

## Do macro announcements still drive the US bond market?

In the 1990s, the sharpest movements in the price of US Treasury securities tended to take place at release times of macroeconomic announcements. In theory, the yield on (and thus the price of) a default-free, fixed income security reflects the financial market's view of the future path of risk-free short-term interest rates over the remaining life of the instrument. In turn, the most fundamental influences leading to changes in the market's expectation of future short rates are macroeconomic developments that induce changes in beliefs regarding future real interest rates or inflation, including beliefs about shifts in monetary policy. Consistent with this view, Fleming and Remolona (1999) find that each of the 25 largest short-term price movements in the five-year US Treasury note during the one-year period from August 1993 to August 1994 was associated with a macroeconomic announcement.

An alternative view suggests that yields on default-free securities might fluctuate because of liquidity-driven movements in the demand for fixed income securities relative to other assets. For example, volatility in equity prices might generate short-term portfolio flows between the equity and bond markets. Such demand-related influences would be expected to be most prevalent in relatively illiquid markets. Although it still ranks among the most liquid markets in the world, Fleming (2000) has documented that, according to various measures, the US Treasury market has witnessed a decline in liquidity in recent years, in part due to reduced issuance. The combination of higher equity price volatility and lower Treasury market liquidity has led some to assert that bond market movements are driven less by macroeconomic developments than was previously the case.

In this special feature, we explore the extent to which macroeconomic announcements and large, short-run equity price movements are associated with large, short-run changes in the price of the five-year US Treasury note during the calendar year 1999.<sup>21</sup> The analysis yields five basic results. First, we find that the largest short-term price movements in the Treasury market were still associated with macroeconomic announcements, but the set of

Announcements in 1999 still exerted an influence on bond prices

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<sup>21</sup> More recent Treasury market data were not yet available for examination.

announcements having large impacts was broader than before. Second, announcements continued to be associated with higher than average price volatility. Third, the surprise content of announcements in 1999 was smaller than before. Fourth, the price response to surprises in non-farm payrolls, the single most important announcement, was no longer consistent in sign although the price response to inflation surprises was similar to that previously found. Finally, we find no evidence that large equity price changes drove bond price movements in 1999.

## The five-year Treasury note in 1999

Data for this feature come from GovPX, Inc., a joint venture of the primary US dealers and inter-dealer brokers. The data contain information on each quote, purchase and sale in the US Treasury market that was transacted through one of five of the leading six inter-dealer brokers. We examine the on-the-run five-year Treasury note, a security that was very actively traded. GovPX posted a daily average of 535 trades for it during 1999, representing a 19% decline in the number of trades reported relative to 1993-94.

In this feature, we follow the empirical methodology of Fleming and Remolona (1999) wherever possible, but focus on the four announcements identified in the earlier study as the most important: employment (with non-farm payroll as the headline number), the producer price index, the consumer price index and advanced retail sales.<sup>22</sup> These four announcements, which we will refer to as the “major” announcements, are made at precisely 08:30 New York time on announcement days. To be certain that price movements in the Treasury note can be associated with the announcement, we examine the change in note price covering a narrow time interval, beginning with the price quote immediately preceding 08:30 and ending with the price quote immediately preceding 08:35.

## The largest price moves of the year

Each of the largest 25 five-minute price changes in the five-year note in 1999 was associated with some type of announcement. Further, all occurred in response to new information that related either directly to US monetary policy or to US economic developments that indirectly conveyed information regarding US monetary policy. Economic developments outside the United States did not cause large changes in US Treasury prices in 1999.

More specifically, four of the largest 25 moves were associated with the announcement of the target federal funds rate and another two were related to comments made by Federal Reserve Chairman Alan Greenspan. The

Many announcements produced sharp bond price movements

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<sup>22</sup> Fleming and Remolona (1999) also indicate the importance of the Fed's announcement of the outcome of the FOMC meeting. This announcement was not examined in this study because the forecast value of the funds rate was equal to the actual funds rate on each of the eight announcement dates in 1999. That is, even though these announcements still occasionally moved the bond market, they contained no surprises.

remaining 19 of the largest price moves in 1999 were associated with nine different types of announcements regarding the state of the US economy. The announcements most frequently associated with the largest 25 price moves in 1999 were the employment report, which was associated with five, and the CPI and PPI announcements, which were each associated with three.

A comparison of the largest price moves in 1999 with those in the earlier period suggests several differences. First, the range of announcements associated with large price moves has increased. In 1993-94, only seven different announcements accounted for the 25 largest price moves whereas 11 were relevant in 1999. Second, whereas the four major announcements were associated with 19 out of the 25 largest price moves in 1993-94, they can only explain 11 out of the 25 largest in 1999. Third, the employment report has apparently become less associated with large price reactions. In 1993-94, this report was associated with the four largest price moves and 10 of the 25 largest. By contrast, employment reports in 1999 were only associated with five of the 25 largest, although they did account for the second, third and fifth largest five-minute price moves. Finally, announcements that were unrelated to

The 25 largest five-minute price moves in 1999 <sup>1</sup>				
Rank	Date	Time	Price variation <sup>2</sup>	Announcement
1	30 Jun 1999	14:15	74.3	Fed policy rate
2	05 Mar 1999	08:30	52.7	Employment
3	03 Sep 1999	08:30	41.8	Employment
4	14 May 1999	08:30	40.8	Consumer price index
5	06 Aug 1999	08:30	39.1	Employment
6	22 Jul 1999	11:00	38.8	Greenspan testimony
7	29 Apr 1999	08:30	36.5	Employment cost index
8	18 May 1999	14:15	35.2	Fed policy rate
9	22 Jul 1999	11:05	29.8	Greenspan testimony
10	08 Jan 1999	08:30	29.4	Employment
11	15 Oct 1999	08:30	26.7	Producer price index
12	01 Jun 1999	10:00	26.2	NAPM <sup>3</sup> index
13	10 Nov 1999	08:30	24.2	Producer price index
14	05 Nov 1999	08:30	24.1	Employment
15	29 Jul 1999	08:30	23.1	Employment cost index
16	13 Jan 1999	07:40	22.1	Producer price index
17	30 Apr 1999	08:30	21.8	GDP and GDP price deflator
18	30 Jun 1999	15:00	21.5	Fed policy rate
19	01 Oct 1999	10:00	21.3	NAPM <sup>3</sup> index
20	28 May 1999	10:00	20.6	University of Michigan confidence indicator
21	14 May 1999	09:15	20.5	Industrial production
22	16 Jun 1999	08:30	20.4	Consumer price index
23	25 Feb 1999	16:00	19.2	Existing home sales
24	15 Sep 1999	08:30	19.0	Consumer price index
25	16 Nov 1999	14:15	18.8	Fed policy rate

<sup>1</sup> The five-minute price moves are sorted in descending order. <sup>2</sup> In basis points. <sup>3</sup> National Association of Purchasing Management.

Sources: Bloomberg; GovPX Inc.; BIS calculations. Table 1

large price moves during the earlier period were important in 1999. In particular, the announcement of the employment cost index and the National Association of Purchasing Management (NAPM) index were each responsible for two of the largest 25 price moves in 1999.

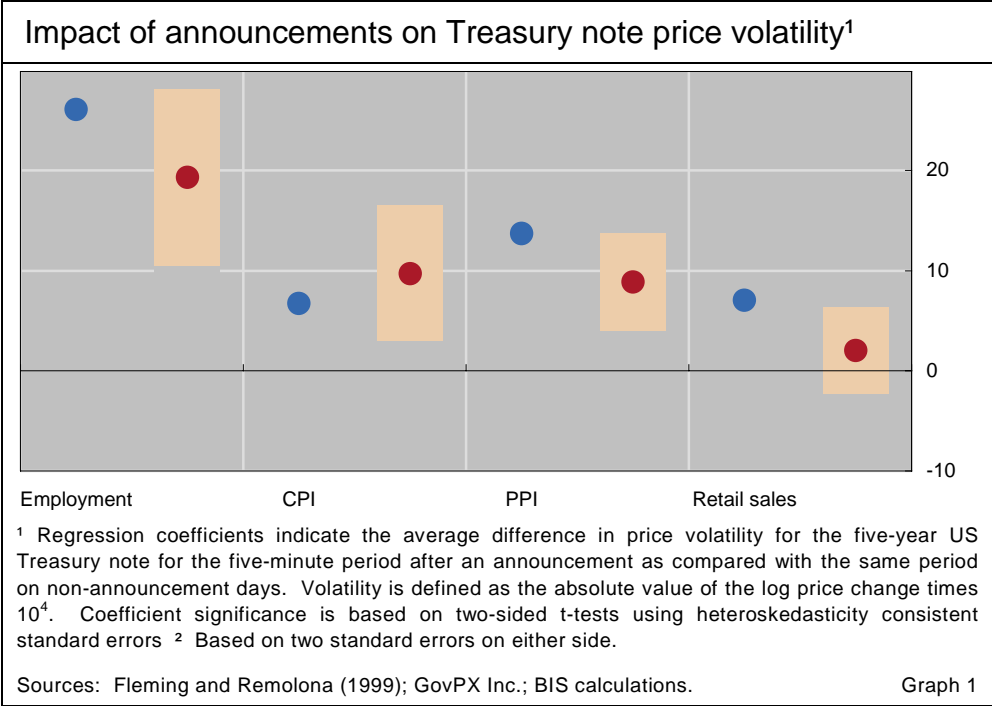
### Announcements and price volatility

Certain types of announcements convey more information on average to market participants than others. Thus, the typical price response should vary across types of announcement.

As the four announcements considered in this feature are released at 08:30, it is possible to determine which has the largest price impact by comparing the magnitude of the 08:30 price change on different announcement days. The magnitude of the price change at 08:30 is measured as the absolute value of the change in the log price between 08:30 and 08:35, where price is defined as the midpoint of the bid and ask price. For each of the 250 business days in the sample period, this measure of price volatility was regressed on four dummy variables, one for each of the four announcements, where each dummy variable was set equal to one on days when the given announcement was made.

The results for the regression using 1999 data indicate that the announcement of the employment report generates the greatest price volatility of just under 20 basis points. The CPI and PPI announcements are associated with roughly half the volatility. These results are quite similar to those found for 1993-94. The estimated coefficients for the employment, CPI and PPI announcements are not statistically significantly different from the point estimates reported for the earlier period. The one difference from the earlier

Price volatility rose shortly after announcements



results is the impact of the data release for retail sales. In 1993-94, this type of announcement was associated with a 7 basis point change in price. In 1999, no statistically significant increase in price volatility is found on days when retail sales figures are made public.

### How informative are the announcements?

The previous section has documented that announcement times are associated with an increase in price volatility. To the extent that markets are efficient, one might expect that these rapid price changes are reflecting only the new information contained in the announcement.

We identify what is “new” in an announcement as the announcement’s “surprise”, defined as the difference between the actual announced value and the median forecast value of that same variable.<sup>23</sup> We then calculate the average size of the announcement surprises in 1999 for each of the four announcements. Comparing the average size of the surprises with those reported in the earlier study, we find that announcements have generally become more predictable. Specifically, the mean absolute size of the surprise component in the announcements of consumer prices, producer prices and retail sales was 10%, 21% and 50% lower respectively in 1999 than in 1993-94. The clear exception is the surprise content of the employment report, which has remained roughly the same.

There are at least two explanations for the apparent reduction in announcement surprises. First, market participants may have become better at forecasting macroeconomic developments. Second, public disclosures other than macroeconomic announcements may have become more revealing. In either of these cases, the amount of new information actually contained in an announcement may have declined.

### Announcement surprises and price movements

The next obvious question is whether the bond market incorporates the new information contained in an announcement surprise into prices in the same way as in the past. In particular, does new information tend to move prices in a predictable direction and by a predictable amount as it did in 1993-94?

To answer this question, we regressed actual five-minute changes in the note’s log price on the set of four surprise variables.<sup>24</sup> The sample for this

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<sup>23</sup> So defined, the data indicate that the forecasts for the four macroeconomic variables were unbiased in 1999. Surprises were relatively evenly split between positive and negative values, and each variable’s mean surprise was much smaller than its standard deviation. Since Fleming and Remolona (1999) did not report information on the dispersion of announcement surprises, one cannot determine whether forecasts were unbiased estimates of announced values during 1993-94.

<sup>24</sup> To determine whether price movements could be attributed solely to the surprise, the regressions were initially run also including the expected component of the announcement. None of the four expected values was statistically significantly different from zero.

Surprises were smaller in 1999 than in 1993-94

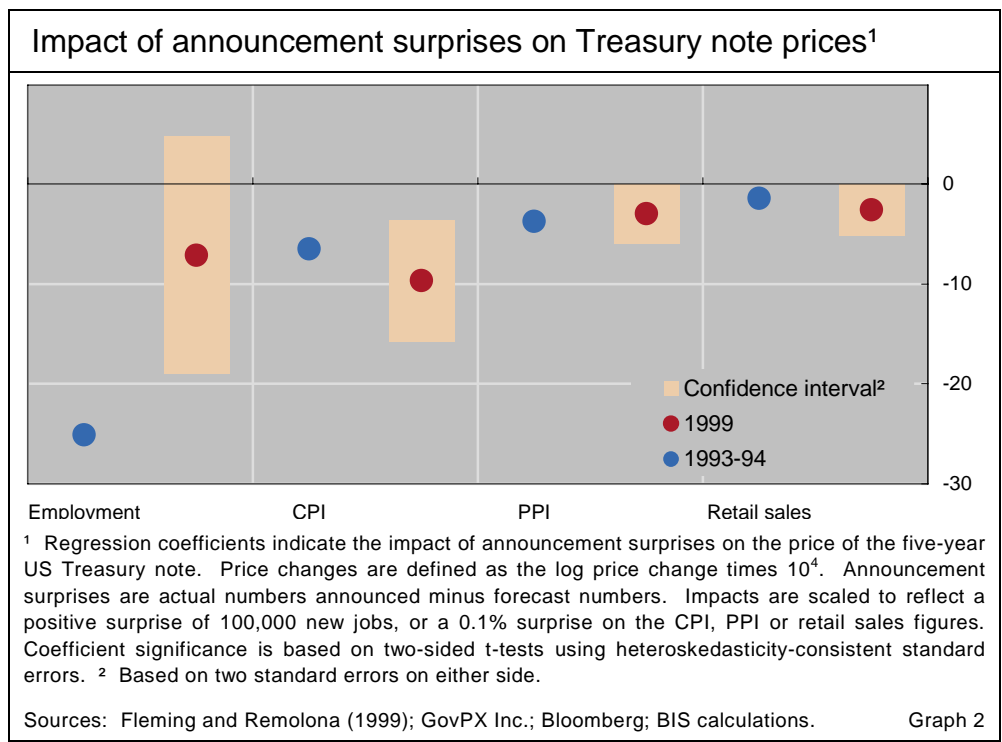
estimation was constrained to contain only the 42 days on which at least one of the four major announcements was made, and the surprise variables were set to zero whenever a given day did not have the given announcement. The results for both 1993-94 and 1999 have been scaled to reflect identically sized surprises. In particular, the coefficients represent the estimated price change in response to a positive surprise of 100,000 new non-farm jobs in the employment report or a 0.10% positive surprise in consumer prices, producer prices or retail sales.

Surprises were defined so that positive values indicate either that the real economy (employment and sales) is performing better than expected or that prices (consumer and producer) are higher than expected. As a result, any positive surprise would probably increase the market's expectation of future monetary tightening, leading to an immediate fall in Treasury prices. This expected negative correlation between announcement surprises and price movements was found in the earlier study for most of announcements examined, but was especially strong for non-farm payrolls.

Positive surprises increase the expectation of monetary tightening

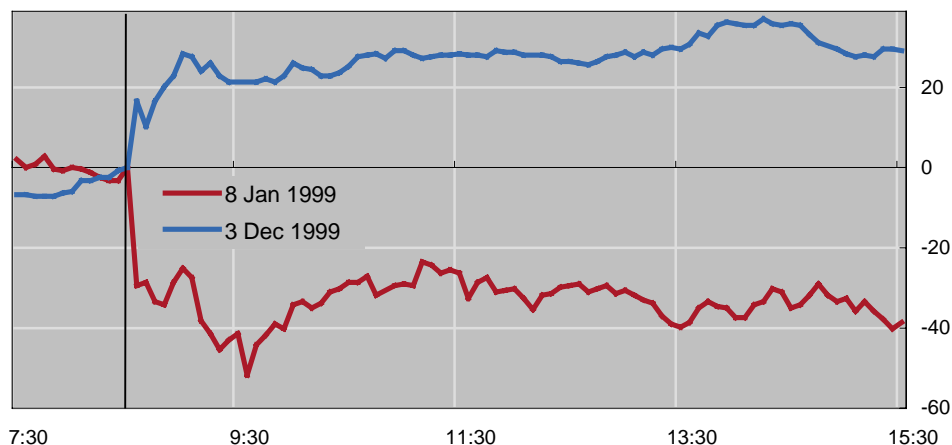
Perhaps the most significant difference between the two periods is the lack of a consistent market response in 1999 to non-farm payroll surprises. In 1993-94, a positive surprise of 100,000 in the change in the non-farm payroll number in the employment announcement was associated with a 25.11 basis point decline in the price of the five-year note. By contrast, in 1999, the response was not statistically different from zero. Since we found earlier that employment announcements during this period were in fact associated with large absolute price movements, this result indicates that the direction of the price change in response to employment surprises was no longer consistent.

The response to the employment report was no longer predictable



### The five-year note on two days with positive employment surprises<sup>1</sup>

Change in price (basis points)



<sup>1</sup> Prices quoted in five minute intervals between 7.30 am and 3.30 pm. The vertical line denotes the time of the announcement; the scales of the vertical axes represent the number of basis points difference from the price at 8.30 am. Employment surprise defined as surprise in non-farm payroll.

Sources: GovPX Inc.; BIS calculations.

Graph 3

As an illustration, one can compare the bond market reaction to the release of employment reports on different dates. On 8 January and 3 December 1999, the employment report revealed that the US economy had created 158,000 and 34,000 more non-farm jobs respectively than had been expected. Based on the results of the 1993-94 study, a fall in the Treasury note price would have been expected on both days. In the five minutes after the announcement, however, the price of the five-year note fell by 29.4 basis points on 8 January, but rose by 16.6 basis points on 3 December.

A second, less obvious difference between the two periods is the response to retail sales announcements. In the period 1993-94, while the response was negative, it was not statistically significant. In 1999, however, a 0.10% positive surprise in this announcement led to a 2.58 basis point decline in the five-year Treasury note price.

Finally, in 1993-94 and 1999, a given positive surprise in either the consumer or the producer price index led to a fall in the Treasury note price of a broadly similar magnitude. In particular, a 0.10% positive surprise in consumer prices led to a 6.48 basis point decline in the Treasury note price in 1993-94. A similarly sized surprise in 1999 led to a 9.64 basis point fall in price, although this estimate is not significantly larger than the estimate for the earlier period in a statistical sense. The results for the producer price announcement

Positive inflation surprises still caused bond prices to fall

are qualitatively similar, with a 0.10% positive surprise leading to a 3.73 basis point decline in the price in 1993-94 and a 2.97 basis point decline in 1999.<sup>25</sup>

## Do equity flows move the bond market?

In recent years, prices of US equities, especially those in the technology sector, have been particularly volatile. Volatility in equity prices has led to large swings in short-term cash flows into and out of equity markets. As the US Treasury market is a natural place to park funds, a movement of funds into or out of equities might be expected to be mirrored by a compensating change in the demand for US Treasuries. If so, in the short run at least, equity and bond prices would move in the opposite direction.

In a recent study, Fair (2001) finds no evidence for this hypothesis for the period 1993-94. In fact, he documents that stock and bond prices nearly always moved in the same direction following announcements. Specifically, of the 17 large bond price changes for which he has equity price information, Fair (2001) reports that 16 were associated with equity price movements in the same direction.

Stock and bond prices still moved in the same direction

This finding was confirmed for 1999. Each of the nine episodes examined by Fair that were associated with the four macroeconomic announcements considered in this feature led to movements in stock and bond prices in the same direction. Fair also reports eight large equity price changes in 1999 that were not associated with any event. These “unexplained” large changes in equity prices were not accompanied by swings in bond prices either. On only one of these eight occasions did the price of the five-year Treasury note change by more than 1 basis point.

## Conclusion

A comparison of the impact of announcements on Treasury market prices in 1999 with those in 1993-94 suggests that large changes in bond prices over short time periods continued to be associated with macroeconomic announcements. Further, the range of announcements leading to significant price movements seems to have increased. The announcements regarding employment, CPI, PPI and retail sales continued to give rise to sizeable increases in short-run price volatility, with positive inflation surprises inducing significant declines in bond prices. In a notable change from previous results, surprises revealed in the employment report did lead to large price changes, but the direction of the changes was unpredictable. In addition, macroeconomic surprises, in general, were smaller than in the past. Finally, stock and bond prices continued to move together following announcements.

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<sup>25</sup> These five-minute reactions are quite large considering that the median *daily* price change throughout 1999 was approximately 17 basis points.



## References

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