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How Economic News Moves Markets

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Exploring how the release of new economic data affects asset prices in the stock, bond, and foreign exchange markets, the authors find that only a few announcements—the nonfarm payroll numbers, the GDP advance release, and a private sector manufacturing report—generate price responses that are economically significant and measurably persistent. Bond yields show the strongest response and stock prices the weakest. The authors’ analysis of the direction of these effects suggests that news of stronger-than-expected growth and inflation generally prompts a rise in bond yields and the exchange value of the dollar.

The U.S. government and some private organizations regularly issue statistics on the performance of the nation’s economy. These data releases can lead to adjustments in the price of financial assets as market participants reassess their views of the economy’s current condition and its likely future evolution.

Naturally, the nature and extent of the market response will vary with the announcement. Small unexpected changes in certain economic indicators may rock asset prices¹ over a long period, while shifts in other indicators—however large or surprising—are quickly shrugged off by the markets. Moreover, while announcements about some economic indicators affect bond yields and exchange rates, news about others may chiefly affect stock prices.

To explore this variety of responses, a substantial body of research has emerged in recent years, spurred by the increasing availability of “high-frequency” data on asset prices—data reported at one-minute or even shorter intervals. In this edition of *Current Issues*, we draw on such high-frequency data to

review and illustrate some of the key patterns that researchers have observed in market reactions to economic releases. Specifically, we track how announcements of thirteen economic indicators affect prices in three broad asset classes—bonds, stocks, and foreign exchange—over a ten-year period ending in 2007. In doing so, we focus on the market’s reaction to the part of each announcement that is actually news. By “news,” we mean the surprise element, or the difference between the actual value announced for an indicator and market participants’ prior expectation of what that value would be.

Our analysis provides lessons on the relative scale and persistence of the recent responses of U.S. asset prices to economic announcements. We find that two government releases—nonfarm payrolls and the GDP advance release—and the Institute for Supply Management’s Manufacturing Report on Business tend to have the strongest impact on asset prices, while indicators such as the government statistics on personal income and personal consumption expenditures excluding food and energy typically have a small and transitory impact on prices. Our evidence also confirms that economic indicators have an uneven effect across asset classes: unexpected changes in the data generally have the most marked impact on interest rates, a weaker impact on exchange rates, and an even weaker impact on equity prices. In addition, we find that while the direction

¹ For simplicity, we use the term “asset prices” throughout the article to refer to bond yields, equity prices, and exchange rates. Although this application of the term is not precise (particularly in the case of bond yields), it is conventional.

and size of news effects on asset prices tend to be consistent from the time of the release to the end of the day, the immediate impact can generally be measured more precisely than the full-day impact. We conclude our analysis by noting that the true impact of economic news on asset prices may be larger than earlier research and our own study suggest, owing chiefly to the difficulty of measuring market participants' expectations about upcoming economic releases.

Predicting the Effects of Economic News

Basic economic thinking would lead one to expect certain relationships between economic news and asset prices. Consider first how news is likely to influence interest rates, such as yields on U.S. Treasury securities, federal funds futures, and Eurodollar futures. News of unexpected economic strength or of unexpected inflationary pressure will typically be seen by the markets as leading to higher interest rates. The reasoning is that a stronger economy will drive prices higher, prompting the central bank to pursue tighter monetary policy than anticipated. Of course, investors cannot be certain about the timing and strength of the central bank's reaction to the news: if the bank's reaction is muted or delayed, long-term rates may respond more than short-term rates. In general, however, interest rates have behaved as one would expect, rising in response to news of faster growth or higher inflation, as documented in Fleming and Remolona (1999), Andersen et al. (2007), Faust et al. (2007), Goldberg and Leonard (2003), and Ehrmann and Fratscher (2005).

The effects of economic news on stock prices are harder to predict. To understand why, consider how stock prices might respond to a news release showing unexpected strength in the U.S. economy—say, a surprising fall in the unemployment rate or an unforeseen increase in personal spending. News that the economy is growing faster than previously thought usually creates expectations of higher corporate earnings and dividends. These expectations in turn should boost stock prices, according to the textbook view that a stock's price should match the expected stream of future dividends from that stock, discounted to their present value. However, as we saw just above, news that the economy is growing faster than anticipated will also lead to higher expected interest rates—the rates used to discount future dividends. Whether stock prices in fact rise or fall will depend on whether the “numerator” (the stream of expected future dividends) or the “denominator” (the discount rate, plus compensation for risk) responds more strongly to the news. The same rule applies to the response of stock prices to news of inflation: inflation boosts prospective nominal future earnings and the nominal rate at which such earnings are discounted. Given the uncertain interplay of these variables, it is not surprising that many studies cannot identify consistent effects of economic news on stock prices.²

² Boyd, Hu, and Jagannathan (2005) show that stock prices respond differently to changes in unemployment during recessions and expansions because the dividend and discount rate effects have different weights at different points of the business cycle.

The consequences of economic news for exchange rates are also somewhat ambiguous. These effects operate largely through interest rates. While news of higher domestic inflation may lead to a weaker currency over time, in the short term such news may cause the currency to appreciate if investors expect the central bank to respond to the higher inflation by raising its target short-term rate. Similarly, if investors believe that positive news about growth will raise demand for the domestic currency and put upward pressure on interest rates, the domestic currency is likely to appreciate. However, if investors place more weight on the surge in domestic imports that may follow stronger domestic growth, the domestic currency may depreciate as demand for foreign currency rises. While both outcomes are plausible in theory, recent studies using high-frequency intraday data, such as Almeida, Goodhart, and Payne (1998), Andersen et al. (2007), and Chaboud, Chernenko, and Wright (2007), find empirical evidence of a relationship in which economic announcements indicating strength lead to currency appreciation, with interest rate tightening emerging as the dominant influence.³

Testing the Impact of News on Asset Prices: Data and Estimation Method

In this section, we use recent data on asset prices and economic news to estimate the effects of announcements on asset prices. We compare our findings with the expected effects just outlined and with the insights gained in previous research. Our goal is to provide some simple lessons about the impact of economic indicators on bond, stock, and foreign exchange markets.

Our methodology follows that of recent studies of the financial market effects of economic news. We tap a rich data set of continuous quotes from Reuters wire service to track the effects of announcements on asset prices at two time horizons: within thirty minutes of the announcement and at 4 p.m. on the day of the announcement.⁴ These two intervals are intended to capture, respectively, the immediate and full-day response of prices to economic news.

The nine news releases examined in our analysis encompass thirteen of the nation's most heavily watched economic indicators. The releases (and their corresponding indicators) are as follows: Employment Situation Summary (*nonfarm payrolls* and *unemployment rate*), consumer price index (*CPI* and *CPI excluding food and energy*), personal income and outlays (*personal consumption expenditures [PCE] excluding food and energy*, *personal income*, and *personal spending*), gross domestic product (*GDP advance release*), ISM Manufacturing Report on Business (*ISM manufacturing*), new residential construction (*housing starts*), Conference Board Consumer Confidence Index (*consumer confidence*), University of Michigan Survey of Consumers

³ Chaboud, Chernenko, and Wright (2007) also show that foreign exchange trading volumes respond to economic news.

⁴ We also captured the response of asset prices at 1 p.m. The midday results generally showed patterns intermediate between those found within thirty minutes and those found at the end of the business day.

(*consumer sentiment*), and advance monthly sales for retail trade and food services (*retail sales less autos*).⁵ We assess the impact of these indicators on three sets of asset prices—interest rates, exchange rates, and equity prices—for the period from January 1998 to July 2007. The specific asset prices are the two- and ten-year Treasury yields, the Eurodollar and federal funds futures rates,⁶ the spot euro/dollar and yen/dollar exchange rates, and the Standard & Poor’s 500 Index.

As noted earlier, we construct a measure of “news” equivalent to the difference between the announced value of an economic indicator and the value that was expected prior to the release.⁷ The expected value is captured by the median response from the last preceding weekly survey of market participants conducted by Bloomberg L.P.⁸ We measure the asset price response to news as the percentage change (or percentage point change, for yields) from immediately before the announcement to thirty minutes after the announcement and from before the announcement to 4 p.m. on the same day. More detailed information about our estimation method can be found in the box.

Main Findings

We present the results of our estimation in the table. Note that the results are divided into three panels corresponding to the three asset classes considered—bonds, foreign exchange, and stocks. The top panel summarizes the responses of the four bond rates to announcements of the thirteen economic indicators; the middle panel, the responses of the two exchange rates; and the bottom panel, the responses of the S&P 500 Index.

The number before the slash in the first two columns of the table represents, for each indicator, the number of asset price responses that are statistically significant at the 5 percent level—a criterion that assures us that the response is highly unlikely to be the result of random chance.⁹ The number after the slash tells us how many of these responses are positive—meaning that the

⁵ The government agencies responsible for data releases are as follows: the Bureau of Labor Statistics, for the Employment Situation Summary and CPI; the Bureau of Economic Analysis, for personal income and outlays and gross domestic product; the Bureau of the Census, for new residential construction and advance monthly sales for retail trade and food services.

⁶ The futures contracts examined are the nearest-term Eurodollar futures contract (a contract written on the Eurodollar rate ninety days after the beginning of the month following the current one) and the second-month federal funds futures contract (a contract written on the average federal funds rate in the second month after the current one).

⁷ For nonfarm payrolls and housing starts, this measure is further divided by the previously announced value of the indicator.

⁸ The Bloomberg survey polls a group of economists, the number varying with the degree of interest in the indicator at issue. Surveys of highly watched indicators, such as the unemployment rate and nonfarm payrolls, often have more than fifty respondents. The lag between the participants’ response and the date of the indicator release also varies, from a few days to two weeks.

⁹ Summing the numbers in the three panels, we see that an announcement could elicit a maximum of seven significant asset responses.

Methodology

To estimate the response of asset prices to the news element in select economic indicators, we run a series of ordinary least squares (OLS) regressions, incorporating each of the seven asset prices, each of the nine economic data reports, and each of the two time intervals, for a total of 126 regressions of the form

$$\Delta AP_{i,t} = \beta_{i,0} + \sum_{k=1}^j \beta_{i,k} * \delta_{i,k,t} + \epsilon_{i,t},$$

where i indicates the asset; t is the time the report was released; $\Delta AP_{i,t}$ is the change in asset price or yield at thirty minutes after the release or through 4 p.m.; $\delta_{i,k,t}$ is the corresponding news measure, with k indexing indicators within a report and j taking values between one and three for any given report, depending on the number of indicators in the report. For example, the Employment Situation Summary contains both the unemployment rate and the nonfarm payrolls release, so the corresponding regressions include two news measures as regressors. In the discussion of our results in the text, we focus on the estimated coefficients $\beta_{i,k}$, each of which represents the average impact of a unit of news on a particular asset price over a specific intraday interval.

change in the asset price is in the same direction as the change in the indicator, so that a rise in GDP, for example, would elicit an increase in the asset price. The significance and sign of the asset price response to an announcement are captured over two time intervals—from immediately before the announcement to thirty minutes after it (column 1) and from before the announcement to 4 p.m. (column 2). The middle two columns in the table show the number of estimated responses (coefficients $\beta_{i,k}$) that are found to be “large,” that is, greater than one-half of one standard deviation of the asset price.¹⁰ The last two columns of the table show whether the signs of the immediate and full-day asset price responses are the same, and whether the precision of the estimated response (as captured by the standard error in the estimate) declines between the thirty-minute and full-day intervals.

With this schematic in place, we can draw some conclusions about the relative impact of various U.S. economic announcements. Clearly, certain announcements dominate as drivers of market reaction. The Employment Situation Summary, with its nonfarm payrolls and unemployment rate components, and the ISM Manufacturing Report on Business have statistically significant effects on five to seven asset prices; the effects are large and persist through the end of the day. The GDP advance release and consumer confidence index also significantly affect most of the asset prices, though for both indicators the number of significant responses drops by day’s end. Other data releases have a

¹⁰ To compare the response coefficients across asset prices and indicators, we divide each indicator, asset price, and yield change by its standard deviation. The resulting coefficient describes the response of the asset price, in standard deviation units, to a one-standard-deviation surprise in the indicator.

Response of Asset Prices to Economic Announcements: Summary of Regressions

Announcement	Bond Yield Responses ^a					Standard Error at 4 p.m. Exceeds That at 30 Min.
	Significant/Positive Sign		Large in Size		Same Sign at 30 Min. and at 4 p.m.	
	At 30 Min.	At 4 p.m.	At 30 Min.	At 4 p.m.		
Nonfarm payrolls	4/4	4/4	3	4	4	4
Unemployment rate	3/3 ^b	1/1 ^b	1	0	4	4
ISM manufacturing	4/4	3/3	2	2	4	4
GDP advance release	3/3	3/3	2	2	4	3
Consumer confidence	3/3	2/2	2	0	4	4
Retail sales less autos	3/3	1/1	1	0	4	3
CPI excluding food and energy	3/3	2/2	1	0	4	4
Consumer price index	0/0	0/0	0	0	4	4
Consumer sentiment	3/3	1/0	0	0	3	4
Housing starts	0/0	0/0	0	0	0	4
PCE excluding food and energy	0/0	0/0	0	0	3	4
Personal income	0/0	0/0	0	0	1	4
Personal spending	0/0	0/0	0	0	2	4

Announcement	Foreign Exchange Rate Responses ^c					Standard Error at 4 p.m. Exceeds That at 30 Min.
	Significant/Positive Sign		Large in Size		Same Sign at 30 Min. and at 4 p.m.	
	At 30 Min.	At 4 p.m.	At 30 Min.	At 4 p.m.		
Nonfarm payrolls	2/2	1/1	2	1	2	2
Unemployment rate	1/1 ^b	1/1 ^b	0	0	2	2
ISM manufacturing	2/2	2/2	2	1	2	2
GDP advance release	2/2	1/1	2	1	2	2
Consumer confidence	2/2	1/1	1	0	2	2
Retail sales less autos	2/2	0/0	0	0	2	2
CPI excluding food and energy	0/0	0/0	0	0	2	2
Consumer price index	0/0	0/0	0	0	2	2
Consumer sentiment	0/0	0/0	0	0	0	2
Housing starts	0/0	0/0	0	0	0	2
PCE excluding food and energy	0/0	0/0	0	0	0	2
Personal income	0/0	0/0	0	0	1	2
Personal spending	0/0	0/0	0	0	2	2

Announcement	Equity Responses (S&P 500 Index)					Standard Error at 4 p.m. Exceeds That at 30 Min.
	Significant/Positive Sign		Large in Size		Same Sign at 30 Min. and at 4 p.m.	
	At 30 Min.	At 4 p.m.	At 30 Min.	At 4 p.m.		
Nonfarm payrolls	1/1	0/0	1	0	1	1
Unemployment rate	1/1 ^b	1/0 ^b	0	0	0	1
ISM manufacturing	0/0	0/0	0	0	1	1
GDP advance release	1/1	0/0	0	0	1	1
Consumer confidence	1/1	0/0	1	0	0	1
Retail sales less autos	0/0	0/0	0	0	1	1
CPI excluding food and energy	0/0	0/0	0	0	1	1
Consumer price index	0/0	0/0	0	0	1	1
Consumer sentiment	0/0	0/0	0	0	1	1
Housing starts	1/1	0/0	0	0	0	1
PCE excluding food and energy	0/0	0/0	0	0	0	1
Personal income	0/0	0/0	0	0	0	1
Personal spending	0/0	0/0	0	0	1	1

^aThe four bond rates considered are the two- and ten-year Treasury yields, the Eurodollar futures rate, and the federal funds futures rate.^bA negative coefficient for the unemployment rate is counted as a positive response, since a decline in this indicator (unlike other indicators) implies economic strength.^cThe two exchange rates considered are the euro/dollar exchange rate and the yen/dollar exchange rate.

narrower impact. The retail sales indicator, the CPI excluding food and energy, and the consumer sentiment index have notable effects, but the effects are mostly confined to interest rates and diminish perceptibly by day's end. The remaining indicators—the CPI, housing starts, and the components of the personal income and outlays report—elicit weak and generally insignificant responses. As for the distribution of these effects across asset prices, we see that the effects on interest rates and exchange rates tend to persist, while only the unemployment rate has a significant impact on equity prices by day's end, and this impact is not large.

In addition to clarifying the relative strength and persistence of the announcement effects in our sample, the results summarized in the table shed light on the direction of these effects. In almost every case in which an estimated response is statistically significant, the response is positive. This finding supports the view that interest rates should increase, the dollar should strengthen, and stock prices should rise (all in nominal terms) in response to news of stronger-than-expected economic growth or stronger-than-expected inflation. Interestingly, the positive responses of interest and exchange rates accord with the findings of the studies we cited earlier. Our results show that economic announcements have a much more muted impact on stock prices than on interest rates or exchange rates: only one of the thirteen stock price responses is statistically significant by 4 p.m., and this response is neither large nor positive.

Another important finding of our estimation exercise is that asset price responses can be ascertained more precisely a short time after the announcement than later in the day. As the table's last column shows, the estimated responses at 4 p.m. exhibit greater standard errors than the responses thirty minutes after the announcement. Here too, our results accord with those of some prior studies. Moreover, the noise around the predicted responses (as gauged by the residuals of the regressions, not shown in the table) is also smaller after thirty minutes than later in the day. This result is intuitive: as time passes after a data release, other forces will influence asset prices, increasing the uncertainty of the response. Thus, our results support the view that asset markets tend to absorb the impact of economic news rather quickly.¹¹

To provide a different perspective on our empirical results, we present in Chart 1 a rendering of the announcement effects of one key indicator, nonfarm payrolls. We assume a 1 percent surprise increase in this indicator and plot the responses of each of the seven asset prices on the vertical axis.¹² The news, on impact, raises the yield on two-year Treasury securities by 78 basis points on average, and nearly all of this effect remains at day's end. In

addition, the increase elicits responses *across* asset classes that tend to be large and significantly different from zero.

To be sure, the chart shows a widening of the 95 percent confidence intervals over the course of the day—a sign that the responses are estimated less precisely as the response interval lengthens. Still, the full-day responses typically have the same sign as the immediate responses, and have a statistically similar magnitude. As we saw in the table, these patterns hold in large part for all economic indicators that elicit a significant response in asset prices.

In sum, our analysis points to a concise set of lessons about the impact of economic announcements on key U.S. asset prices. First, only a few economic indicators give rise to asset price responses that are economically significant and measurably persistent through the day. Second, the significant responses support the view that asset prices rise (in nominal terms) in response to news of stronger growth and faster inflation. Third, the strongest effects are seen on interest-bearing assets, and the weakest and most erratic on stock prices. Fourth, the immediate effects of economic news on asset prices are easier to assess than the full-day effects, because the accumulation of other shocks to asset prices through the business day makes the identification of persistent effects more difficult.

The Problem of Measuring Market Expectations: Implications for Our Results

Our approach to measuring the effects of economic news on asset prices, like the analogous approaches used by other practitioners, is likely to provide a conservative estimate of the scale of these effects. The reason is that the measure of news we construct—the difference between the value announced for an indicator and the value expected by the market—relies on survey data to capture the market's expectation.¹³ Although the survey data provide the best available real-time measure of market sentiment, they still have some shortcomings.

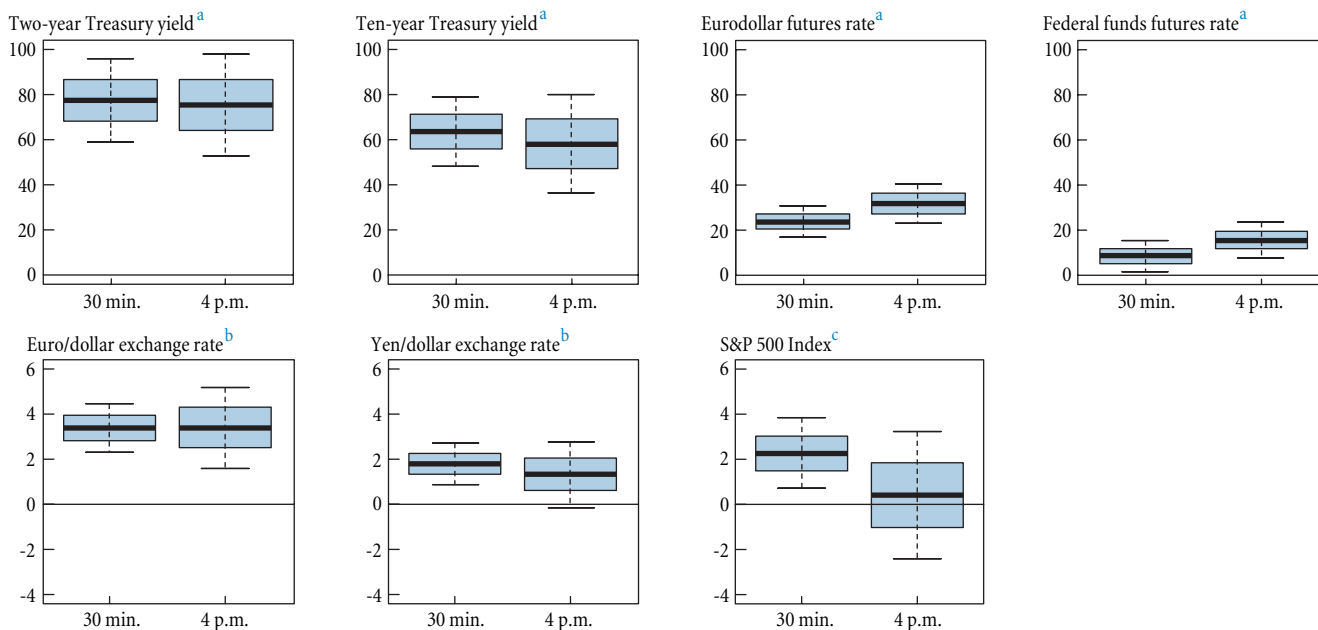
Most notably, survey data may capture market expectations with errors. One source of error is the lag between the date of the survey and the release of the indicator. Surveys are typically conducted in advance of data releases, with leads ranging from a few days to a week or more. Such leads imply that by the time of the announcement, a great deal of new information on the indicator may have accumulated, so that part of the “measured news” is no longer news. The accumulated information could include signals gathered from a variety of sources, including another indicator release, a pertinent policy statement, and other domestic or foreign developments. In this sense, the amount of news contained in a data release may be smaller than what we measure, so the effects of the actual news may be even larger than our estimates suggest.

¹¹ One might instead reason that the full-day impact would yield the most precise measure since markets need time to digest economic news. Indeed, some recent studies that focus on the microstructure of financial markets (for example, Evans and Lyons [2005]) present theoretical and empirical evidence suggesting that it takes time for news to become incorporated in asset prices.

¹² We have chosen, for the simplicity of our illustration, a large surprise of 1 percent. In our sample, the largest absolute value of a nonfarm payrolls surprise was 0.3 percent, and most surprises were considerably smaller.

¹³ Earlier studies of announcement effects usually defined news with respect to the predictions of an empirical forecasting model—a practice that made the resulting measure of news dependent on the model chosen to generate the forecasts. Thus, it was unclear whether a finding that news affected asset prices only slightly was truly indicative of a weak impact or instead reflected an inadequate forecasting model.

Chart 1
Response of Asset Prices to a 1 Percent “Surprise” in Nonfarm Payrolls



Notes: The heavy central line of each box plot shows the estimated asset price response to the surprise. The box represents a one-standard-error confidence interval around the response, and the “whiskers,” a two-standard-error confidence interval.

^a In basis points. ^b Dollar appreciation, in percentage points. ^c Change in index, in percentage points.

Another source of measurement error is the fact that market expectations are constructed from the survey responses of a small subset of investors. As a limited sample of the whole market, these investors represent the overall market view up to a random factor. Furthermore, many of the individuals polled, while capable professional forecasters, are not in charge of managing their companies’ portfolios, and thus may have little monetary incentive to provide their most considered forecast.¹⁴

In an effort to provide insight into the potential consequences of survey data problems, Rigobon and Sack (2008) have developed a methodology to estimate the impact of news when “true news” (that is, *the indicator as released minus the indicator as expected one instant before the release*) differs from the standard definition of news, or “measured news” (that is, *the indicator as released minus the indicator as expected at survey time*), by a random measurement error. The essence of the Rigobon-Sack methodology is to correct the estimated asset price response for the measurement errors that arise when surveys of forecasts are conducted well before the actual data release.

¹⁴ Studies have shown that forecasters may not learn quickly from their mistakes, an outcome that can lead to correlated forecast errors (see, for instance, the discussion in Gürkaynak and Wolfers [2007]). Individual forecasts may also be biased because forecasters may wish to maximize public recognition when their names or affiliations are explicitly listed (Laster, Bennett, and Geom 1999; Lamont 2002). Some forecasters have also been found to skew forecasts toward outcomes that would benefit their firms, a practice that Ito (1990) dubs “wishful expectations.”

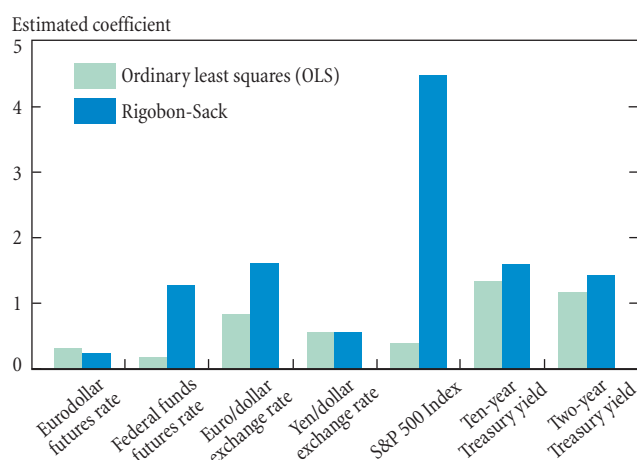
To illustrate the difference in results between standard approaches and this alternative methodology, we first compute the Rigobon-Sack responses of the various asset prices in our sample thirty minutes after the release of the ISM Manufacturing Report on Business, an indicator that we identified earlier as one of the most significant in its effects on asset prices. We then compare our estimates of the asset responses to the ISM report with those generated by the Rigobon-Sack methodology (Chart 2).

The comparison produces two findings. First, the Rigobon-Sack approach yields estimates of asset price responses that agree in sign with those produced by our standard OLS approach (see box). Second, the Rigobon-Sack estimated responses are typically larger than their standard counterparts. The intuition underlying this finding is simple: the true news contained in an indicator release is typically smaller than the measured news because it is cleaned of measurement errors and of the informational noise that accumulates between the survey and the release. Therefore, the asset price impact per unit of true news is typically larger than the impact per unit of measured news.

Note, however, that while the Rigobon-Sack methodology delivers a better measure of the impact of news on asset prices, it cannot be used in practice to forecast the asset price response, because true news is not available to observers in reality. The market’s expectations of the future economic release are known only as of the time of the last survey, not as of one instant before the announcement, as would be required to put the Rigobon-Sack

Chart 2

Impact of ISM Manufacturing “News” on Asset Prices: A Comparison of the OLS and Rigobon-Sack Estimators



Source: Authors' calculations.

methodology into practice. Thus, the standard approach relying on survey-based measures of news may be the only one available in practice. Still, in using this approach, researchers should recognize that it may lead to overly low estimates of asset price responses to true news.

Conclusion

Our analysis, based on recent data from a large archive of economic news releases and high-frequency asset prices, distills some lessons about the response of financial markets to economic news. In line with much of the earlier research, our study suggests that only a handful of economic announcements—those contained in the Employment Situation Summary, GDP advance release, and ISM Manufacturing Report—affect asset prices in significant and systematic fashion, while most other releases tend to generate erratic or insignificant price responses. The strongest impact of these announcements is on interest rates and the weakest is on stock prices. Asset responses for the most part show the same patterns of sign and magnitude over different intraday intervals, and generally support the view that asset prices rise in response to news of positive growth and faster inflation. However, researchers and practitioners seeking a reliable basis to analyze the impact of economic news on financial markets will find the immediate impact to be more precisely measured than the full-day impact.

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The views expressed in this article are those of the authors and do not necessarily reflect the position of the Federal Reserve Bank of New York or the Federal Reserve System.

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