classical solution for the errors in variables problem is to use an instrumental variable that is correlated with the proxy but uncorrelated with that part of the stock index return that is orthogonal to the proxy. We have not been able to identify such an instrument and thus this bias is to some degree present in our estimates.

5. We did, however, find structural changes in the reactions of short-term interest rates. When the data are partitioned into sub-periods, the reaction to unemployment news was not significant before 1979, but was significant after 1983. We chose 79 and 83 as break points because according to the common view the 79–82 period was rather unusual. For brevity, these results are not presented

6. The nature of the relation between volatility and the risk premium is still subject to debate. While French, Schwert and Stambaugh (1987) and Campbell and Hentschel (1992) find a positive relation, Glosten, Jagannathan and Runkle (1993) find a negative relation. Backus and Gregory (1993) show that a negative and time varying relation between expected return and volatility is not necessarily inconsistent and rational expectations. Whitelaw (1999) convincingly argues that such a relation, in addition, is also consistent with aggregate consumption data in a representative agent framework. Since we want to examine the hypothesis that unemployment news and the equity premium are unrelated, the sign of the correlation between the equity premium and future volatility does not matter, as long as the correlation is not zero.

7. Because of the long time-series we are employing these interest rate spread data were only available to us on a monthly basis. Thus, DBA is actually the change in the monthly spread over the full month of the announcement date. Since the announcement is the first Friday of each month, this means that about one fourth of the days included in the spread computation occurred before the announcement date and three quarters after it. If anything, this measurement problem could bias our results towards insignificance.

8. We also investigated two other proxies for the equity risk premium. One was the bond default risk premium constructed by Ibbotson and Associates and the other was a commercial paper yield spread: the three month commercial paper rate minus the three month Treasury Bill rate. Neither of these two proxy measures was significantly associated with the unemployment surprise variable at usual confidence levels.

9. The correlation between the annual rate of growth in dividends and the IIP is only.247. However, it is well known that dividend payments are intentionally smoothed, even at annual frequencies. The correlation between quarterly earnings growth and IIP growth is a more respectable .464. Unfortunately, we know of no better proxy variable for dividends which is observable at monthly intervals.

10. This selection procedure undoubtedly introduces a "survivor bias" in the samples, but there is no obvious harm in that for present purposes.

11. For example, Bollerslev, Engle and Woodridge (1988), Ferson and Harvey (1991, 1993, 1999) and Ferson and Korajczyk (1993) empirically examine linear beta pricing models where the betas are allowed to vary over time. Jagannathan and Wang (1996) and Harvey (1999) follow Chen, Roll and Ross (1986) and use macroeconomic variables as factors, but allow factor betas to vary over time. Cochrane (2000) shows how time varying beta models can be examined using the stochastic discount factor approach.