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Is Macroeconomic Announcement News Priced?

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Is macroeconomic announcement news priced?

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Abstract

In this paper, we test whether news contained in macroeconomic announcements is priced in the cross-section of stock returns. When including news on a set of widely followed individual macroeconomic fundamentals in the cross-section of stock returns, estimates of their prices of risk are consistent with the explanation that good news on the economy is bad news for stocks during expansions. In contrast, during contractions, good news on the economy is good news for stocks as well. We find, however, that for most macroeconomic news events, their prices of risk are estimated imprecisely due to lack of data.

Keywords: Economic risk premia, macroeconomic announcements

JEL classification: G12, G14

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1 Introduction

In financial markets, macroeconomic announcements are frequently surrounded by large price movements. Jumps in return and trading dynamics around the release of macroeconomic fundamentals suggest that these announcements contain news that is relevant for investors. Theory also provides a strong case for seeing macroeconomic news as risk, for which investors command a reward in addition to the reward for the traditional risk factors. Ross [1976]'s arbitrage pricing theory predicts that variables that relate to common variation in financial assets are priced risk factors. Campbell and Hentschel [1992] argue that the arrival of small (large) pieces of news lowers (increases) expected future volatility, resulting in higher (lower) prices today. In the model of Bansal and Yaron [2004], the recursive nature of agents' preferences leads to price reactions and equity risk premiums when news on expected growth rates arrives.

Existing studies show ample evidence that financial markets are sensitive to news in macroeconomic announcements. Fleming and Remolona [1999], Balduzzi et al. [2001], Andersen et al. [2003, 2007] and Faust et al. [2007], for example, show that bond and foreign exchange prices respond to news on employment, inflation, output, housing, and consumer and producer confidence. For stocks, earlier studies find little evidence that their prices respond to macroeconomic announcements other than to inflation (see, for example, Schwert [1981], Hardouvelis [1987] and Cutler et al. [1989]). However, recognizing that macroeconomic announcements contain news on future interest rates and growth expectations, which may be valued differently over expansions and contractions, McQueen and Roley [1993], Boyd et al. [2005] and Andersen et al. [2007] show that stocks respond negatively to news about higher economic activity and employment during expansions, but positively during contractions.

Not only are financial markets sensitive to the arrival of macroeconomic news, macroeconomic announcement days are characterized by different average returns as well. Jones et al. [1998], for example, find a bond return Sharpe ratio of 0.145% for days on which the Bureau of Labor Statistics' (BLS) employment report and PPI are announced, compared

to a mere 0.01% for other days. Savor and Wilson [2013b] show that for the announcement days of FOMC rate decisions, and BLS' employment report and inflation statistics, Sharpe ratios are significantly higher than for other days. Lucca and Moench [2013] show that stock market returns in the 24-hour period prior to FOMC rate announcements are orders of magnitude larger than average returns outside of this 24-hour pre-FOMC window. Since the returns are earned prior to the announcement and thus can not be explained by the news event, the authors refer to this finding as a puzzle. In a discussion of Lucca and Moench [2013], Vissing-Jorgensen [2013] shows that the high pre-FOMC announcement earnings are particularly high when important macro news was scheduled in the pre-FOMC window.[1]

A natural question that follows is whether the high average announcement day returns are a compensation for sensitivity to news contained in macroeconomic announcements. Even though it is widely documented in the literature that financial markets are sensitive to macroeconomic announcement news, relatively few studies deal with how this sensitivity to macroeconomic announcement news is rewarded. In this paper, we examine whether macroeconomic announcement news, arguably the most important class of news events, is also a priced risk that partly determines expected returns. Our study is most closely related to Chen et al. [1986], who consider innovations in several economic variables as risks in their cross-sectional tests. Some economic variables that Chen et al. [1986] found to be significant in explaining expected returns are industrial production, changes in the risk premium, twists in the yield curve, and to a lesser extent, unexpected inflation. In this paper, we examine whether macroeconomic news events constitute priced risks, and relate news contained in macroeconomic announcements to the cross-section of announcement day returns. Considering the evidence from the literature that stocks respond differently to macroeconomic announcement news when the economy is expanding or contracting, we also allow for different prices of risk for macroeconomic announcement news during expansions and contractions.

[1] In fact, the high announcement day Sharpe ratios found by Savor and Wilson [2013b] are largely driven by the high returns observed just prior to FOMC announcements documented by Lucca and Moench [2013].

Our cross-sectional results show the following. For 12 out of the 14 macroeconomic fundamentals considered, we find that sensitivity to good news on the economy commands a positive price of risk during expansions, but a negative price of risk during contractions. Thus, while McQueen and Roley [1993] and Boyd et al. [2005], amongst others, show that stocks' sensitivity to macroeconomic announcement news is of different sign over expansions and contractions, our results indicate that their prices of risk also differ over the course of the business cycle. An implication of prices of risk changing sign over expansions and contractions is that when, for a given asset, its sensitivity to macroeconomic news changes sign over expansions and contractions as well, the reward for macroeconomic news for that asset (calculated as sensitivity times price of risk) is either always positive or always negative, regardless of whether the economy is expanding or contracting. However, we find that only the prices of risk for news on the University of Michigan's (U. Mich.) Consumer Confidence and the Federal Reserve Board's (FRB) Industrial Production during expansions are statistically different from zero. For all other macroeconomic news events, estimated prices of risk are not statistically significant. To obtain longer series on macroeconomic news events, we pool individual macroeconomic fundamentals with similar content. However, estimates for the factor prices for the macroeconomic news groups are not statistically different from zero for any of the categories of news events considered. Given that we have used the longest available series of macroeconomic survey data, have considered various specifications (including pooling of economic news events with similar content) and used efficient estimators, we conclude that the available data is not too short for precise inference of its factor premia.

The remainder of the paper is structured as follows. Section 2 outlines the empirical framework we use. In Section 3, we describe the data on macroeconomic surveys and announcements. To built intuition, Section 4 first describes the large differences in average returns between announcement days. Next, we report the cross-sectional results from augmenting the Fama-French model with macroeconomic announcement news. Finally, Section 5 concludes.

2 Research design

To test whether news contained in macroeconomic announcements changes the risk-return relation for stocks, we relate macroeconomic announcement news to expected returns in a linear factor model. We specify the cross-sectional risk-return relation for asset i as

$$E(R^e_{i,t}) = c + \beta^T_{i,F}\lambda_F + \sum_{j=1}^{J} \beta_{i,MEA_j}\lambda_{MEA_j}, \tag{1}$$

where $E(R^e_{i,t})$ is the expected excess return for asset i and c is a constant. $\beta_{i,F}$ and β_{i,MEA_j} are asset i's loadings on the pricing factors in F_t and to MEA_{jt}, news on macroeconomic fundamental of type j. λ_F and λ_{MEA_j} are its corresponding prices of risk.

As McQueen and Roley [1993] and Boyd et al. [2005] argue, stock markets respond differently to news contained in macroeconomic announcements, depending on whether the economy is expanding or contracting. This asymmetry is because macroeconomic events may contain news on future interest rates and growth expectations, which are valued differently over the course of the business cycle. In particular, McQueen and Roley [1993] and Boyd et al. [2005] find that news about interest rates dominates during expansions, while news about growth expectations dominates during contractions. Thus, when the economy is strong, good news on economic activity is bad news for stocks as it signals an increase in interest rates, while during contractions, good news about economic activity signals improved growth expectations. To allow for a different relation between macroeconomic announcement news and expected returns over expansions and contractions, we generalize (1) as follows

$$E(R^e_{i,t}) = c + \beta^T_{i,F}\lambda_F + \sum_{j=1}^{J} \beta^E_{i,MEA_j}\lambda^E_{MEA_j} + \sum_{j=1}^{J} \beta^C_{i,MEA_j}\lambda^C_{MEA_j}, \tag{2}$$

where β^E_{i,MEA_j} is stock i's loading to $MEA_j \times D_E$ and β^C_{i,MEA_j} its loading to $MEA_j \times D_C$. Here, D_E and D_C are dummy variables that take the value 1 during expansions and contractions, respectively. $\lambda^E_{MEA_j}$ is the price of risk for macroeconomic news of type j during expansions, while $\lambda^C_{MEA_j}$ is the price of risk for macroeconomic news of type j

during contractions.

Equations (1) and (2) link the expected returns on stocks to the risk factors in F, and to news on macroeconomic fundamentals $j = 1, ..., J$. While we cannot observe all news events that investors use to update their beliefs about macroeconomic fundamental j, we will focus our empirical analysis solely on scheduled announcement days, days for which we know for sure that news about fundamental j arrives.[2] Thus, for each macroeconomic fundamental j, we estimate the following cross-sectional equation

$$E(R^e_{i,t_j}) = c + \beta^T_{i,F,T_j}\lambda_{F,T_j} + \beta^E_{i,MEA_j,T_j}\lambda^E_{MEA_j,T_j} + \beta^C_{i,MEA_j,T}\lambda^C_{MEA_j,T_j}, \tag{3}$$

where $t_j \in T_j$ is the set of announcement days for macroeconomic fundamental j. $\beta^T_{i,F,j}$ are asset i's loadings to the risk factors in F, estimated on the set of announcement days T_j, with λ_{F,T_j} its prices of risk. β^E_{i,MEA_j,T_j} and $\beta^C_{i,MEA_j,,T}$ are asset i's loadings to announcement news of type j during expansions and contractions, respectively, estimated on the set of announcement days T_j. $\lambda^E_{MEA_j,T_j}$and $\lambda^C_{MEA_j,T_j}$ are their corresponding prices of risk.

The traditional risk factors included in the empirical tests are the market, size, and value factors, for which summary statistics for the traditional risk factors are given in Table 1. Return data on the value-weighted market index and Fama and French [1992]'s size and value factors are obtained from the website of Professor Kenneth French for the period January 1, 1980 to December 31, 2011. The value-weighted market index is in excess of the one-month Treasury bill rate from Ibbotson Associates. The empirical tests are performed using the framework of Hansen [1982]'s Generalized Method of Moments

[2]For our analysis, we assume that stock returns are driven by the same risk factors on both announcement days and non-announcement days, but that on announcement days, announcement news becomes observable. In contrast, Savor and Wilson [2013a]'s results show strong evidence for a relation between market beta and average returns on the announcement days for the employment report, inflation statistics, and FOMC rate decisions, while they find no evidence for such a relation on other days. However, Savor and Wilson [2013a]'s analysis is different from ours in that they impose that stock prices do not respond to news contained in macroeconomic announcements and that stocks' sensitivities do not change over announcement days and non-announcement days, which we do allow for. Reproducing Savor and Wilson [2013a]'s analysis, we find that the evidence for the CAPM and the Fama-French model is much weaker when FOMC announcement days are excluded. As shown by Lucca and Moench [2013], on FOMC announcement days, returns are mainly earned prior to the FOMC announcement.

(GMM), for which the details are summarized in the Appendix. Following Lewellen et al. [2010], we include the excess return market index and the size and value factors in our set of assets, thus implicitly imposing $\lambda_F = E_T(F_t)$.

3 Macroeconomic survey and announcement data

We obtain survey and announcement data on a set of widely followed macroeconomic fundamentals from Money Market Services (MMS) International and Bloomberg. MMS International has been conducting its survey on macroeconomic announcements from 1980 until the end of 2004, when it was discontinued after the company was taken over by Informa Financial Group. Forecast data from the MMS survey have been widely used in the literature on macroeconomic announcements (e.g. Andersen et al. [2003, 2007], De Goeij and Marquering [2006] and Funke and Matsuda [2006]). Bloomberg has been conducting surveys on scheduled macroeconomic releases since February 1997. Initially, the survey covered releases of the Bureau of Economic Analysis' (BEA) Gross Domestic Product (GDP) but within two years of its inception, it was extended to include other widely followed macroeconomic releases such as BLS' Consumer Price Index (CPI), Producer Price Index (PPI) and unemployment rate, and the FRB's Industrial Production. Currently, the Bloomberg survey covers more than 40 regularly scheduled macroeconomic releases. We merge the two surveys using the MMS survey for the period January 2, 1980 to October 31, 2004 and the Bloomberg survey for the period November 1, 2004 to December 31, 2011.[3]

We follow the literature (Pearce and Roley [1985], Balduzzi et al. [2001], Flannery and Protopapadakis [2002], and many others) and proxy macroeconomic news as the difference between the actual announcement, A_{jt}, and the median in analysts' prior forecasts, f_{jt}. To allow for comparison of estimates across fundamentals with different units of measurement,

[3]Tests for the equality of means for the MMS and Bloomberg surveys from January 4, 1999 to October 29, 2004, the period for which we have data from both data sources, do not reject that the means are equal.

all surprises are demeaned and standardized. Thus, news about fundamental j is defined

$$MEA_{jt} = \frac{A_{jt} - f_{jt}}{\hat{\sigma}_j}, \tag{4}$$

where $\hat{\sigma}_j$ is the sample standard deviation of the difference between the announcements and forecasts for macroeconomic fundamental of type j.

Table 2 describes the macroeconomic news series that are included in our analysis. The table lists the sources of the macroeconomic fundamentals, its starting date, its unit of measurement, and some summary statistics prior to demeaning and standardizing.

4 Empirical results

This section presents our main empirical results. Section 4.1 carries out some preliminary analyses and shows that average returns are distinctly different on announcement days, depending on whether the announcement contained good news or bad news and depending on whether the economy is expanding or contracting. Section 4.2 deals with the main question of this paper and examines whether news on a set of widely followed macroeconomic fundamentals is priced. In Section 4.3, we construct groups of macroeconomic fundamentals with similar economic content, pooled together to obtain longer macroeconomic news series. Section 4.3.2 reports estimates and their precisions for the cross-sectional prices of risk for the macroeconomic news groups.

4.1 Announcement day returns

To obtain some intuition on macroeconomic announcement news events and expected returns, Panel B of Table 3 compares average daily excess returns for the market index across the announcement days of the fundamentals included in the dataset. Columns 3-5 describe announcement day returns, also distinguishing between days with positive and negative announcement shocks.[4] To examine the difference in average returns over

[4]We refer to positive differences between the announced value and analysts' prior forecast as positive shocks, while announcements which were lower than the previously anticipated value are referred to as

expansions and contractions, Columns 6-8 describe average announcement day returns during expansions, and Columns 9-11 describe average announcement day returns during contractions. For comparison, Panel A of the Table summarizes daily returns for the market index for all days from January 1, 1980 to December 31, 2011

The table reports the averages and standard deviations of returns. For convenience, we annualize all average daily returns by multiplying it with 250 while standard deviations are annualized by multiplying it with the square root of 250. We do this regardless of whether the returns were averaged over the full sample or only over the subset of announcement days. Note though, that annualizing announcement day returns and standard deviations in this way may give the impression that during the year, each day was an announcement day, which is of course not the case. The p-values reported in Panel A are for the test that expected daily return over the full sample from January 1, 1980 to December 31, 2011 is zero. The p-values reported in Panel B, on the other hand, are for the test that announcement day expected returns equal expected daily return over the full sample from January 1, 1980 to December 31, 2011.

The table shows that announcement day average returns can be quite substantial. For example, annualized average daily returns on the Institute of Supply Management's (ISM) index announcement days and the Census Bureau's New home sales announcement days are an economically impressive 45% and 34%, respectively. This is much higher than the annualized daily market return of about 7% over the full sample.

If macroeconomic announcement news is priced, positive shocks and negative shocks should be reflected in different average returns. Columns 3 and 4 compare announcement day returns when the announced value was higher or lower than anticipated by analysts, and show some strong differences between average returns for announcement days with positive or negative shocks. For example, for days that the PPI was lower than expected, annualized average daily returns are about 35%, much higher than than its annualized daily return of about -4% for days that the announced value PPI was higher than expected.

We know that investors may value the same news differently over the course of the

negative shocks.

business cycle (McQueen and Roley [1993], Boyd et al. [2005], and others). Columns 6-8 and Columns 9-11 describe average announcement day returns in expansions and contractions, respectively. The columns show that average returns are in line with the finding in literature that good news on the state of the economy is bad news for stocks during expansions, while during contractions, good news on the economy is good news for stocks. For example, when the economy is expanding, negative Nonfarm Payrolls employment shocks, positive unemployment rate shocks, or a negative shock in the ISM index are characterized by high daily average returns of between about $48\% - 110\%$ per annum. In contractions, for days with bad news on Nonfarm payrolls (negative shocks), the unemployment news (positive shocks), or the ISM index (negative shocks), annualized average daily returns are between about -21% and -12%.

While the differences in average announcement day returns across expansions and contractions, and between days with positive and negative shocks are impressive, we cannot yet conclude from these results that returns on announcement days are driven by macroeconomic announcement news. To formally examine whether macroeconomic news events constitute priced risk, we test whether macroeconomic news help explain the cross-section of returns. This we do in the next section.

4.2 News on macroeconomic fundamentals and the cross-section of returns

4.2.1 Portfolios sorted on macroeconomic announcement news

Andersen et al. [2007] find that the response of stock indices, bonds, and exchange rates is largely restricted to the five-minute interval following the news announcement. Due to the transitory nature of news, betas on macroeconomic announcement news estimated on a daily frequency are commonly relatively inaccurately estimated. To alleviate the problems of inaccurately estimated betas, we aggregate stocks into portfolios to reduce estimation error.

The portfolios are constructed as follows. We download all common NYSE, AMEX,

and NASDAQ stocks from the Center for Research in Security Prices (CRSP). Individual stock returns are in excess of the one-month Treasury bill rate from Ibbotson Associates and the sample period is January 1, 1980 to December 31, 2011. For each non-penny stock[5] with at least 20 or more announcement day observations during both expansions and during contractions, we estimate (3) on the set of announcement days T_j. In our first attempt, stocks are sorted into portfolios on the basis of their sensitivity to macroeconomic announcement news. Since we know from the literature that stocks respond differently to macroeconomic announcement news over the course of the business cycle, we allocate stocks to portfolios on the basis of $\beta^E_{MEA_j,T_j}$ during expansions, while during contractions, we allocate stocks portfolios on the basis of $\beta^C_{MEA_j,T_j}$. To define expansions and contractions, we use the the Chicago Fed National Activity Index (CFNAI) index. Each portfolio has the same cumulative market cap, is rebalanced on a daily basis, and value-weighted. However, when sorted only on sensitivity to MEA_j, the portfolios with the lowest and highest β_{MEA_j,T_j} contain a very large number of small stocks, while middle portfolios contain relatively few, larger stocks. Though post-formation loadings to MEA_j line up as expected for the portfolios sorted on β_{MEA_j,T_j}, average portfolio returns seem to reflect a size premium: the portfolios with the lowest and highest β_{MEA_j,T_j} contain a large number of small stocks and have higher average portfolio returns, while the middle portfolios contain relatively few, large, stocks and have lower average returns than the outer portfolios.

To correct for a possible dependence between loadings to announcement news MEA_j and size, we construct portfolios sorted on both size and sensitivity to macroeconomic announcement news. First, we sort stocks into three size portfolios, where the cumulative market cap of each size-portfolio equals one-third of the total NYSE, AMEX, and NASDAQ market cap. Then, the stocks in each size portfolio are sorted into four portfolios on the basis of their β^E_{i,MEA_j,T_j} during expansions, and on the basis of their β^C_{i,MEA_j,T_j} during contractions. Again, cumulative market cap is the same across all portfolios, and

[5]We define penny stocks as stocks with prices lower than 5. Thus, when a stock's price drops below 5 today, it is not used for portfolio construction tomorrow.

portfolios are rebalanced on a daily basis and are value-weighted.

As an illustration, Table 4 reports various statistics for the 3×4 portfolios formed on size and sensitivity to Nonfarm payrolls employment (NFP) news. The left blocks of Panels A and B report the portfolios' post-formation $\beta^{E}_{MEA_{NFP},T_{NFP}}$ and $\beta^{C}_{MEA_{NFP},T_{NFP}}$, while the right blocks of Panels A and B report the t-statistics for the test that the portfolios' post-formation loadings are zero. Panels A and B of Table 4 show that the portfolios' post-formation loadings to NFP announcement news line up as expected. That is, within each size group, sensitivity to news on NFP increases from about -0.20 for portfolio 1 to about 0.20 for portfolio 4. Also, the loadings of the lower and higher $\beta_{MEA_{NFP},T_{NFP}}$ portfolios are all significantly different from zero.

Remember that portfolios were constructed on the basis of stocks' $\beta^{E}_{MEA_j,T_j}$ during expansions, while during contractions, stocks are allocated to portfolios on the basis of their $\beta^{C}_{MEA_j,T_j}$. To compare portfolio average returns, we thus also consider portfolio returns during expansions and contractions separately. Panels C and D of Table 4 report average announcement day portfolio returns during expansions and contractions, respectively. For each panel, the left block reports average announcement day return, while the right block reports the t-statistics for the test that the portfolio expected return equals zero. In Panel C, the average return for the difference between portfolios 5 and 1 is positive for all size groups, suggesting a positive price of risk for NFP news during expansions. Panel D, on the other hand, shows a negative average portfolio return for the difference portfolio, suggesting a negative price of risk for NFP during contractions. These average returns are in line with McQueen and Roley [1993] and Boyd et al. [2005], who argue that positive shocks in employment are bad news for stocks during expansions (and thus must be rewarded with a positive price of risk), but good news during contractions (and thus investors are willing to accept lower expected returns when stocks are sensitive to this). Even though we cannot draw any conclusions from these average portfolio returns, they suggest that NFP news commands a positive price of risk during expansions, and a negative price of risk during contractions.

4.2.2 Is macroeconomic announcement news priced?

To examine whether macroeconomic announcement news is a priced risk for stocks, we now examine the relation between macroeconomic announcement news in the cross-section of returns. For each macroeconomic fundamental j, (3) is estimated on the set of announcement days T_j for fundamental j using the 25 Fama-French portfolios and the value-weighted 3×4 portfolios sorted on size and sensitivity to announcement news. Table 6 reports the estimates for the prices of risk in (3) for all macroeconomic fundamentals in our dataset. For comparison, Table 5 gives the cross-sectional results for the Fama-French model estimated on all daily returns for our full sample period from January 1, 1980 to December 31, 2011.[6] Remember that to allow for comparison across fundamentals with different units of measurement, we standardized all macroeconomic news series. This implies that the prices of risk estimated for the macroeconomic news series equal their Sharpe ratios. Coefficients and adj. R^2 are estimated using GLS, while standard errors account for the errors-in-variables problem inherent to cross-sectional regressions.

Table 6 shows factor price estimates for good news on the economy which are negative during expansions, but positive during contractions. This is the case for all considered macroeconomic fundamentals, except for the ISM index and the Census Bureau's consumer confidence index. The asymmetric price estimates for macroeconomic announcement news are in line with the existing literature which shows that, during expansions, good news on the economy is bad news for stocks, but that during contractions, good news about the economy is also good news for stock markets (McQueen and Roley [1993], Boyd et al. [2005] and Andersen et al. [2007]). Boyd et al. [2005], for example, also show that their proxy for the equity risk premium responds positively to bad news on the unemployment rate during expansions, while its response during contractions is not significantly different from zero. For PPI and CPI, prices of risk are negative during expansions but

[6] As a robustness, we have checked the effects on our results of a few modifications in our methods and data. First, whether we use the CAPM or the Fama-French model as the benchmark model does not qualitatively or quantitatively change our results. Second, using NBER business cycle turning points instead of the CFNAI does not affect results much either. When we use NBER to distinguish between expansions and contractions, this results in fewer days that are identified as contracting. For most specifications, the reduction in contraction observations lowers the adj. R^2 of the regression slightly, but with estimates and inference very similar.

positive during contractions. This is in line with the negative response of stock markets to higher inflation during expansions documented by McQueen and Roley [1993] and Andersen et al. [2007]. Thus, while McQueen and Roley [1993] and Boyd et al. [2005], amongst others, show that stocks' sensitivity to macroeconomic announcement news is different during expansions and contractions, our results indicate that their prices of risk also differ over the course of the business cycle. An implication of prices of risk changing sign over expansions and contractions is that when, for a given asset, its sensitivity to macroeconomic news changes sign over expansions and contractions as well, the reward for macroeconomic news for that asset (calculated as sensitivity times price of risk) is either always positive or always negative, regardless of whether the economy is expanding or contracting. However, only few of those estimates are statistically different from zero, suggesting that individual macroeconomic news series are too short for precise estimation of its prices of risk. In the next subs-section, we try and improve on this precision by grouping macroeconomic indicators by economic content to obtain longer series.

The prices of risk that are statistically significant in Table 6 are the U. Mich.'s Consumer Confidence index's and Industrial Production's prices of risk during expansions. The estimated factor price for news on the U. Mich.'s Consumer Confidence index is 0.209% on a daily basis, which amounts to an annualized factor price of about 52%. This factor price seems high, but note that stock sensitivity to Consumer Confidence news can be very low. For example, the market index's loading to news on U. Mich.'s Consumer Confidence index is about 0.066 during expansions, resulting in an premium induced by sensitivity to U. Mich. Consumer Confidence news during expansions of $0.066 \times 52\%$, which is about 3.4% per annum. The factor price estimate for sensitivity to news on Industrial Production during expansions is about 0.135%, which is annualized about 34%. The market index's sensitivity to news about FRB's Industrial Production is about 0.016, resulting in an induced premium during expansions of about 0.5% per annum. As these two examples suggest, the contribution of announcement news to expected returns can be economically substantial, and can differ across macroeconomic fundamentals.

In Table 6, the cross-sectional adj. R^2's are reported in the second-to-last columns.

For comparison, for each macroeconomic fundamental, we also report the cross-sectional adj. R^2 of the regression on the Fama-French factors only, estimated on the same set of announcement days T_j. As the table shows, when we augment the Fama-French model with macroeconomic announcement news, the adj. R^2 slightly increases. For example, on the announcement days of the U. Mich. Consumer Confidence index, adding news on the announcement to the Fama-French factors increases cross-sectional adj. R^2 with about 4%. However, increases in adj. R^2 are generally relatively small and the adj. R^2's are thus likely not outside of each others' confidence interval.

In a recent paper, Savor and Wilson [2013a] show that on the announcement days for the BLS' employment report, BLS' CPI or PPI, and the announcement days for FRB's FOMC interest rate decisions, there is a much stronger relation between the traditional risk factors and average returns. In contrast to their results, we do not find stronger evidence for the CAPM or Fama-French model on announcement days, but rather the other way around (which we suspect to be due to the reduction in sample size). This is because the strong risk-return relation documented by Savor and Wilson [2013a] is particularly strong on FOMC announcement days. When FOMC announcement days are excluded from Savor and Wilson [2013a]'s set of announcement days, the relation between average returns and market beta becomes much weaker. As is shown by Lucca and Moench [2013], average returns earned during the 24 hours prior to the 2.15 p.m. FOMC rate decision announcements puzzlingly account for most of the return documented on FOMC announcement days.

4.3 Macroeconomic news groups

4.3.1 Construction of the macroeconomic news groups

The previous section showed that, given the available data, prices of risk for individual macroeconomic news events are not precisely estimated. A natural question to ask is whether longer series will improve efficiency in estimation of the prices of risk for macroeconomic news events. To obtain longer series on macroeconomic announcement news, we

pool the macroeconomic fundamentals to construct factors that contain news on similar economic content. The constructed groups comprise the categories employment, inflation, forward-looking fundamentals, consumer confidence, output and housing, where each category contains the macroeconomic fundamentals that are listed under its group heading in Table 2.

To make sure that the groups load positively on employment, inflation, output, etc., we multiply the individual news series in each group with 1 or -1.[7] For example, the employment news factor loads positively on positive shocks to Nonfarm payrolls employment but loads negatively on higher than expected Unemployment rate or the Department of Labor's (DOL) Initial jobless claims. Since all macroeconomic fundamentals considered in this paper, except for the Unemployment rate and Initial jobless claims, load positively on employment, inflation, output, etc., we multiply Unemployment rate news and Initial jobless claims news with -1 when constructing the groups, while all other news group constituents are multiplied with 1. Prior to pooling, individual announcement news series are standardized to unit standard deviation, and demeaned. Finally, the individual series in each group are stacked together, with news that is announced on the same day, averaged.

4.3.2 Prices of risk for the macroeconomic news groups

Table 7 reports the estimates for the prices of risk in (3), where we substitute the macroeconomic news factors $\widetilde{MEA}_j$ for news on individual macroeconomic fundamentals, MEA_j. The assets used are the 25 Fama-French portfolios and the 3×4 portfolios sorted on size and $\beta^E_{\widetilde{MEA}_j,T_j}$ during expansions, and on size and $\beta^C_{\widetilde{MEA}_j,T_j}$ during contractions. As before, macroeconomic news is standardized such that their estimated prices of risk equal their Sharpe ratios. Factor price estimates and cross-sectional adj. R^2's are calculated

[7] Ang and Piazzesi [2003] also construct macroeconomic factors by combining information from different macroeconomic fundamentals. To construct measures for inflation and real activity, they do the following. First, they extract the principal component from a group of variables that are selected to represent measures of inflation and real activity. Then, they add to this, some latent factors. Since we focus specifically on announcement days, aggregating information on a monthly level using principal components analysis is not suitable for our analysis.

using GLS, and the reported GMM standard errors automatically correct for the errors-in-variables problem due to the two-pass nature of cross-sectional regressions.

Our intention for creating the macroeconomic news factors $\widetilde{MEA}_j$ was to obtain longer series with similar macroeconomic news content to estimate prices of risk for macroeconomic news events more efficiently. Table 7 shows that pooling macroeconomic fundamentals does not lead to estimates of its prices of risk so precise that they are statistically significant. Furthermore, for half of the groups, the sign of the price of risk estimates are different from what is expected from economic reasoning. For example, factor price estimates for good news on employment, forward-looking fundamentals and consumer confidence are negative during expansions. However, as shown by Boyd et al. [2005] and others, good news on the state of the economy is bad news for stocks and thus, a negative price of risk is economically not plausible.

5 Conclusions

In this paper, we examine whether news on macroeconomic fundamentals constitutes priced risk. To answer this question, we relate a comprehensive set of widely followed macroeconomic news factors to the cross-section of stock returns. Using the evidence from the existing literature that investors can value the same news differently, depending on whether the economy is expanding or contracting, we allow for different prices of risk during expansions and contractions for macroeconomic news events.

We find positive price of risk estimates for good news on the state of the economy during expansions, but negative price of risk estimates for good news on the economy during contractions. Thus, while existing literature shows that stocks respond differently to the same macroeconomic news over the course of the business cycle, our results suggest that their associated prices of risk also differ over expansions and contractions. However, only for sensitivity to U. Mich.'s Consumer Confidence news and sensitivity to news contained in FRB's Industrial Production during expansions, prices of risk are statistically significant. For all other announcement news events, prices of risk are not statistically

significant. While prices of risk are not always sufficiently accurately estimated to be statistically significant, signs of the prices of risk during expansions and contractions for almost all included fundamentals are in line with McQueen and Roley [1993] and Boyd et al. [2005]'s "good news is bad news" story. However, given that we have made use of the longest available series of survey data, have considered various specifications and used efficient estimators, we conclude that the available macroeconomic survey data is too short for precise estimation of macroeconomic announcement news factor premia.

Our results are useful for future research, and suggest that other methods might be more fruitful for precise estimation of the factor premia associated with macroeconomic announcement news. Thus, although some studies show that analyst survey medians are better forecasters than forecasts obtained from econometric models (e.g. Ang et al. [2007]), available data on analyst survey medians is not long enough to obtain precise price of risk estimates for most macroeconomic fundamentals.

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6 Appendix

To control for the errors-in-variables problem due to the two-pass nature of cross-sectional regressions, we follow Cochrane [2005, p. 241] and estimate the time-series and cross-sectional regressions for our empirical tests simultaneously via GMM. For news about fundamental j, $j = 1, ..., J$, the moment conditions corresponding to asset i are

$$\begin{bmatrix} I & 0 \\ 0 & \theta \end{bmatrix} E_T \begin{bmatrix} R^e_{i,t_j} - \alpha_{i,T_j} - \beta^T_{iF,T_j} F_{t_j} - \beta^E_{i,MEA_j,T_j} MEA_{j,t_j} D_{E.t_j} - \beta^C_{i,MEA_j,T_j} MEA_{j,t_j} D_{C.t_j} \\ (R^e_{i,t_j} - \alpha_{i,T_j} - \beta^T_{iF,T_j} F_{t_j} - \beta^E_{i,MEA_j,T_j} MEA_{j,t_j} D_{E.t_j} - \beta^C_{i,MEA_j,T_j} MEA_{j,t_j} D_{C.t_j}) \otimes [F_{t_j} \; MEA_{j,t_j}] \\ R^e_{i,t_j} = c + \beta^T_{i,F,T_j} \lambda_{F,T_j} + \beta^E_{i,MEA_j,T_j} \lambda^E_{MEA_j,T_j} + \beta^C_{i,MEA_j,T} \lambda^C_{MEA_j,T_j}, \end{bmatrix} = 0,$$

where T_j is the set of announcement days for macroeconomic fundamental j, I is an identity matrix of size $n + nK$, with n the number of assets and K the number of factors. θ sets a linear combination of the moments relating to the expected return relation to zero to obtain estimates for the cross-sectional parameters and is of size nK. Solving for the above system obtains OLS estimates for the time-series parameters. For the cross-sectional parameters, setting θ to $[\beta^T_{F,T_j} \; \beta^E_{MEA_j,T_j} \; \beta^C_{MEA_j,T_j}]$ obtains OLS estimates. To obtain GLS estimates for the cross-sectional parameters, we can use either Σ^{-1}_{rr} instead of Σ^{-1}_{ee} in the weighting matrix θ. As noted in Section 2, we include the traded factors in F_t in our set of test assets. Since by definition the time-series residuals for the traded factors are 0, this results in infinite weights for the traded factors when $\theta = [\beta^T_{F,T_j} \; \beta^E_{MEA_j,T_j} \; \beta^C_{MEA_j,T_j}]\Sigma^{-1}_{ee}$. To avoid infinite weights, we use Σ^{-1}_{rr} instead of Σ^{-1}_{ee} in the weighting matrix θ.

As a measure of goodness-of-fit, we report the GLS cross-sectional Adj. R^2. Kandel and Stambaugh [1995] and Lewellen et al. [2010] argue that the GLS cross-sectional R^2 is an economically appealing metric for comparing models as it measures the proximity of the factors' mimicking portfolios to the minimum-variance boundary, thereby quantifying the model's ability to explain expected returns. The OLS cross-sectional R^2, on the other hand, measures only the model's ability to explain the expected returns of the included set of assets.

7 Tables

Table 1: Summary statistics for the market, size and value factors

The table reports summary statistics for the value-weighted market index, and the size and value factors. The value-weighted market index is in excess of the 1-month Treasury bill from Ibbotson Associates. Means and standard deviations are in annualized percent return, while maximum and minimum refer to the maximum and minimum daily percent return. The sample period is January 1, 1980 to December 31, 2011.

	$MKT - R_f$	SMB	HML
Mean (annualized)	6.80%	0.54%	4.00%
St. Dev. (annualized)	17.52%	9.09%	8.72%
Maximum	11.52%	6.46%	4.01%
Minimum	-17.16%	-11.25%	-4.91%
Skewness	-0.62	-1.10	0.14
Kurtosis	18.57	27.02	9.83

Table 2: Descriptives for the macroeconomic fundamentals

The table describes the macroeconomic fundamentals considered in our analyses. The acronyms in the second column are for the Bureau of Labor Statistics (BLS), the Department of Labor (DOL), the Federal Reserve's Board of Governors (FRB), and the Bureau of Economic Analysis (BEA). The columns labeled "Mean" and "St. Dev." give the mean and standard deviation for news about the fundamentals, where news is defined as the difference between the actual announcement and analysts' prior median forecast. Macroeconomic survey and announcement data are downloaded from MMS International for the period January 1, 1980 to October 31, 2004, and announcement and survey data for the period November 1, 2004 to December 31, 2011 are downloaded from Bloomberg.

	Source	Unit of measurement	Nr. of obs.	Start of sample	Mean	St. dev.
Employment						
NFP	BLS	$K change	316	02/85	-10.755	106.901
Unemployment rate	BLS	% change	374	02/80	0.000	0.002
Initial Jobless claims	DOL	K claims	1059	07/91	0.370	18.774
Inflation						
PPI	BLS	% change	379	02/80	0.000	0.004
CPI	BLS	% change	382	02/80	0.000	0.001
Forward-looking						
ISM	Inst. of supply management	Index value, % change	263	02/90	0.038	2.034
Leading indicators	Conference board	MoM % change	381	02/80	0.000	0.003
Durable goods orders	Census bureau	MoM % change	380	02/80	0.000	0.029
Consumer confidence						
Consumer confidence index	Conference board	Index value, % change	246	07/91	0.149	5.089
U. Michigan confidence index	U. Michigan/Thomson Reuters	Index value, % change	301	05/99	-0.144	2.916
Output						
Industrial production	FRB	MoM % change	380	02/80	0.000	0.003
GDP final	BEA	QoQ net % change	167	04/97	0.000	0.005
Housing						
New home sales	Census bureau	Thousands	281	03/88	6.338	60.063
Housing starts	Census bureau	Millions, seas. Adj.	377	03/80	11.987	94.915

Table 3: Average market returns on announcement days

The table describes average daily percent returns for excess returns of the value-weighted market index, calculated on the full sample of daily returns, and the samples of announcement days. Rows labeled "Mean (ann., %)" give average daily percent returns that were annualized by multiplying it with 250. Rows labeled "St. Dev. (ann., %)" are daily standard deviations annualized by multiplying it with $\sqrt{250}$. Panel A describes average returns over the full sample of daily returns, and Panel B describes average returns calculated only on the sets of announcement days for the macroeconomic fundamentals considered. In Panel B, Columns 3-5 describe announcement day returns for all announcement days, and for days when positive and negative announcement shocks were announced, respectively. To examine the difference in average returns over expansions and contractions, Columns 6-8 describe announcement day returns during expansions, while Columns 9-11 describe average announcement day returns during contractions. The p-value in Panel A is for the test that expected daily return over the full sample from January 1, 1980 to December 31, 2011 is zero. Rows labeled "P-value" in Panel B give the p-values for the test that announcement day expected returns equal expected daily return over all days.

Panel A: market returns on full sample of daily returns										
Full sample	Mean (ann.,%)	6.80								
	P-value	0.03								
	St. Dev. (ann.,%)	17.52								
Panel B: market returns on macroeconomic announcement days										
		Announcement days			Announcement days in expansions			Announcement days in contractions		
		All	Pos. shocks	Neg. shocks	All	Pos. shocks	Neg. shocks	All	Pos. shocks	Neg. shocks
NFP	Mean (ann.,%)	8.60	4.39	12.97	34.42	23.98	48.33	-20.71	-24.54	-17.71
	P-value	0.91	0.91	0.78	0.20	0.55	0.21	0.23	0.36	0.42
	St. Dev. (ann.,%)	18.34	17.80	18.93	17.44	17.92	16.87	19.19	17.61	20.45
Unemp. Rate	Mean (ann.,%)	12.23	30.88	-8.76	32.32	78.22	-1.70	-9.66	-3.28	-21.13
	P-value	0.71	0.23	0.46	0.20	0.02	0.75	0.43	0.70	0.42
	St. Dev. (ann.,%)	17.70	17.86	17.46	17.07	16.96	16.91	18.30	18.26	18.50
Initial jobless claims	Mean (ann.,%)	7.42	-0.52	14.91	0.30	7.62	-6.10	15.32	-8.84	40.07
	P-value	0.95	0.57	0.51	0.59	0.96	0.43	0.51	0.38	0.06
	St. Dev. (ann.,%)	18.98	20.33	17.62	14.40	13.66	15.04	23.02	25.42	20.19
PPI	Mean (ann.,%)	14.93	-4.07	34.86	34.41	29.42	39.60	-7.29	-41.98	29.42
	P-value	0.58	0.59	0.17	0.16	0.41	0.24	0.51	0.10	0.45
	St. Dev. (ann.,%)	17.99	20.45	14.95	14.42	16.51	11.94	21.31	24.02	17.87
CPI	Mean (ann.,%)	9.93	2.89	22.09	13.00	8.31	21.27	6.49	-3.30	22.99
	P-value	0.83	0.83	0.52	0.75	0.95	0.66	0.99	0.70	0.63
	St. Dev. (ann.,%)	17.66	17.23	18.40	15.01	16.15	12.83	20.26	18.46	23.10

Table 2.3, continued.

		Panel B: market returns on macroeconomic announcement days								
		Announcement days			Announcement days in expansions			Announcement days in contractions		
		All	Pos. shocks	Neg. shocks	All	Pos. shocks	Neg. shocks	All	Pos. shocks	Neg. shocks
ISM	Mean (ann.,%)	45.36	47.39	43.35	64.98	27.53	109.92	25.59	71.61	-12.12
	P-value	0.03	0.10	0.13	0.02	0.53	0.00	0.44	0.07	0.57
	St. Dev. (ann.,%)	20.70	18.90	22.42	14.85	14.49	14.90	25.26	23.22	26.75
Leading ind.	Mean (ann.,%)	17.90	41.34	3.34	10.19	44.94	-11.22	26.61	37.32	19.89
	P-value	0.44	0.14	0.85	0.86	0.23	0.47	0.35	0.36	0.62
	St. Dev. (ann.,%)	17.75	17.55	17.84	14.02	14.52	13.58	21.21	20.52	21.71
Dur. Goods orders	Mean (ann.,%)	19.82	21.02	18.65	11.43	0.18	21.93	29.45	43.72	14.68
	P-value	0.37	0.48	0.56	0.81	0.81	0.58	0.28	0.21	0.79
	St. Dev. (ann.,%)	14.74	14.57	14.94	11.41	11.38	11.46	17.82	17.35	18.35
Cons. Conf.	Mean (ann.,%)	34.23	23.92	44.05	13.22	14.30	11.71	57.39	39.94	68.30
	P-value	0.13	0.50	0.14	0.79	0.82	0.90	0.05	0.42	0.06
	St. Dev. (ann.,%)	19.83	18.01	21.47	16.91	17.01	16.93	22.60	19.73	24.34
U. Mich. Conf	Mean (ann.,%)	3.02	-25.03	35.29	-10.32	-23.10	2.46	11.39	-26.12	58.51
	P-value	0.82	0.15	0.23	0.51	0.41	0.91	0.82	0.23	0.09
	St. Dev. (ann.,%)	19.45	20.48	18.05	18.03	19.82	16.17	20.32	20.94	19.23
Ind. Prod.	Mean (ann.,%)	4.30	-10.42	23.27	23.08	3.80	54.38	-17.02	-30.39	-3.65
	P-value	0.86	0.37	0.45	0.41	0.90	0.13	0.26	0.21	0.72
	St. Dev. (ann.,%)	16.43	17.00	15.63	15.56	16.64	13.48	17.31	17.52	17.16
GDP final	Mean (ann.,%)	17.05	30.94	6.53	-3.25	12.89	-15.85	32.82	45.38	23.52
	P-value	0.64	0.46	0.99	0.76	0.90	0.60	0.37	0.38	0.66
	St. Dev. (ann.,%)	19.59	21.30	18.27	18.91	18.69	19.27	20.15	23.38	17.58
New home sales	Mean (ann.,%)	34.02	34.11	33.93	1.36	15.65	-15.58	67.39	57.42	75.19
	P-value	0.10	0.25	0.25	0.82	0.78	0.52	0.01	0.15	0.03
	St. Dev. (ann.,%)	16.57	14.18	18.64	14.65	11.46	17.74	18.14	16.99	19.09
Housing starts	Mean (ann.,%)	19.31	21.00	17.89	37.62	43.30	32.38	-1.83	-7.83	2.67
	P-value	0.39	0.51	0.57	0.12	0.20	0.35	0.69	0.65	0.88
	St. Dev. (ann.,%)	17.89	17.12	18.56	13.15	13.17	13.20	22.10	21.13	22.91

Table 4: Portfolios sorted on size and sensitivity to news on Nonfarm payrolls

NYSE, AMEX, and NASDAQ common stocks are sorted into 3×4 portfolios sorted on size and sensitivity to Nonfarm payrolls news. First, stocks are assigned to one of the three size portfolios, where all size portfolios are of equal cumulative market cap. Second, each size portfolio is sorted into four Nonfarm payrolls news portfolios as follows. During expansions, stocks are sorted into portfolios on the basis of their $\beta^{E}_{MEA_{NFP},T_{NFP}}$, while during contractions, stocks are sorted into portfolios on the basis of their $\beta^{C}_{MEA_{NFP},T_{NFP}}$. The left block of Panels A and B report the portfolios' post-formation $\beta^{E}_{MEA_{NFP},T_{NFP}}$ and $\beta^{C}_{MEA_{NFP},T_{NFP}}$, while the right blocks report the t-statistics for the test that post-formation loadings to Nonfarm payrolls news equal zero. Panels C and D describe average portfolio returns during announcement days in expansions and contractions, respectively. In each Panel, the left block reports average announcement day returns for the portfolios, while the right block reports the t-statistics for the test that the portfolio average return equals zero. The sample period is January 1, 1980 to December 31, 2011.

	Panel A: Post-formation $\beta^{E}_{MEA_{NFP}}$							
	$\beta^{E}_{MEA_{NFP}}$				T-statistic			
	Low	2	3	High	Low	2	3	High
Small	-0.271	-0.057	0.062	0.275	-10.13	-3.98	3.28	9.85
Middle	-0.214	-0.050	0.041	0.187	-5.77	-1.31	1.46	5.58
Big	-0.134	-0.068	0.086	0.135	-3.27	-1.28	2.11	3.39

	Panel B: Post-formation $\beta^{C}_{MEA_{UNEMP}}$							
	$\beta^{C}_{MEA_{NFP}}$				T-statistic			
	Low	2	3	High	Low	2	3	High
Small	-0.283	-0.059	0.083	0.326	-7.84	-2.66	4.50	9.30
Middle	-0.171	-0.047	0.038	0.290	-4.76	-1.41	1.24	7.84
Big	-0.213	-0.091	0.097	0.080	-4.67	-2.07	1.50	1.74

	Panel C: Expansion sample, announcement day average returns									
	Average returns					T-statistic				
	Low	2	3	High	High - Low	Low	2	3	High	High - Low
Small	0.104	0.086	0.090	0.195	0.092	1.15	1.16	1.17	1.98	1.59
Middle	0.124	0.127	0.065	0.195	0.070	1.12	1.37	0.73	1.89	1.11
Big	0.109	0.138	0.052	0.230	0.121	1.03	1.44	0.52	1.95	1.57

	Panel C: Contraction sample, announcement day average returns									
	Average returns					T-statistic				
	Low	2	3	High	High - Low	Low	2	3	High	High - Low
Small	-0.032	-0.038	-0.060	-0.121	-0.089	-0.26	-0.38	-0.57	-0.99	-1.45
Middle	-0.062	-0.081	-0.111	-0.184	-0.123	-0.54	-0.85	-1.06	-1.66	-1.95
Big	-0.109	-0.071	-0.159	-0.184	-0.075	-1.05	-0.81	-1.34	-1.67	-1.11

Table 5: Prices of risk Fama-French model

The table reports the prices of risk for the Fama-French model. The assets are the 25 Fama-French portfolios and the 12 industry portfolios. Prices of risk are in daily percent and estimated using GLS. The column labeled "Adj. R^2" gives the cross-sectional GLS adj. R^2. T-statistics are calculated using GMM standard errors that account for the errors-in-variables problem. The sample period is January 1, 1980 to December 31, 2011.

	λ_F	T-statistic	Adj. R^2
Constant	0.001	1.76	0.072
ERM	0.026	2.14	
SMB	0.001	0.21	
HML	0.015	2.47	

Table 6: Factor prices Fama-French model augmented with macroeconomic announcement news

The table presents price of risk estimates for the specification in (3) that includes news about macroeconomic fundamental j, $j = 1, ..., J$. For each macroeconomic fundamental j, $j = 1, ..., J$, the specification is estimated on T_j, the set of announcement days for fundamental j, using the 25 Fama-French portfolios and the 3×4 portfolios sorted on size and stocks' sensitivity to announcement news. The column labeled "Adj. R^2" gives the cross-sectional GLS Adj. R^2 while the column labeled "Adj. R^2 (FFC)" gives the GLS cross-sectional adj. R^2 for the Fama-French model estimated on the set of days T_j. Prices of risk are in daily percent and estimated using GLS. T-statistics are calculated using GMM standard errors that account for the errors-in-variables problem. The sample period is January 1, 1980 to December 31, 2011.

		λ	T-stat.	Adj. R^2	Adj. R^2 (FFC)	Nr. of obs.
NFP	c	-0.001	-0.48	0.026	0.028	316
	ERM	0.035	0.54			
	SMB	0.018	0.58			
	HML	-0.030	-0.96			
	$MEA \times D^E$	0.022	0.19			
	$MEA \times D^C$	-0.014	-0.13			
Unemp. Rate	c	0.000	-0.18	0.036	0.025	374
	ERM	0.049	0.85			
	SMB	0.026	0.92			
	HML	-0.025	-0.87			
	$MEA \times D^E$	-0.004	-0.05			
	$MEA \times D^C$	0.021	0.26			
Jobless claims	c	0.001	0.95	0.096	0.096	1059
	ERM	0.028	0.77			
	SMB	0.040	2.27			
	HML	-0.009	-0.47			
	$MEA \times D^E$	-0.093	-1.07			
	$MEA \times D^C$	0.077	0.77			
PPI	c	-0.001	-0.44	0.222	0.203	379
	ERM	0.061	1.04			
	SMB	0.053	1.88			
	HML	-0.031	-1.25			
	$MEA \times D^E$	-0.045	-0.38			
	$MEA \times D^C$	0.026	0.19			
CPI	c	0.001	0.30	0.088	0.049	382
	ERM	0.039	0.69			
	SMB	-0.013	-0.48			
	HML	0.038	1.27			
	$MEA \times D^E$	-0.070	-0.74			
	$MEA \times D^C$	0.015	0.14			

Table 2.6, continued.

		λ	T-stat.	Adj. R^2	Adj. R^2 (FFC)	Nr. of obs.
ISM	c	0.005	1.75	0.186	0.191	263
	ERM	0.177	2.19			
	SMB	-0.139	-3.41			
	HML	0.059	1.55			
	$MEA \times D^E$	-0.018	-0.21			
	$MEA \times D^C$	0.072	0.85			
Leading ind.	c	-0.003	-1.54	0.100	0.052	381
	ERM	0.075	1.29			
	SMB	0.049	1.72			
	HML	-0.026	-0.86			
	$MEA \times D^E$	0.045	0.51			
	$MEA \times D^C$	-0.010	-0.08			
Dur. Goods orders	c	0.000	0.01	0.092	0.019	380
	ERM	0.079	1.66			
	SMB	0.010	0.32			
	HML	0.009	0.37			
	$MEA \times D^E$	0.026	0.32			
	$MEA \times D^C$	-0.034	-0.46			
Cons. Conf	c	0.002	0.82	0.128	0.018	246
	ERM	0.135	1.69			
	SMB	0.004	0.09			
	HML	0.016	0.41			
	$MEA \times D^E$	-0.119	-1.53			
	$MEA \times D^C$	0.058	0.64			
U. Michigan conf.	c	0.005	2.50	0.123	0.085	301
	ERM	0.007	0.10			
	SMB	0.083	2.35			
	HML	0.001	0.03			
	$MEA \times D^E$	0.209	2.17			
	$MEA \times D^C$	-0.083	-0.82			
Ind. Prod.	c	-0.002	-1.02	0.089	0.032	380
	ERM	0.019	0.36			
	SMB	-0.037	-1.30			
	HML	0.036	1.29			
	$MEA \times D^E$	0.135	1.83			
	$MEA \times D^C$	-0.096	-1.28			
GDP final	c	-0.006	-1.99	0.198	0.205	167
	ERM	0.074	0.77			
	SMB	0.192	3.73			
	HML	0.100	2.13			
	$MEA \times D^E$	0.043	0.47			
	$MEA \times D^C$	0.014	0.14			
New home sales	c	0.005	2.46	0.248	0.127	281
	ERM	0.131	2.10			
	SMB	0.079	2.12			
	HML	0.035	1.09			
	$MEA \times D^E$	0.141	1.25			
	$MEA \times D^C$	-0.062	-0.78			
Housing starts	c	0.005	2.45	0.062	0.048	377
	ERM	0.073	1.25			
	SMB	-0.054	-1.27			
	HML	-0.010	-0.32			
	$MEA \times D^E$	0.102	0.90			
	$MEA \times D^C$	-0.060	-0.73			

Table 7: Prices of risk Fama-French model augmented with macroeconomic announcement news groups

The table presents the price of risk estimates for the specification in (3) that includes the macroeconomic news groups $\widetilde{MEA}_j$, $j = 1, ..., J$. For each macroeconomic news group j, $j = 1, ..., J$, the specification is estimated on T_j, the set of announcement days for fundamental j. The specifications are estimated using the 25 Fama-French portfolios and the 3×4 portfolios sorted on size and stocks' sensitivity to announcement news during expansions and contractions. The column labeled "Adj. R^2" gives the regression's GLS cross-sectional Adj. R^2 while the column labeled "Adj. R^2 (FFC)" gives the GLS cross-sectional Adj. R^2 for the Fama-French model estimated on the set of days T_j. Prices of risk are in daily percent and estimated using GLS. T-statistics are calculated using GMM standard errors that account for the errors-in-variables problem. The sample period is January 1, 1980 to December 31, 2011.

		λ	T-stat.	Adj. R^2	Adj. R^2 (FFC)	Nr. of obs.
Employment 1	c	0.000	-0.07	0.121	0.118	1427
	ERM	0.035	1.11			
	SMB	0.039	2.59			
	HML	-0.010	-0.63			
	$MEA \times D^E$	-0.005	-0.07			
	$MEA \times D^C$	0.039	0.48			
Inflation	c	0.000	-0.15	0.125	0.043	761
	ERM	0.050	1.22			
	SMB	0.020	1.02			
	HML	0.004	0.19			
	$MEA \times D^E$	-0.081	-0.84			
	$MEA \times D^C$	0.064	0.51			
Forward-looking	c	0.000	-0.35	0.151	0.049	1000
	ERM	0.096	2.72			
	SMB	-0.009	-0.45			
	HML	0.012	0.65			
	$MEA \times D^E$	-0.104	-1.15			
	$MEA \times D^C$	0.054	0.57			
Consumer conf.	c	0.003	1.99	0.095	0.073	547
	ERM	0.065	1.22			
	SMB	0.048	1.78			
	HML	0.008	0.32			
	$MEA \times D^E$	-0.006	-0.06			
	$MEA \times D^C$	-0.013	-0.13			
Output	c	0.000	-0.21	0.162	0.096	566
	ERM	0.034	0.74			
	SMB	0.025	0.96			
	HML	0.051	2.17			
	$MEA \times D^E$	0.110	1.33			
	$MEA \times D^C$	-0.127	-1.65			
Housing	c	0.006	3.83	0.103	0.062	658
	ERM	0.097	2.26			
	SMB	0.002	0.08			
	HML	0.008	0.37			
	$MEA \times D^E$	0.124	1.26			
	$MEA \times D^C$	-0.083	-1.18			